SOIL SURVEY

Westmoreland County Pennsylvania

OUR SOIL ★ OUR STRENGTH

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
in cooperation with
PENNSYLVANIA STATE UNIVERSITY
College of Agriculture and Agricultural Experiment Station
and
PENNSYLVANIA DEPARTMENT OF AGRICULTURE
State Soil and Water Conservation Commission
Issued November 1968

Major fieldwork for this soil survey was done in the period 1957–62. Soil names and descriptions were approved in 1965. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1965. This survey was made cooperatively by the Soil Conservation Service and the College of Agriculture and Agricultural Experiment Station of Pennsylvania State University and the Pennsylvania Department of Agriculture, State Soil and Water Conservation Commission. The survey is part of the technical assistance furnished to the Westmoreland County Soil and Water Conservation District.

HOW TO USE THIS SOIL SURVEY

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

Locating Soils

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

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

Finding and using information

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

Individual colored maps showing the relative suitability or limitation of soils for many specific purposes can be developed by using the soil map and information in the text. Interpretations not included in the text can be developed by grouping the soils according to their suitability or limitation for a particular use. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from descriptions of the soils and from the discussions of the capability 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 concerned with wildlife will find information about soils and wildlife in the section "Wildlife."

Engineers and builders will find under "Engineering Uses" tables that describe soil properties that affect engineering and show the relative suitability of the soils for specified engineering purposes.

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

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

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

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NOTICE TO LIBRARIANS

Series year and series number are no longer shown on soil surveys. See explanation on the next page.

Issued November 1968

EXPLANATION

Series Year and Series Number

Series year and number were dropped from all soil surveys sent to the printer after December 31, 1965. Many surveys, however, were then at such advanced stage of printing that is was not feasible to remove series year and number. Consequently, the last issues bearing series year and number will be as follows:

Series 1957, No 23, Las Vegas and Eldorado Valleys Area, Nev.
Series 1958, No. 34, Grand Traverse County, Mich.
Series 1959, No. 42, Judith Basin Area, Mont.
Series 1960, No. 31, Elbert County, Colo. (Eastern Part)
Series 1961, No. 42, Camden County, N.J.
Series 1962, No. 13, Chicot County, Ark.
Series 1963, No. 1, Tippah County, Miss.

Series numbers will be consecutive in each series year, up to and including the numbers shown in the foregoing list. The soil survey for Tippah County, Miss., will be the last to have a series year and series number.

SOIL SURVEY OF WESTMORELAND COUNTY, PENNSYLVANIA

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UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH PENNSYLVANIA STATE UNIVERSITY COLLEGE OF AGRICULTURE AND AGRICULTURAL EXPERIMENT STATION AND PENNSYLVANIA DEPARTMENT OF AGRICULTURE, STATE SOIL AND WATER CONSERVATION COMMISSION

WESTMORELAND COUNTY is in the southwestern part of Pennsylvania (fig. 1). The county was created by Act of Assembly and approved by Governor Richard Penn in 1773. It covers an area of 1,040 square miles and lies at the northeastern end of the soft coalfields on the Appalachian Plateau. The eastern part is in the Allegheny foothills. Ligonier Valley lies between Chestnut Ridge and Laurel Hill. Greensburg is the county seat. Ligonier, Bush Run, and Hannastown are three of the original settlements.

The first farmers chose the limy soils and the deeper soils for their first homesteads and found a favorable market for farm products. Wheat, meat, and wool were the leading products in the early days. Dairy products are the leading products today. The presence of coal encouraged the development of a large iron and steel industry.

How This Soil Survey Was Made

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

They went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by roots.

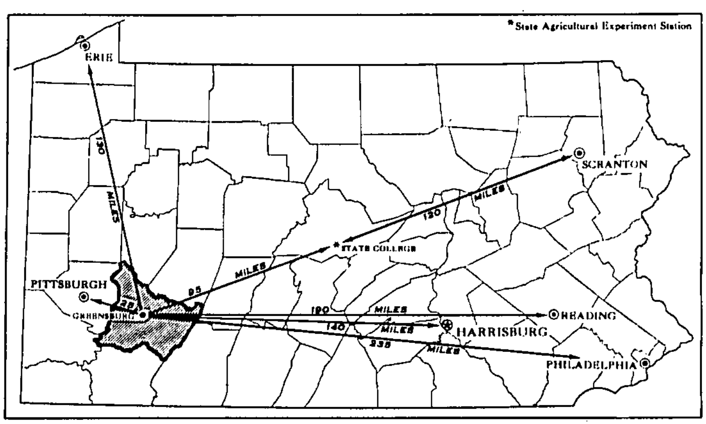

Figure 1.—Location of Westmoreland County in Pennsylvania.

The soil scientists made comparisons among the profiles they studied and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. To use this report efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, the major horizons of all the soils of one series are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Cavode and Westmoreland, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the natural, undisturbed landscape. Soils of one series can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

Many soil series contain soils that differ in the texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Cavode silt loam, for example, is a soil type in the Cavode series.

Some soil types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into soil phases. The name of a soil phase indicates a feature that affects management. For example, Cavode silt loam, 3 to 8 percent slopes, is one of several phases of Cavode silt loam, a soil type that has a slope range of 3 to 25 percent.

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

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

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed or occur in such small individual tracts that it is not practical to show them separately on the map. They show this mixture of soils as one mapping unit and call it a soil complex. Ordinarily a soil complex is named for the major kinds of soils in it, for example, Upshur-Gilpin silty clay loams.

Most surveys include areas where the soil material is so rocky, so shallow, or so frequently worked by wind and water that it cannot be classified by soil series. These areas are shown on the map like other mapping units, but are given descriptive names, such as Gullied land or Made land, and are called land types.

Another kind of mapping unit is the undifferentiated group, which consists of two or more soils that may occur together without regularity in pattern or relative proportion. The individual tracts of the component soils could be shown separately on the map, but the differences between the soils are so slight that the separation is not important for the objectives of the soil survey. An example is Burgin and Burgin gray surface variant, silt loams.

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

But only part of the soil survey is done when the soils have been named, described, and delineated on the map and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way that it is readily useful to different groups of users, among them farmers, foresters, and engineers. Grouping soils that are similiar in suitability for each specified use is the method of organization most commonly used in soil surveys. The soil scientists set up trial groups based on yield and practice tables and other data. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others; then they adjust the groups according to the results of their studies and consultations. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

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

The seven associations in Westmoreland County are described in the paragraphs that follow.

1. *Westmoreland-Guernsey-Clarksburg association*

Deep and moderately deep, well-drained to somewhat poorly drained soils over interbedded sandstone, shale, and limestone

This association consists chiefly of rounded hills that have long, smooth, convex slopes, and of nearly level to gently sloping benches and fans. It is mainly in the west-central part of the county and is at elevations above the Pittsburgh coal seam.

About 50 percent of the association consists of moderately deep to deep, well-drained Westmoreland soils, which are gently sloping to steep. About 30 percent consists of moderately well drained to somewhat poorly drained Guernsey soils. These soils are nearly level to moderately steep and occur on the lower parts of slopes, below Westmoreland soils. About 15 percent of the association consists of moderately well drained to somewhat poorly drained Clarksburg soils. These soils are nearly level to sloping. They are in drainageways and on benches and fans along streams. The rest of the association consists of Brooke and other soils. This association occupies about 9 percent of the county.

The topography and the high natural fertility of the soils make this association well suited to farming. Moderate limitations affecting farming and moderate to severe limitations affecting residential and industrial development are the seasonal high water table of some soils, the moderate depth to bedrock of some, and the instability of others. Limitations affecting onlot disposal of septic-tank effluent are generally severe. In areas where coal has been removed, the level of the water table may have changed, and depressions are likely to form.

2. *Gilpin-Wharton-Cavode association*

Deep and moderately deep, well-drained to somewhat poorly drained soils over acid, gray shale and siltstone

This association is steep and hilly. It is generally at elevations below the Pittsburgh coal seam. About 40 percent of the association consists of moderately deep, well-drained Gilpin soils, which are gently sloping to very steep. About 30 percent of the association consists of moderately well drained Wharton soils. These soils are sloping to moderately steep and occur on benches and drainage divides on the lower parts of rounded hills. About 20 percent consists of somewhat poorly drained Cavode soils, which are nearly level to moderately steep. The rest of the association consists of Ernest soils and other soils that occur on benches and fans along drainageways. This association occupies 53 percent of the county.

About half of this association is in farm woodlots. The rest is in cultivated crops. The soils are lower in natural fertility than those in association 1. Moderate to severe limitations affecting farming and residential and industrial development are the moderate depth to bedrock and the steep slopes of some of the soils, and the seasonally high water table of others. Soil limitations affecting onlot disposal of septic-tank effluent are severe on much of the association.

3. *Gilpin-Dekalb-Cavode association*

Deep and moderately deep, well-drained to somewhat poorly drained soils on ridges; underlain by acid, gray shale and sandstone

This association occurs mainly on Chestnut Ridge and Laurel Hill in the eastern part of the county, at elevations below the Freeport coal seam. About 50 percent of the association consists of moderately deep, well-drained Gilpin soils. These soils occur as rough, irregularly benched slopes that range from gently sloping to very steep. About 30 percent of the association consists of moderately deep to deep, well-drained Dekalb soils. These soils occur as gentle to very steep, long smooth slopes. They are underlain by light-colored sandstone. Many areas are hilly and very stony. About 15 percent of the association consists of somewhat poorly drained Cavode soils. These soils are nearly level to moderately steep and for the most part are stony. The rest of the association consists of Ernest and other soils and a few small areas of Mucky peat. This association occupies about 14 percent of the county.

Most of this association is woodland and is used by private and State agencies for wildlife propagation or timber production. Part of it has been cultivated. The major limitations affecting farming are the stoniness and droughtiness of some soils and the seasonal high water table of others. The less sloping parts of the association, particularly where the soils are deeper, are fairly well suited to residential and industrial development.

4. *Calvin association*

Moderately deep, well-drained, red soils on ridges

This association occurs in the eastern part of the county, on the uppermost parts of Chestnut Ridge and Laurel Hill. About 90 percent of the association consists of moderately deep, well-drained, red, shaly Calvin soils. These soils are gently sloping to steep. They are moderate in natural fertility but tend to be droughty. The rest of the association consists of small areas of Ernest and other soils. These soils are nearly level to moderately steep and occur on benches and fans along drainageways. This association occupies about 2 percent of the county.

Most of this association is woodland. The less sloping parts are fairly well suited to farming, but only a small part is farmed. The major limitations affecting residential and industrial development are the moderate depth and steep slopes of many of the soils.

5. *Weikert association*

Shallow, well-drained, rocky soils on escarpments along streams

This association occurs as escarpments cut by Loyalhanna Creek and the Kiskiminetas, Conemaugh, Allegheny, Youghiogheny, and Monongahela Rivers. The largest areas occur where the streams have cut across Chestnut Ridge and Laurel Hill. Most of the geologic formations in the county are exposed in these cuts. The rocks include sandstone, shale, siltstone, and limestone. This association consists chiefly of Weikert soils, which vary considerably in depth within short distances, and includes small areas of Ernest soils. It occupies about 2 percent of the county.

This association is wooded in most areas where the soils are deep enough to support trees. The slopes are generally too steep for farming or for residential and industrial development. Shallowness to bedrock and rockiness are limitations for all uses except recreation and watershed protection.

6. *Philo-Monongahela-Atkins association*

Deep, moderately well drained to poorly drained soils on terraces and flood plains

This association occurs along the larger streams of the county. About 45 percent of it consists of deep, moderately well drained Philo soils. These soils are frequently flooded. About 30 percent of the association consists of deep, moderately well drained Monongahela soils. These soils are level to sloping. They have a fragipan. About 20 percent of the association consists of deep, poorly drained Atkins soils. These soils are level and nearly level and, like Philo soils, are frequently flooded. The remaining 5 percent consists of small areas of Tygart and Purdy soils. This association occupies about 15 percent of the county.

Approximately two-thirds of the association is woodland. The rest is pasture or cropland. If drained, limed, and fertilized, these soils are fairly well suited to farming. Frequent flooding and a seasonal high water table are limitations that affect residential and industrial development and the disposal of septic-tank effluent.

7. *Upshur-Gilpin-Clarksburg association*

Deep and moderately deep, well drained and moderately well drained soils over red and brown clay shale, siltstone, and sandstone

This association is gently sloping to steep and occurs in the northwestern part of the county. The steeper and the more dissected slopes are near the larger streams. About 40 percent of this association consists of nearly level to sloping, moderately deep to deep, well-drained, reddish Upshur soils. About 40 percent consists of moderately deep, well-drained Gilpin soils, and about 20 percent consists of moderately well drained to somewhat poorly drained Clarksburg soils. This association occupies about 5 percent of the county.

About three-fourths of this association is woodland. The rest is cropland or pasture. The soils are moderately low in natural fertility. Limitations affecting residential and industrial development are the instability and slow permeability of some soils, the moderate depth of some, and the seasonal high water table of others.

Use and Management of the Soils

This section describes the major uses of the soils in Westmoreland County and the limitations and management needs of the soils for each of these uses. It explains how the soils can be used for farming and discusses their suitability for use as woodland. It rates the soils according to their capacity to support specified game species and gives general suggestions for the improvement of wildlife habitat. This section also reports data from engineering tests and interpretations of soil properties that affect highway construction and gives information about uses of the soils for community development.

Farming

In the following pages the capability classification used by the Soil Conservation Service is explained; the capability units, in which the soils are grouped according to their suitability for crops, are described; and productivity ratings are given for specified crops under two levels of management.

Capability groups

Capability classification is the grouping of soils to show, in a general way, their suitability for most kinds of farming. It is a practical classification based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment. The soils are classified according to degree and kind of permanent limitation, but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soils; and without consideration of possible but unlikely major reclamation projects.

In the capability system, all kinds of soils are grouped at three levels: the capability class, the subclass, and the units. 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 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 restrict the choice of plants, require very careful management, or both.

Class V. Soils are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife food and cover.

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 food and cover.

Class VII. Soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife.

Class VIII. Soils and landforms have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes.

Management by capability units

The capability units are described in the following pages. The soils in one capability unit have about the same limitations and similar risks of damage. All of the soils in one unit, therefore, need about the same kind of management, even though they formed in different ways and from different kinds of parent material.

Suitable cropping systems are described for each capability unit in terms of *high, medium, low,* and *very low* intensity rotations.

1. A high-intensity rotation is defined as a 4-year rotation that consists of 1 year of a row crop followed by a cover crop, another row crop, small grain, and 1 year of hay or pasture.
2. A medium-intensity rotation is defined as a 3-year rotation that consists of 1 year each of a row crop, small grain, and hay.
3. A low-intensity rotation is defined as a 4- or 5-year rotation that consists of 1 year of a row crop, 1 year of a small grain, and 2 or 3 years of hay.
4. A very low intensity rotation is defined as a rotation of 5 or more years and consists of 1 year of a row crop, 1 year of a small grain, and then 3 or more years of hay.

CAPABILITY UNIT I-1

This unit consists of Sequatchie silt loam, 0 to 5 percent slopes. This is a deep, well-drained soil on low terraces. It is generally adjacent to streams but is seldom flooded. Only occasionally is a crop flooded out. Natural fertility is high. Permeability is moderate, and the available water capacity is high.

This soil warms up quickly in spring. It is suited to corn and other general farm crops and to truck crops and pasture grasses. Because of the slight hazard of flood damage, a cover of vegetation should be maintained in winter and spring. Minimum tillage is advisable. This soil is suitable for irrigation and in most places is near a source of water.

CAPABILITY UNIT IIe-1

This unit consists of deep, gently sloping, moderately well drained to somewhat poorly drained silt loams. These soils were derived from calcareous parent material. They generally occupy depressions and concave slopes. Their root zone is limited by a slowly permeable or moderately slowly permeable layer that begins at a depth between 26 and 36 inches. Permeability is moderate above this layer. The available moisture capacity is moderate. Natural fertility is high.

These soils are suited to general farm crops and pasture grasses. Crops can be grown in a medium-intensity rotation. Alfalfa tends to winterkill because of frost heaving. Liberal use of lime and fertilizer reduces this tendency. Graded strips, diversions, and sod waterways help to control runoff.

CAPABILITY UNIT IIe-3

This unit consists of moderately deep to deep, gently sloping, well-drained soils on uplands. These soils were derived from acid parent material. Their surface layer is silt loam that in places is modified by fragments of siltstone and sandstone. Permeability is moderately rapid, and the available moisture capacity is low to moderate. Natural fertility is moderate to low.

These soils are suited to alfalfa. They are suited to deep-rooted crops, including fruits and vegetables, if they are protected from erosion and if air drainage is favorable. Crops can be grown in a medium-intensity rotation. Stripcropping, contour cultivation, sod waterways, and diversions help to control runoff. These soils are suitable for irrigation.

CAPABILITY UNIT IIe-4

This unit consists of moderately deep to deep, gently sloping, moderately well drained silt loams that were derived from calcareous parent material. These soils occupy convex slopes on uplands. Permeability is moderately slow, and the available moisture capacity is moderate. Natural fertility is high.

These soils are suited to deep-rooted crops. They are excellent for alfalfa and corn. Crops can be grown in a medium-intensity rotation. Stripcropping, contour cultivation, sod waterways, and diversions help to control runoff. These soils are suitable for irrigation.

CAPABILITY UNIT IIw-1

This unit consists of Monongahela silt loam, 0 to 3 percent slopes. This is a deep, moderately well drained soil that was derived from acid parent material. It is on stream terraces. In depressions it is covered with water during wet periods. The root zone is limited by a fragipan that generally begins at a depth of 28 inches. Permeability is moderate above the pan and moderately slow in the pan. The available moisture capacity is moderate. Natural fertility is moderate.

This soil is suited to general farm crops and pasture grasses, but most legumes and winter grains tend to winterkill because of excess water. Natural drainageways should be kept open, and outlets should be provided for water in depressions. Runoff from adjacent higher lying areas should be diverted.

CAPABILITY UNIT IIw-2

This unit consists of deep, nearly level, moderately well drained silt loams on bottom lands. These soils are flooded occasionally. In depressions they are covered with water during wet periods. The root zone is limited by a seasonal high water table that generally is at a depth between 18 and 26 inches. Permeability is moderate or moderately slow. The available moisture capacity is high. Natural fertility is high.

These soils warm up slowly in spring. They are suitable for most general farm crops. Alfalfa tends to winterkill because of wetness. Occasionally, a crop is flooded out. Natural drainageways and floodways should be kept open, and outlets should be provided for water in depressions. Runoff from adjacent higher lying areas should be diverted. Tile drainage is effective if outlets are available.

CAPABILITY UNIT IIIe-1

This unit consists of moderately deep or deep, gently sloping, well-drained and moderately well drained silt loams and silty clay loams on uplands. The Gilpin soil was derived from acid parent material, and the rest of the soils from calcareous parent material. These soils occupy ridgetops, drainage divides, and bench terraces. Permeability is slow and moderately slow in Upshur and Brooke soils and moderately rapid in Gilpin soils. The available moisture capacity is moderate. Natural fertility is high. Erosion is the major hazard.

These soils are suited to general farm crops and pasture grasses. They are excellent for alfalfa. A low-intensity rotation is advisable. Contour strips, sod waterways, diversions, and cover crops help to control erosion.

CAPABILITY UNIT IIIe-2

This unit consists of Cavode silt loam, 8 to 15 percent slopes, moderately eroded. This is a deep, somewhat poorly drained soil that was derived from acid parent material. It generally occupies concave slopes on uplands. Its root zone is limited by a slowly permeable layer that begins at a depth between 15 and 18 inches. Permeability is moderately slow above this layer. The available moisture capacity is moderate to high. Natural fertility is low. Erosion is the major hazard.

This soil warms up slowly in spring. It tends to be droughty during dry periods. It is used for general farm crops and pasture grasses, but most legumes and winter grains tend to winterkill because of seasonal wetness. A low-intensity rotation is advisable. Natural drainageways should be kept open. Contour tillage, graded strips, sod waterways, and diversions help to control runoff.

CAPABILITY UNIT IIIe-3

This unit consists of deep, moderately sloping, moderately well drained to somewhat poorly drained silt loams that were derived from limy parent material. These soils generally occupy concave slopes. Their root zone is limited by a slowly permeable clayey layer that generally begins at a depth between 26 and 36 inches. Permeability is moderate above this layer. The available moisture capacity is moderate. Natural fertility is high. Erosion is the major hazard.

These soils are suitable for general farm crops and pasture grasses. Alfalfa tends to be short lived because of wetness. A low-intensity rotation is advisable. Graded strips, sod waterways, and diversions help to control runoff.

CAPABILITY UNIT IIIe-4

This unit consists of deep, sloping, moderately well drained silt loams derived from acid parent material. The Monongahela soils are on stream terraces; the Wharton and Ernest soils are on concave upland benches. The root zone is limited by a moderately slowly or slowly permeable layer that generally begins at a depth of 20 to 36 inches. The available moisture capacity is moderate to high. Natural fertility is moderate. Erosion is the major hazard.

These soils are suitable for general farm crops and pasture grasses. Alfalfa tends to be short lived. A low-intensity rotation is advisable. Cover crops, green manure crops, graded strips, sod waterways, and diversions help to control erosion.

CAPABILITY UNIT IIIe-5

This unit consists of moderately deep to deep, sloping, well-drained soils. Upshur soils were derived from limy parent material, and the rest from acid parent material. These soils occupy irregularly benched slopes on uplands. They have a surface layer of loam to silty clay loam, and some contain fragments of siltstone and sandstone. Permeability is moderately rapid, and the available moisture capacity is low to moderate. Natural fertility is moderate to low. Erosion is the major hazard.

Calvin and Dekalb soils warm up quickly in spring. All the soils in this unit are suited to alfalfa and other general farm crops and to pasture grasses. They are also suited to tree fruits if air drainage is favorable. A low-intensity rotation is advisable. Contour strips, graded strips, sod waterways, and diversions help to control erosion.

CAPABILITY UNIT IIIe-6

This unit consists of shallow to deep, gently sloping and sloping, well-drained soils. These soils occupy convex slopes on uplands. They have a surface layer of silt loam, and some contain shale chips. Permeability is moderately slow to moderately rapid, and the available moisture capacity is moderate to low. Natural fertility is moderate to low. Erosion is the major hazard.

These soils are suitable for general farm crops and pasture grasses. The shaly soils are droughty. A low-intensity rotation is advisable. Contour strips, sod waterways, and diversions help to control erosion.

CAPABILITY UNIT IIIw-1

This unit consists of Tygart silt loam, 0 to 3 percent slopes. This is a deep, somewhat poorly drained soil that was derived from acid parent material. It occurs in depressions on river terraces and is generally covered with water during wet periods. Its root zone is limited by a slowly permeable clayey layer that generally begins at a depth between 8 and 12 inches. Permeability is moderate above this layer. The available moisture capacity is high, but the soil tends to be droughty during dry periods in the growing season. Natural fertility is moderate to low.

This soil warms up slowly in spring. Because of poor surface drainage and somewhat poor internal drainage, it is better suited to spring grains and grasses than to row crops, winter grains, and legumes, most of which tend to winterkill. Varieties that tolerate wetness should be chosen. Natural drainageways should be kept open, and outlets should be provided for water in depressions. Runoff from adjacent higher lying areas should be diverted. Tile drainage is rarely satisfactory.

CAPABILITY UNIT IIIw-2

This unit consists of deep, nearly level, poorly drained silt loams on bottom land. These soils are frequently flooded. In depressions they are covered with water for several days during and following wet periods. Their root zone is limited by a seasonal high water table that is generally at a depth between 6 and 12 inches. Permeability is moderate above the water table. The available moisture capacity is high. Natural fertility is high.

These soils warm up slowly in spring. Because of poor surface drainage and poor internal drainage, they are better suited to perennial hay, pasture, and woodland than to cultivated crops. If adequately drained, they can be used for a rotation that includes row crops. Occasionally, a crop is flooded out. Natural drainageways and floodways should be kept open, and outlets should be provided for water in depressions. Runoff from adjacent higher lying areas should be diverted. Tile drainage is effective if outlets are available.

CAPABILITY UNIT IIIw-3

This unit consists of deep, gently sloping, somewhat poorly drained silt loams that were derived from acid parent material. These soils occur on concave slopes on uplands. Their root zone is limited by a slowly permeable subsoil. Permeability is slow above this layer. The available moisture capacity is moderate to high. Natural fertility is low.

These soils warm up slowly in spring and tend to be droughty during dry periods of the growing season. They are used for general farm crops and pasture grasses. Most legumes and winter grains tend to winterkill. Natural drainageways should be kept open. Graded strips, sod waterways, and diversions help to control runoff. Tile drainage is generally unsatisfactory because of the slowly permeable subsoil.

CAPABILITY UNIT IIIw-4

This unit consists of deep, level to nearly level, poorly drained silt loams. These soils generally occupy concave slopes and depressions. In depressions they are covered with water during wet periods. Their root zone is limited by a layer of slowly permeable silty clay loam that generally begins at a depth between 8 and 28 inches. Permeability is moderate above this layer. The available moisture capacity is high. Natural fertility is high.

These soils warm up slowly in spring. They are suitable for general farm crops. Alfalfa tends to winterkill. Natural drainageways should be kept open, and outlets should be provided for water in depressions. Runoff from adjacent higher areas should be diverted. Tile drainage is not generally effective, because of the clay layer.

CAPABILITY UNIT IVe-1

This unit consists of moderately deep to deep, sloping to moderately steep, well-drained silty clay loams, most of which were derived from calcareous parent material. These soils occupy ridgetops, drainage divides, and bench terraces on uplands. Permeability is moderately slow to slow, and the available moisture capacity is moderate. Natural fertility is high. Erosion is the major hazard.

These soils are suitable for perennial hay and are excellent for alfalfa. They should be used only occasionally for cultivated crops. In fact, they should be plowed only when the hayfields need to be reseeded. Growing a cultivated crop the year before reseeding helps to control weeds. Diverting runoff to grassed waterways helps to control gully erosion. Some gullies have to be filled in before farm machinery can be used.

CAPABILITY UNIT IVe-2

This unit consists of deep, sloping to moderately steep, moderately well drained silt loams that were derived from acid parent material. These soils generally occupy concave slopes on uplands. Most of the acreage is eroded. The root zone is limited by a slowly permeable subsoil. Permeability is moderate above this layer. The available moisture capacity is moderate to high. Natural fertility is moderate to low.

These soils tend to be droughty during dry periods of the growing season. Because of past erosion and the hazard of further erosion, they are better suited to perennial hay, pasture, and woodland than to cultivated crops. An occasional cultivated crop can be grown. Crops and trees that tolerate wetness should be chosen. Diversions and grassed waterways help to control runoff.

CAPABILITY UNIT IVe-3

This unit consists of deep, sloping and moderately steep, moderately well drained silt loams that were derived from calcareous parent material. These soils generally occupy concave slopes. All are eroded, some severely. The root zone is limited by a moderately slowly permeable subsoil. Permeability is moderate above this layer. The available moisture capacity is moderate. Natural fertility is high.

Because of past erosion and the risk of further erosion, these soils are better suited to perennial hay and pasture than to cultivated crops. Varieties that tolerate wetness should be chosen. An occasional cultivated crop can be grown. Diversions and waterways help to control runoff.

CAPABILITY UNIT IVe-4

This unit consists of moderately deep and shallow, moderately sloping to moderately steep, well-drained soils that were derived from acid parent material. These soils generally occupy irregularly benched slopes on uplands. They have a surface layer of silt loam, and some contain shale chips or fragments of siltstone and sandstone. Permeability is moderately rapid, and the available moisture capacity is low to moderate. Natural fertility is low.

Because of past erosion and the risk of further erosion, these soils are better suited to perennial hay or woodland than to cultivated crops. An occasional cultivated crop can be grown as part of a very low intensity rotation, if the field is stripcropped on the contour and runoff is diverted to grassed waterways. South-facing slopes tend to be droughty. Yields of shallow-rooted pasture grasses are low during dry periods. Diversions and sod waterways help to control erosion.

CAPABILITY UNIT IVe-5

This unit consists of moderately deep to deep, sloping to steep, well-drained soils that were derived from calcareous parent material. These soils occupy convex slopes on uplands. They are all eroded, some severely. They have a surface layer of silt loam, and some contain shale chips. Permeability is moderately slow, and the available moisture capacity is low. Natural fertility is moderate.

Because of past erosion and the risk of further erosion, these soils are better suited to perennial hay and pasture than to cultivated crops. They are well suited to alfalfa. An occasional cultivated crop can be grown. Yields of shallow-rooted pasture grasses are low during dry periods. Contour strips, sod waterways, and diversions help to control erosion.

CAPABILITY UNIT IVw-1

This unit consists of deep, nearly level, poorly drained silt loams that were derived from acid parent material. Brinkerton soils occupy seep spots and depressions on uplands, and Purdy soils occupy depressions on river terraces. These soils are covered with water during wet periods. Their root zone is limited by a slowly permeable fragipan and a high water table. Permeability is moderate above the pan. The available moisture capacity is moderate. Natural fertility is moderate to high.

These soils warm up slowly in spring. Because of very poor surface drainage, they are better suited to perennial hay, pasture, and woodland than to cultivated crops. If they are adequately drained, a cultivated crop can be grown as part of a very low intensity rotation. Crops and trees that tolerate ponding should be chosen. Natural drainageways should be kept open, and outlets should be provided for water in depressions. Runoff from higher lying areas should be diverted.

CAPABILITY UNIT IVw-2

This unit consists of Brinkerton silt loam, 3 to 8 percent slopes, moderately eroded. This is a deep, gently sloping, poorly drained soil that was derived from acid parent material. It generally occurs on foot slopes and in depressions. Its root zone is limited by a slowly permeable fragipan and a seasonal high water table. Permeability is moderate above the pan. The available moisture capacity is moderate. Natural fertility is moderate.

This soil warms up slowly in spring. Because of poor drainage, it is better suited to perennial hay, pasture, and woodland than to cultivated crops. If adequately drained, it can be used for a rotation that includes a row crop. Crops and trees that tolerate wetness should be chosen. Natural drainageways should be kept open. Runoff from higher lying areas should be diverted.

CAPABILITY UNIT IVs-1

One land type, Made land, 0 to 8 percent slopes, makes up this unit. It consists of areas that have been filled with soil material taken during grading operations from airport, highway, building, or other construction sites, and of spoil piles from rock quarries. The surface layer of this land type is generally silt loam. In many places it contains numerous stones and boulders. Permeability is moderate to slow, and the available moisture capacity is moderate to low. The depth to bedrock, the internal drainage, and the chemical properties all vary, and the soil material contains varying numbers of stones and boulders.

This land type is better suited to grass sod and perennial hay than to cultivated crops. Generally it is suited to alfalfa. Yields of shallow-rooted plants are likely to be low during prolonged dry periods because of a shortage of available moisture. Tillage and seeding should be on the contour. Drought-tolerant varieties of grass should be chosen. Tillage should be kept to a minimum.

CAPABILITY UNIT VIe-1

This unit consists of Wharton silt loam, 15 to 25 percent slopes, severely eroded. This is a deep, moderately steep, moderately well drained soil that was derived from acid parent material. It generally occupies concave slopes on uplands. Its root zone is limited by a slowly permeable subsoil. Permeability is moderate above this layer. The available moisture capacity is moderate to high. Natural fertility is moderate to low.

This soil tends to be droughty in dry periods during the growing season. Because of past erosion and the risk of further erosion, it is not suited to cultivated crops. It is suited to pasture or woodland. Grasses and trees that tolerate both wetness and droughtiness should be chosen. Diversions and waterways help to control runoff.

CAPABILITY UNIT VIe-2

This unit consists of shallow to deep, moderately steep and very steep, well-drained soils on uplands. The surface layer of these soils is silt loam to silty clay loam that in places contains many fragments of siltstone and sandstone. Westmoreland soils generally are on convex slopes, and the rest on irregularly benched slopes. These soils are eroded; some are severely eroded. Permeability is moderately slow to moderately rapid, and the available moisture capacity is moderate to low. Natural fertility is moderate to low.

Because of past erosion and the risk of further erosion, these soils are not suited to cultivated crops. They are suited to pasture or woodland. South-facing slopes tend to be droughty. Yields of shallow-rooted pasture grasses are likely to be low during dry periods. Drought-tolerant grasses or trees should be chosen. Diversions and waterways help to control erosion.

CAPABILITY UNIT VIe-3

This unit consists of Guernsey silt loam, 15 to 25 percent slopes, severely eroded. This is a deep, moderately steep, moderately well drained soil that was derived from calcareous parent material. It generally occupies concave slopes. Its root zone is limited by a slowly permeable clayey layer. Permeability is moderate above this layer. The available moisture capacity is moderate. Natural fertility is high.

Because of past erosion and the risk of further erosion, this soil is not suited to cultivated crops. It is suited to pasture and woodland. Grasses and trees that tolerate wetness should be chosen. Diversions and waterways help to control runoff.

CAPABILITY UNIT VIs-1

This unit consists of nearly level to moderately steep, moderately well drained and somewhat poorly drained silt loams that were derived from acid parent material. These soils generally occupy concave slopes on uplands. There are numerous sandstone boulders on the surface and throughout the profile. The root zone is limited by a slowly or moderately slowly permeable layer. Permeability is moderate above this layer. The available moisture capacity is moderate to high. Natural fertility is moderate.

These soils warm up slowly in spring. They are well suited to pasture and woodland. Grasses and trees that tolerate wetness should be favored. The boulders make it impractical to grow cultivated crops. Erosion is a hazard during logging operations.

CAPABILITY UNIT VIs-2

This unit consists of nearly level to steep, well-drained soils that were derived from acid parent material. For the most part, these soils are moderately deep. They generally occupy irregularly benched slopes on uplands. Their surface layer is silt loam or loam. There are numerous sandstone boulders on the surface and throughout the profile. Permeability is moderately rapid, and the available moisture capacity is slow to moderate. Natural fertility is low.

These soils are suited to woodland or pasture. Drought-tolerant trees and grasses should be favored. The boulders make it impractical to grow cultivated crops.

CAPABILITY UNIT VIIe-1

Gullied land makes up this unit. It occurs in areas where vegetation has been destroyed by toxic fumes from smelters and coal fires. The soil material ranges from very shallow to moderately deep, from neutral to very acid, and from well drained to poorly drained. Between the gullies there is an erosion pavement made up of siltstone and sandstone fragments. Permeability is slow, and the available moisture capacity is low.

Gullied land is very droughty. If possible, permanent vegetation should be established. Varieties that tolerate droughtiness as well as smoke and fumes should be chosen. Runoff from the gullies should be diverted to waterways.

CAPABILITY UNIT VIIw-1

This unit consists of a level to nearly level, very poorly drained soil that has a thick organic layer over mineral soil material. This soil occupies depressions on Laurel Hill. Except in summer, the water table is at the surface. The total acreage, as well as the acreage of individual areas, is small.

This soil can be used as a source of organic material. It has not been cleared. If artificially drained, Mucky peat is suitable for vegetable crops. If too much water is drained off, the surface layer shrinks and the soil material sinks. It is advisable to study each individual area to determine whether reclamation is practical.

CAPABILITY UNIT VIIs-1

This unit consists of moderately deep, very steep, well-drained soils that were derived from acid parent material. These soils generally occupy very steep, irregular slopes on uplands. Their surface layer is silt loam to loam. There are numerous sandstone boulders on the surface and throughout the profile. Permeability is moderate to moderately rapid, and the available moisture capacity is moderate to low. Natural fertility is low.

These soils are suited to woodland. They are limited for pasture and, because of the boulders, are not suitable for cultivated crops. Harvesting saw logs is difficult on these very steep slopes. A vigorous stand of trees helps to control erosion.

CAPABILITY UNIT VIIs-2

This unit consists of shallow, very steep, droughty soils that were derived from acid parent material. These soils generally occupy smooth, exposed slopes adjacent to the larger streams. They are either covered with sandstone boulders or are shallow over bedrock. The available moisture capacity is low. Natural fertility is low.

These soils should be kept wooded, even though trees grow slowly. A vigorous stand helps to control erosion. Drought-tolerant species should be favored. It is difficult to remove saw logs from the steeper sites.

CAPABILITY UNIT VIIs-3

This unit consists of disturbed soil material, overburden that has been stripped from coal seams to allow open pit mining of coal, soil that has been excavated during construction operations, and overburden from stone quarries. Trenches on the landscape, left from coal stripping operations, form natural diversion ditches. The gradient ranges from gently undulating to very steep. All of this material varies in depth to bedrock and in internal drainage. The surface layer is generally silt loam that contains varying numbers of fragments and cobblestones of sandstone, siltstone, shale, and limestone. There are numerous stones and boulders. Permeability ranges from moderate to slow, and the available moisture capacity is low. Natural fertility is low to moderate.

This soil material is suited to trees and shrubs. Drought-tolerant species should be selected for planting. South-facing slopes are droughty. A vigorous stand of trees helps to control erosion.

CAPABILITY UNIT VIIIs-1

Mine dump and Mine wash make up this unit. Mine dumps are piles of low-grade coal and shale that have been separated from the commercial coal. Near mine openings there are cone-shaped piles more than 100 feet high. Frequently, these dumps catch fire and burn slowly for months, or even years. The burned material (slag) is used for capping unpaved roads. Mine wash consists of areas that are frequently flooded by drainage water from coal mines. This water is high in sulfur and iron compounds and kills most of the vegetation.

These land types are incapable of supporting vegetation of economic value. Native vegetation should be encouraged, and coniferous trees can be planted to form a protective cover and screen the areas from view. Leveling would make some areas more favorable as planting sites.

Productivity ratings

Table 1 shows estimated productivity ratings of the soils in the county under two levels of management. The ratings are averages for a period of at least 10 years. No rating is given if the soil is unsuitable for the crop specified.

The ratings in columns A indicate the estimated productivity of the soils under management that is common on many farms in the county. Those in columns B indicate the estimated productivity under improved management, which includes such practices as using adapted crop varieties; applying fertilizer in amounts indicated by soil tests; controlling insects and plant diseases; managing crop residue; stripcropping; tilling on the contour; and draining excess water. Irrigation is not considered in arriving at these ratings. The ratings shown in columns B are not intended to represent the maximum yields obtainable, but they represent an increase of about 20 percent over present yields in the county.

Each rating denotes the productivity of a soil for a particular crop in relation to a standard index of 100. The standard index represents the average acre yield of the most productive soils in the county under normal management. The standard index is shown at the head of each column. The ratings are based on the yields obtained in favorable growing seasons while the soil survey was in progress.

TABLE 1.—*Estimated productivity ratings of soils for specified crops under two levels of management*

[The ratings in columns A indicate productivity under common management; those in columns B indicate productivity under improved management. Where no rating is given, the soil is considered unsuitable for the specified crop]

Map symbol	Soil	Corn (100=75 bushels of grain per acre or 15 tons of silage)		Oats (100=60 bushels per acre)		Wheat (100=30 bushels per acre)		Hay: Alfalfa-grass mixture (100=3 tons per acre)		Hay: Grass-legume mixture (100=3 tons per acre)		Pasture: Bluegrass (100=100 cow-acre-days) [1]		Pasture: Tall grass (100=100 cow-acre-days) [1]	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B
At	Atkins silt loam	65	95	65	85	50	85	-----	-----	65	90	75	120	100	155
BkA	Brinkerton silt loam, 0 to 3 percent slopes	65	80	65	90	50	65	-----	-----	50	70	55	95	75	120
BkB2	Brinkerton silt loam, 3 to 8 percent slopes, moderately eroded	80	100	75	100	75	90	50	85	55	75	60	100	80	140
BrB2	Brooke silty clay loam, 3 to 8 percent slopes, moderately eroded	95	160	85	110	100	120	100	165	100	150	100	140	150	205
BrC2	Brooke silty clay loam, 8 to 15 percent slopes, moderately eroded	85	155	85	100	95	115	95	160	95	145	95	135	145	195
Bu	Burgin and Burgin gray surface variant, silt loams	80	100	60	85	75	90	-----	-----	60	100	65	110	90	160
CaB2	Calvin silt loam, neutral substratum, 5 to 12 percent slopes, moderately eroded	80	100	75	90	65	85	85	125	70	105	75	135	125	195
CaC2	Calvin silt loam, neutral substratum, 12 to 20 percent slopes, moderately eroded	65	90	65	85	60	75	75	115	60	100	65	130	110	190
CaD2	Calvin silt loam, neutral substratum, 20 to 30 percent slopes, moderately eroded	55	65	60	75	50	65	65	100	55	90	60	120	100	170
ClB	Calvin very stony silt loam, neutral substratum, 0 to 12 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	65	85	-----	-----
ClD	Calvin very stony silt loam, neutral substratum, 12 to 30 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	50	80	-----	-----
ClE	Calvin very stony silt loam, neutral substratum, 30 to 50 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	40	55	-----	-----
CnB	Cavode silt loam, 3 to 8 percent slopes	65	105	65	85	65	85	-----	-----	60	85	60	110	85	140
CnC2	Cavode silt loam, 8 to 15 percent slopes, moderately eroded	65	100	70	85	60	65	-----	-----	60	85	65	110	85	145
CoB	Cavode very stony silt loam, 0 to 8 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	45	80	-----	-----
CoD	Cavode very stony silt loam, 8 to 25 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	50	90	-----	-----
CuB2	Clarksburg silt loam, 3 to 8 percent slopes, moderately eroded	100	135	100	135	90	135	80	125	90	125	100	145	135	215
CuC2	Clarksburg silt loam, 8 to 15 percent slopes, moderately eroded	95	120	90	125	85	100	75	120	80	115	90	135	120	205
DaB	Dekalb channery loam, 5 to 12 percent slopes	80	100	65	85	65	85	80	120	65	100	75	130	120	195

See footnote at end of table.

TABLE 1.—*Estimated productivity ratings of soils for specified crops under two levels of management*—Continued

Map symbol	Soil	Corn (100=75 bushels of grain per acre or 15 tons of silage)		Oats (100=60 bushels per acre)		Wheat (100=30 bushels per acre)		Hay: Alfalfa-grass mixture (100=3 tons per acre)		Hay: Grass-legume mixture (100=3 tons per acre)		Pasture: Bluegrass (100=100 cow-acre-days) [1]		Pasture: Tall grass (100=100 cow-acre-days) [1]	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B
DaC2	Dekalb channery loam, 12 to 20 percent slopes, moderately eroded	65	90	60	75	60	75	70	110	60	90	65	120	105	185
DaD2	Dekalb channery loam, 20 to 30 percent slopes, moderately eroded	55	65	55	65	50	65	60	100	55	85	60	110	90	170
DbB	Dekalb very stony loam, 0 to 12 percent slopes	----	----	----	----	----	----	----	----	----	----	50	85	----	----
DbD	Dekalb very stony loam, 12 to 30 percent slopes	----	----	----	----	----	----	----	----	----	----	45	70	----	----
DbF	Dekalb very stony loam, 30 to 80 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	----	----
ErB	Ernest silt loam, 3 to 8 percent slopes	95	140	90	125	85	100	70	95	85	105	90	140	125	175
ErC	Ernest silt loam, 8 to 15 percent slopes	80	120	85	115	75	90	60	90	75	100	85	135	115	170
EsB	Ernest very stony silt loam, 0 to 8 percent slopes	----	----	----	----	----	----	----	----	----	----	75	110	----	----
EsD	Ernest very stony silt loam, 8 to 25 percent slopes	----	----	----	----	----	----	----	----	----	----	65	90	----	----
GcB2	Gilpin channery silt loam, 5 to 12 percent slopes, moderately eroded	80	100	65	90	85	90	85	125	70	105	75	130	125	195
GcC2	Gilpin channery silt loam, 12 to 20 percent slopes, moderately eroded	65	95	60	85	75	85	75	115	60	100	65	125	110	190
GcD2	Gilpin channery silt loam, 20 to 30 percent slopes, moderately eroded	55	65	55	75	70	80	65	100	55	90	60	120	100	170
GcD3	Gilpin channery silt loam, 20 to 30 percent slopes, severely eroded	----	----	----	----	----	----	----	----	----	----	55	100	----	----
GcE2	Gilpin channery silt loam, 30 to 40 percent slopes, moderately eroded	----	----	----	----	----	----	----	----	----	----	50	80	----	----
GnB	Gilpin very stony silt loam, 0 to 12 percent slopes	----	----	----	----	----	----	----	----	----	----	60	100	----	----
GnD	Gilpin very stony silt loam, 12 to 30 percent slopes	----	----	----	----	----	----	----	----	----	----	50	85	----	----
GnF	Gilpin very stony silt loam, 30 to 80 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	----	----
GsB2	Guernsey silt loam, 3 to 8 percent slopes, moderately eroded	95	135	100	135	90	135	85	135	90	125	100	145	135	225
GsC2	Guernsey silt loam, 8 to 15 percent slopes, moderately eroded	90	120	90	125	85	120	80	125	80	115	90	135	120	210
GsC3	Guernsey silt loam, 8 to 15 percent slopes, severely eroded	----	----	60	100	60	75	65	100	75	90	80	115	110	170
GsD2	Guernsey silt loam, 15 to 25 percent slopes, moderately eroded	80	100	85	110	75	90	75	115	75	105	80	125	110	200
GsD3	Guernsey silt loam, 15 to 25 percent slopes, severely eroded	----	----	----	----	----	----	60	90	60	90	65	100	85	150
GuB	Gullied land, 0 to 12 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	----	----
GuD	Gullied land, 12 to 30 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	----	----
GuF	Gullied land, 30 to 60 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Ln	Lindside silt loam	95	160	90	125	90	120	95	135	95	125	105	155	140	225
Ls	Lindside silt loam, very acid	80	135	85	115	85	115	85	125	85	120	90	150	125	210
MaB	Made land, 0 to 8 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MaD	Made land, 8 to 35 percent slopes	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Mc	Melvin silt loam	65	100	75	100	50	100	----	----	75	100	85	135	110	170
Md	Mine dump	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Mm	Mine wash	----	----	----	----	----	----	----	----	----	----	----	----	----	----
MoA	Monongahela silt loam, 0 to 3 percent slopes	80	100	85	100	65	90	----	85	75	90	80	120	110	155
MoB2	Monongahela silt loam, 3 to 8 percent slopes, moderately eroded	90	140	90	115	75	100	75	95	80	100	90	135	120	170
MoC2	Monongahela silt loam, 8 to 15 percent slopes, moderately eroded	80	100	85	110	65	90	65	90	75	90	80	120	110	155
Mp	Mucky peat	----	----	----	----	----	----	----	----	----	----	40	95	----	----
Ph	Philo silt loam	95	160	90	125	90	120	95	125	95	125	105	150	140	215
Pu	Purdy silt loam	65	80	65	85	50	65	----	----	50	75	55	80	75	110

See footnote at end of table.

TABLE 1.—*Estimated productivity ratings of soils for specified crops under two levels of management*—Continued

Map symbol	Soil	Corn (100=75 bushels of grain per acre or 15 tons of silage)		Oats (100=60 bushels per acre)		Wheat (100=30 bushels per acre)		Hay: Alfalfa-grass mixture (100=3 tons per acre)		Hay: Grass-legume mixture (100=3 tons per acre)		Pasture: Bluegrass (100=100 cow-acre-days) [1]		Pasture: Tall grass (100=100 cow-acre-days) [1]	
		A	B	A	B	A	B	A	B	A	B	A	B	A	B
SeA	Sequatchie silt loam, 0 to 5 percent slopes	100	165	85	100	90	120	100	165	75	100	80	135	150	230
SmB	Strip mine spoil, 0 to 8 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SmD	Strip mine spoil, 8 to 25 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SmF	Strip mine spoil, 25 to 75 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
TrA	Tygart silt loam, 0 to 3 percent slopes	55	105	60	75	60	80	-----	-----	60	86	60	110	85	140
UcB2	Upshur silty clay loam, 3 to 8 percent slopes, moderately eroded	100	155	85	110	100	120	100	165	100	150	100	135	145	195
UcC2	Upshur silty clay loam, 8 to 15 percent slopes, moderately eroded	95	140	85	100	95	115	90	150	90	140	95	135	135	190
UgB2	Upshur-Gilpin silty clay loams, 3 to 8 percent slopes, moderately eroded	95	140	85	100	85	100	90	135	85	120	95	130	130	195
UgC2	Upshur-Gilpin silty clay loams, 8 to 15 percent slopes, moderately eroded	90	135	75	90	75	90	85	125	75	115	85	125	125	180
UgC3	Upshur-Gilpin silty clay loams, 8 to 15 percent slopes, severely eroded	-----	-----	50	75	70	85	65	100	60	100	65	115	100	170
UgD2	Upshur-Gilpin silty clay loams, 15 to 25 percent slopes, moderately eroded	-----	-----	60	85	70	85	75	115	75	105	80	115	110	160
UgD3	Upshur-Gilpin silty clay loams, 15 to 25 percent slopes, severely eroded	-----	-----	-----	-----	-----	-----	60	100	50	85	55	105	90	160
UgE2	Upshur-Gilpin silty clay loams, 25 to 35 percent slopes, moderately eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	50	95	-----	-----
WeB	Weikert shaly silt loam, 5 to 12 percent slopes	-----	-----	60	75	50	65	75	100	50	75	55	95	100	125
WeC	Weikert shaly silt loam, 12 to 20 percent slopes	-----	-----	60	65	50	60	70	90	50	65	50	90	90	115
WeD	Weikert shaly silt loam, 20 to 30 percent slopes	-----	-----	-----	-----	-----	-----	65	85	45	60	45	75	80	105
WhF	Weikert soils, 30 to 60 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
WkF	Weikert very rocky silt loam, 40 to 100 percent slopes	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
WmB2	Westmoreland silt loam, 5 to 12 percent slopes, moderately eroded	100	160	100	135	100	120	100	165	100	150	100	135	150	205
WmB3	Westmoreland silt loam, 5 to 12 percent slopes, severely eroded	90	140	90	125	85	100	95	155	95	145	90	130	140	200
WmC2	Westmoreland silt loam, 12 to 20 percent slopes, moderately eroded	85	140	90	125	80	100	90	150	90	135	90	130	135	195
WmC3	Westmoreland silt loam, 12 to 20 percent slopes, severely eroded	75	125	85	110	75	90	85	145	85	120	85	120	125	175
WmD2	Westmoreland silt loam, 20 to 30 percent slopes, moderately eroded	55	85	65	90	60	80	85	125	85	125	70	105	125	180
WmD3	Westmoreland silt loam, 20 to 30 percent slopes, severely eroded	45	80	60	85	50	75	75	115	75	115	65	100	110	170
WmE2	Westmoreland silt loam, 30 to 40 percent slopes, moderately eroded	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	75	105	-----	-----
WrB2	Wharton silt loam, 3 to 8 percent slopes, moderately eroded	95	140	90	115	75	90	75	100	85	105	95	140	125	175
WrC2	Wharton silt loam, 8 to 15 percent slopes, moderately eroded	80	105	85	110	65	75	70	95	80	100	90	135	120	170
WrC3	Wharton silt loam, 8 to 15 percent slopes, severely eroded	-----	-----	60	90	50	60	55	85	55	85	55	115	75	140
WrD2	Wharton silt loam, 15 to 25 percent slopes, moderately eroded	65	95	65	85	60	65	65	90	75	90	85	120	115	150
WrD3	Wharton silt loam, 15 to 25 percent slopes, severely eroded	-----	-----	-----	-----	-----	-----	50	75	50	75	55	105	75	130

[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. An acre of pasture that provides 30 days of grazing for two cows has a carrying capacity of 60 cow-acre-days.

The use of this table is best explained by an example. For instance, to find the estimated yield of corn on Westmoreland silt loam, 5 to 12 percent slopes, severely eroded, under the A level of management, first look at the standard index under the heading "Corn." The standard index is 75 bushels. In column A, the productivity rating for corn on Westmoreland silt loam, 5 to 12 percent slopes, severely eroded, is 90. Therefore, 90 percent of 75 bushels, or 67.5 bushels, is the estimated yield of corn on this soil under common management.

Woodland [1]

The dense virgin forests that once covered Westmoreland County have disappeared as a result of repeated cuttings and the clearing of land for farming. At present about 36 percent of the county is commercial woodland consisting of second- and third-growth stands (*15*).[2]

The forest types in the county (*10*) and their proportionate extent (*15*) are as follows:

The *red oak* type makes up 64 percent of the commercial woodland. Northern red oak is predominant. The associates are black oak, scarlet oak, chestnut oak, and yellow-poplar.

The *sugar maple-beech-yellow birch* type makes up 17 percent of the woodland. Sugar maple, beech, and yellow birch are predominant. Associates are basswood, red maple, red oak, white pine, and black cherry.

The *aspen-gray birch* type makes up 9 percent of the total woodland. Aspen and gray birch are predominant. The principal associates are pin cherry, northern red oak, white pine, white oak, and sugar maple.

The remaining 10 percent of the woodland consists of other forest types.

Sawtimber stands make up approximately 38 percent of the commercial forest. Poletimber accounts for 32 percent, and seedlings account for 30 percent.

Woodland suitability groups

Management of woodland can be planned more effectively if soils are grouped according to those characteristics that affect growth of trees and management of the stands. The soils of Westmoreland County have been placed in 10 woodland suitability groups. Each group consists of soils that in general are suited to the same kinds of trees, that need similar management, and that have about the same potential productivity. The factors considered in placing each soil in a woodland group include potential productivity, which is expressed as site index; species to be favored in management of existing stands and to be preferred for planting; and soil-related hazards and limitations to be considered in management. These factors are explained in the paragraphs that follow.

The potential productivity of a soil for a given species is commonly expressed as site index. It is the height in feet that the dominant trees of a given species, growing on a specified soil, will reach at a specified age. On the basis of the site index, rates of growth and total yields can be calculated.

Seedling mortality refers to the expected loss of naturally occurring or planted seedlings, as a result of unfavorable soil characteristics. Mortality is *slight* if the loss is less than 25 percent. It is *moderate* if the loss is between 25 and 50 percent. Mortality is *severe* if more than 50 percent of the seedlings die.

The windthrow hazard, or the danger of trees being blown over by the wind, is *slight* if roots extend to a considerable depth and individual trees are stable during high winds. The hazard is *moderate* if trees are stable except during periods of excessive wetness and high winds. It is *severe* if root development is restricted and individual trees are unstable during periods of wetness and moderate or high winds.

Plant competition refers to invasion by or growth of undesirable species when openings are made in the canopy. Competition is *slight* if invaders do not prevent adequate regeneration and early growth and do not interfere with the development of planted seedlings. It is *moderate* if the invaders delay but do not prevent the establishment of a normal, fully stocked stand. Competition is *severe* if invaders prevent adequate regeneration or if intensive site preparation and maintenance are needed.

The equipment limitation is *slight* if there are no restrictions on the type of equipment that can be used or on the time of year that the equipment can be used. The limitation is *moderate* if the slope is between 20 and 50 percent, or if the use of equipment is restricted by seasonal wetness that lasts for more than 3 months. The limitation is *severe* if the slope is more than 50 percent, if the use of equipment is severely restricted by wetness that lasts more than 3 months, or if the use of equipment causes severe damage to tree roots or soil structure.

The erosion hazard is the degree of potential loss of soil by wind or water. The hazard is *slight* if erosion control is no problem. It is *moderate* if measures are needed to prevent unnecessary loss of soil. It is *severe* if special equipment and special methods of operation are needed.

WOODLAND GROUP 1

This group consists of deep, well-drained soils. The slope range is 0 to 5 percent. The available moisture capacity is high.

These soils are excellent for the production of timber. For oak, the site index is 75 or more, and the expected yield is about 13,750 board feet (International rule) per acre for a stand at 50 years of age (*8*). Seedling mortality is slight. The windthrow hazard is slight. Plant competition is severe. The equipment limitation is slight to moderate, and the erosion hazard is slight to moderate. Red oak, tulip-poplar, ash, sugar maple, and black walnut are the species to be encouraged in existing woodland. White pine, Austrian pine, larch, and Norway spruce are the species to be selected for planting.

WOODLAND GROUP 2

This group consists of deep and moderately deep, well-drained soils on uplands. The slope range is 0 to 30 percent. The available moisture capacity is moderate.

Most of the soils in this group are good for the production of timber. For oak, the site index is 65 to 74, and the expected yield is about 9,750 board feet (International rule) per acre for a stand at 50 years of age (*8*). Seedling mortality is slight. The windthrow hazard is slight. Plant competition is severe. The equipment limitation is slight to moderate, and the erosion hazard is slight to moderate. Tulip-poplar, red oak, sugar maple, ash, and white pine are the species to be encouraged in

[1] By V. C. Miles, woodland specialist, Soil Conservation Service.
[2] Italic numbers in parentheses refer to Literature Cited, p. 67.

existing woodland. White pine, Austrian pine, larch, and Norway spruce are the species to be selected for planting.

The Dekalb soils that are on plateaus, ridges, and ridge slopes make poor woodland sites. For oak, the site index is 54 or less, and the expected yield is about 3,250 board feet (International rule) per acre for a stand at 50 years of age (*8*). Seedling mortality is severe, and plant competition is severe. Red oak, black oak, chestnut oak, and white pine can be grown, but the practicality of using these soils for wood crops is questionable. Virginia pine and white pine should be selected for planting in areas used for esthetic and recreational purposes.

WOODLAND GROUP 3

This group consists of moderately deep and deep, well-drained soils on uplands. The slope range is 25 to 80 percent. The available moisture capacity is low to moderate in areas where the slope is more than 30 percent.

Most of the soils in this group are fair for the production of timber. For oak, the site index is 55 to 64, and the expected yield is about 6,300 board feet (International rule) per acre for a stand at 50 years of age (*8*). Seedling mortality is slight. The windthrow hazard is slight. Plant competition is severe. The equipment limitation is severe, and the erosion hazard is severe. Red oak, black oak, tulip-poplar, and white pine are the species to be encouraged in existing woodland. Larch, white pine, Austrian pine, and Norway spruce are the species to be selected for planting.

The Dekalb soils that occur on Chestnut Ridge and Laurel Hill make poor woodland sites. For oak, the site index is 54 or less, and the expected yield is 3,250 board feet (International rule) or less per acre for a stand at 50 years of age (*8*). Seedling mortality is severe, and plant competition is slight. Red oak, black oak, chestnut oak, and white pine can be grown, but the practicality of using these soils for wood crops is questionable. Virginia pine and white pine should be selected for plantings in areas used for esthetic and recreational purposes.

WOODLAND GROUP 4

This group consists of deep, moderately well drained and somewhat poorly drained, permeable soils on flood plains. The slope range is 0 to 5 percent. The available moisture capacity is moderate to high.

These soils are good for the production of timber. For oak, the site index is 65 to 74, and the expected yield is 9,750 board feet (International rule) per acre for a stand at 50 years of age (*8*). Seedling mortality is slight. The windthrow hazard is slight to moderate. Plant competition is severe. The equipment limitation is moderate. The erosion hazard is slight. Tulip-poplar, red oak, ash, and white pine are the species to be encouraged in existing woodland. Larch, white pine, Austrian pine, and Norway spruce are the species to be selected for planting.

WOODLAND GROUP 5

This group consists of deep, moderately well drained and somewhat poorly drained soils on uplands. The slope range is 0 to 25 percent. The available moisture capacity is high.

These soils are good for the production of timber. For oak, the site index is 65 to 75, and the expected yield is about 9,750 board feet (International rule) per acre for a stand at 50 years of age (*8*). Seedling mortality is slight. The windthrow hazard is slight to moderate. Plant competition is severe. The equipment limitation is generally moderate; in stony areas the limitation to the use of tree planters is severe. The erosion hazard is slight to moderate. Tulip-poplar, red oak, sugar maple, black cherry, ash, and white pine are the species to be encouraged in existing woodland. Larch, white pine, Austrian pine, Norway spruce, and white spruce are the species to be selected for planting.

WOODLAND GROUP 6

This unit consists of deep, poorly drained, permeable soils on flood plains. The slope range is 0 to 5 percent. The available moisture capacity is high.

These soils are fair for the production of timber. For oak, the site index is 55 to 64, and the expected yield is about 6,300 board feet (International rule) per acre for a stand at 50 years of age (*8*). Seedling mortality is moderate. The windthrow hazard is moderate to severe. Plant competition is severe. The equipment limitation is severe. The erosion hazard is slight. White pine, hemlock, red maple, and pin oak are the species to be encouraged in existing woodland. White pine and white spruce are the species to be selected for planting.

WOODLAND GROUP 7

This group consists of deep, poorly drained soils on uplands. These soils have a fragipan or a fine-textured subsoil. The slope range is 0 to 8 percent. The available moisture capacity is moderate.

These soils are fair for the production of timber. For oak, the site index is 55 to 64, and the expected yield is 6,300 board feet (International rule) per acre for a stand at 50 years of age (*8*). Seedling mortality is moderate. The windthrow hazard is moderate to severe. Plant competition is severe. The equipment limitation is severe. The erosion hazard is slight to moderate. Red oak, tulip-poplar, sugar maple, and white pine are the species to be encouraged in existing woodland. White pine, white spruce, and larch are the species to be selected for planting.

WOODLAND GROUP 8

This group consists of shallow, well-drained soils on uplands. The slope range is 5 to 100 percent. The available moisture capacity is very low.

These soils are poor for the production of timber. For oak, the site index is 54 or less, and the expected yield is about 3,250 board feet (International rule) per acre for a stand at 50 years of age (*8*). Seedling mortality is severe. Plant competition is slight. In areas where the slope is less than 25 percent, the equipment limitation is slight to moderate, the erosion hazard is slight to moderate, and the windthrow hazard is moderate. In areas where the slope is more than 25 percent, the equipment limitation, the windthrow hazard, and the erosion hazard are all severe. Pitch pine, Virginia pine, and chestnut oak are the species to be encouraged in existing woodland. Virginia pine is the species to be selected for planting.

WOODLAND GROUP 9

This group consists of Gullied land, Made land, and Strip mine spoil. All of these land types vary in physical and chemical properties. Their suitability for woodland depends mainly on the acidity of the soil material (*7*).

WOODLAND GROUP 10

This group consists of Mine dump, Mine wash, and Mucky peat. These miscellaneous land types and organic soils are not suitable for woodland production.

Wildlife [3]

The wildlife population of an area depends largely on the vegetation, and the vegetation, in turn, depends on the distribution and management of the soils. If the natural condition of the soils is changed by drainage or other management practices, the pattern of vegetation changes. With this change in vegetation, there is likely to be a change in the kinds and numbers of wildlife.

Habitat requirements

The following paragraphs describe the habitat requirements of the principal kinds of wildlife of Westmoreland County and relate these requirements to the soil associations, which are described under the heading "General Soil Map."

Cottontail rabbits, the most abundant small-game animals in the county, prefer brushy areas interspersed with cropland and pasture. Cottontail rabbits occur in greatest numbers in the southwestern part of the county, on associations 1 and 2. They occur in moderate numbers elsewhere in the county, except on associations 3 and 5, which are mountainous, stony, and mainly wooded.

Gray squirrels are second in abundance among the small game animals. They generally prefer the edges of woodland. They are most plentiful on associations 3 and 5, where black oak, red oak, and chestnut oak are dominant. They are also numerous where cornfields are interspersed with woodlots of hickory, walnut, and oak.

Ring-necked pheasants are most common in the southwestern part of the county, on associations 1 and 2. The production of corn, oats, and wheat on these associations provides the food and cover most suitable for pheasants. There are no pheasants in the southeastern part of the county, where no grain is grown, and few in the parts where grassland is predominant.

Ruffed grouse are plentiful on associations 3 and 5 and are to be found in large wooded tracts on farms throughout the county. They prefer brush, young trees in cut-over areas, and openings in larger, more heavily wooded tracts. They are scarce where there are stands of pole-stage hardwoods. The southwestern part of the county provides poor habitat for grouse because of the residential and industrial developments and the extensive open areas of farmland.

Bobwhite quail are to be found, in limited numbers, in all farming areas of the county, particularly where small fields of corn or other grain are interspersed with meadows, brushy areas, and small wooded tracts. They are most common on associations 1 and 2, where the land-use pattern provides the most suitable habitat of any in the county. Quail do not thrive in intensively farmed areas and in areas where grassland is predominant.

Association 6, which is frequently flooded, provides conditions attractive to woodcocks. This association occurs along Loyalhanna Creek, the Conemaugh River, Beaver Run, and a number of streams in the Ligonier Valley. Limited numbers of woodcock occur also in wet, brushy or lightly wooded areas along streams.

Association 3 is the only part of the county that provides habitat suitable for wild turkey, and it supports only limited numbers. Wild turkey require extensive tracts of woodland that have small, scattered grassy openings. An abundance of mast-producing trees is an important element of the habitat.

White-tailed deer occur throughout the county but are most abundant on association 3. They prefer a combination of brush and saplings, lesser amounts of mature woods, and open grassland.

Mourning doves find suitable habitat on the extensively farmed parts of associations 1, 2, and 7. They are among the few small game species that require drinking water daily. They are migratory birds and fly considerable distances to feed and drink. Doves prefer young conifers for nesting, but their nesting places range from the bare ground to tall trees. They are seldom found in woodland or in dense grassland.

Migrating waterfowl, mainly Canadian geese, mallards, black ducks, and wood ducks, visit the impoundments on Loyalhanna Creek and the Conemaugh and Youghiogheny Rivers.

Muskrats, opossums, raccoons, and red and gray foxes are common in all parts of the county.

Twelve streams, with a total length of 60 miles, and two lakes with a total area of 86 acres, provide trout fishing. Several large lakes and streams provide warm-water fishing.

About 100 resident species of nongame birds and about 30 of nongame mammals occur in Westmoreland County.

Suitability of the soils for wildlife

Table 2 shows the suitability of the soils of Westmoreland County for six kinds of wildlife food and cover plants, two kinds of water developments, and three groups of wildlife. The categories in table 2 are explained in the following paragraphs.

Grain and seed crops.—Domestic grains or seed-producing annual herbaceous plants planted to produce food for wildlife; examples are corn, sorghum, wheat, millet, buckwheat, soybeans, and sunflowers.

Grasses and legumes.—Domestic perennial grasses and herbaceous legumes established by planting to furnish cover and food for wildlife; examples are fescue, brome, timothy, redtop, bluegrass, orchardgrass, reed canarygrass, clover, trefoil, alfalfa, and sericea lespedeza.

Wild herbaceous upland plants.—Native or introduced perennial grasses or forbs that generally are established naturally and that provide food and cover principally for upland wildlife; examples are ragweed, wheatgrass, wildrye, oatgrass, pokeweed, strawberry, beggarweed, goldenrod, and dandelion.

Hardwood woody plants.—Deciduous trees, shrubs, and woody vines that produce fruits, nuts, buds, catkins, twigs, or foliage used as food by wildlife, and that commonly are established naturally but may be planted; examples are oak, beech, hawthorn, dogwood, viburnum, holly, maple, birch, poplar, honeysuckle, grape, cherry, blueberry, raspberry, greenbrier, briers, and roses.

Coniferous woody plants.—Cone-bearing trees and shrubs important to wildlife primarily as cover but that also furnish food in the form of browse, seeds, or cones; these trees and shrubs are commonly established naturally but may be planted; examples are pine, spruce, white-cedar, hemlock, fir, redcedar, juniper, and yew.

Wetland food and cover plants.—Annual and perennial wild herbaceous plants that grow in moist to wet places;

[3] By CLAYTON L. HEINEY, wildlife biologist, Soil Conservation Service.

TABLE 2.—*Suitability of the soils for elements of wildlife habitat and for kinds of wildlife*

[Figure *1* denotes *well suited*; *2* denotes *suited*; *3* denotes *poorly suited*; and *4* denotes *unsuited*]

Soil series and map symbols	Elements of wildlife habitat								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hard-wood woody plants	Conif-erous woody plants	Wetland food and cover plants	Shallow water de-velopments	Exca-vated ponds	Open land wildlife	Wood-land wildlife	Wetland wildlife
Atkins:											
At	3	2	2	1	2	1	2	3	2	1	1
Brinkerton:											
BkA	3	3	2	2	2	1	1	1	3	2	1
BkB2	3	3	2	2	2	3	4	4	3	2	4
Brooke:											
BrB2	2	2	1	1	1	4	4	3	1	1	4
BrC2	2	2	1	1	1	4	4	4	1	1	4
Burgin:											
Bu	4	3	3	1	1	1	1	1	3	1	[1] 1
Calvin:											
CaB2	2	2	2	2	2	4	4	4	2	2	4
CaC2	3	2	2	2	2	4	4	4	2	2	4
CaD2, C1B, C1D	4	3	2	2	2	4	4	4	3	2	4
C1E	4	4	3	2	2	4	4	4	3	2	4
Cavode:											
CnB	2	2	2	2	2	3	4	4	2	2	4
CnC2	2	2	2	2	2	4	4	4	2	2	4
CoB	4	3	2	2	3	2	2	2	3	3	2
CoD	4	3	2	2	3	4	4	4	3	3	4
Clarksburg:											
CuB2	2	2	1	1	3	4	4	4	1	2	4
CuC2	3	2	1	1	2	4	4	4	3	2	4
Dekalb:											
DaB, DaC2	3	2	2	2	2	4	4	4	2	2	4
DaD2, DbB, DbD	4	3	2	2	2	4	4	4	3	2	4
DbF	4	4	2	2	2	4	4	4	3	2	4
Ernest:											
ErB	2	1	1	1	3	3	3	3	1	1	3
ErC	2	1	1	1	3	3	4	4	1	1	4
EsB	4	3	1	1	3	3	[2] 3	3	3	2	[1] 3
EsD	4	3	1	1	3	4	4	4	3	2	4
Gilpin:											
GcB2	2	1	1	1	3	4	4	4	1	2	4
GcC2	3	2	1	1	3	4	4	4	3	2	4
GcD2	4	3	1	1	3	4	4	4	3	2	4
GcD3	4	4	1	1	3	4	4	4	4	3	4
GcE2, GnF	4	4	1	1	3	4	4	4	3	2	4
GnB, GnD	4	3	1	1	3	4	4	4	3	2	4
Guernsey:											
GsB2	2	2	1	1	3	4	4	4	1	2	4
GsC2	3	2	1	1	2	4	4	4	3	2	4
GsC3	3	2	1	1	3	4	4	4	2	2	4
GsD2	3	2	1	1	3	4	4	4	2	3	4
GsD3	4	3	1	1	3	4	4	4	3	2	4
Gullied land:											
GuB, GuD, GuF	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
Lindside:											
Ln, Ls	2	1	1	1	3	3	3	3	1	1	3
Made land:											
MaB, MaD	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------

See footnote at end of table.

TABLE 2.—*Suitability of the soils for elements of wildlife habitat and for kinds of wildlife*—Continued

Soil series and map symbols	Elements of wildlife habitat								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Open land wildlife	Woodland wildlife	Wetland wildlife
Melvin:											
Mc	3	2	2	1	2	2	3	4	2	1	3
Mine dump:											
Md	----	----	----	----	----	----	----	----	----	----	----
Mine wash:											
Mm	----	----	----	----	----	----	----	----	----	----	----
Monongahela:											
MoA	2	1	1	1	3	3	3	3	1	1	3
MoB2	2	2	1	1	3	4	4	4	1	2	4
MoC2	3	2	1	1	3	4	4	4	2	2	4
Mucky peat:											
Mp	----	----	----	----	----	----	----	----	----	----	----
Philo:											
Ph	2	1	1	1	3	3	3	3	1	1	3
Purdy:											
Pu	3	3	2	2	2	1	1	1	3	2	1
Sequatchie:											
SeA	1	1	1	1	3	4	4	4	1	1	4
Strip mine spoil:											
SmB, SmD, SmF	----	----	----	----	----	----	----	----	----	----	----
Tygart:											
TrA	3	3	2	2	2	1	1	1	3	2	1
Upshur:											
UcB2	2	2	1	1	3	4	4	4	1	2	4
UcC2	2	1	1	1	3	4	4	4	1	1	4
Upshur-Gilpin: (Refer also to "Gilpin.")											
UgB2	2	2	1	1	3	4	4	4	1	2	4
UgC2	2	1	1	1	3	4	4	4	1	1	4
UgC3, UgD2	3	2	1	1	3	4	4	4	2	2	4
UgD3, UgE2	4	3	1	1	3	4	4	4	3	2	4
Weikert:											
WeB	4	3	3	3	1	4	4	4	4	3	4
WeC, WeD, WhF	4	4	3	3	1	4	4	4	4	3	4
WkF	4	4	3	3	3	4	4	4	4	3	4
Westmoreland:											
WmB2	2	1	1	1	3	4	4	4	1	1	4
WmB3	3	2	1	1	1	4	4	4	2	2	4
WmC2, WmC3	3	2	1	1	3	4	4	4	2	2	4
WmD2	4	3	1	1	3	4	4	4	3	2	4
WmD3	4	4	1	1	3	4	4	4	3	2	4
WmE2	4	4	2	2	2	4	4	4	3	2	4
Wharton:											
WrB2	2	2	1	1	3	4	4	4	1	2	4
WrC2	3	2	1	1	2	4	4	4	3	2	4
WrC3, WrD2	3	2	1	1	3	4	4	4	2	2	4
WrD3	4	3	1	1	3	4	4	4	3	2	4

[1] Rating is 4 if rating for shallow water development is 4.

[2] Rating is 4 if slope is more than 3 percent.

examples are smartweed, wild millet, wild rice, switchgrass, reed canarygrass, bullrushes, sedges, and cattails. Wetland food plants do not include submerged or floating aquatic plants that provide food and cover for aquatic wildlife.

Shallow water developments.—Water generally not more than 5 feet deep, in excavations or impoundments created by building low dikes and levees, shallow dugouts, or level ditches, or by using devices for water-level control on marshy streams or channels.

Excavated ponds.—Dug-out areas or a combination of dug-out areas and dammed areas that hold water of suitable quality, of suitable depth, and in ample supply for fish or wildlife. Excavated ponds should have a surface area of at least a quarter of an acre and a depth of 6 feet or more in at least a quarter of the area. They require a water table that is high most of the time or another source of unpolluted water of low acidity.

Open land wildlife.—Birds and mammals commonly found in crop fields, in meadows and pastures, and on nonforested overgrown land; examples are bobwhite quail, ringneck pheasants, mourning doves, woodcocks, field sparrows, meadowlarks, killdeer, and cottontail rabbits.

Woodland wildlife.—Birds and mammals commonly found in wooded areas; examples are ruffed grouse, wild turkeys, wood thrushes, warblers, vireos, deer, squirrels, and raccoons.

Wetland wildlife.—Birds and mammals commonly found in marshes and swamps; examples are ducks, geese, herons, snipes, rails, coots, muskrats, minks, and beavers.

Engineering Uses

Some soil properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, building foundations, facilities for water storage, erosion control structures, drainage systems, and sewage disposal systems. The properties most important to engineers are permeability, shear strength, compaction characteristics, drainage, shrink-swell characteristics, particle size, plasticity, and acidity or alkalinity. Depth to the water table, depth to bedrock, and topography also are important.

The information in this publication can be used to—

1. Make studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Make preliminary estimates of the soil properties that affect the planning of irrigation systems, farm ponds, agricultural drainage systems, and other structures for conservation of soil and water.
3. Evaluate the suitability of soils for septic-tank fields and other liquid waste disposal systems.
4. Locate probable sources of sand and gravel and other construction material.
5. Make preliminary evaluations that will aid in selecting locations for highways, pipelines, airports, and cables, and in planning detailed investigations at the selected locations.
6. Correlate performance of engineering structures with soil mapping units to develop information that will be useful in planning engineering practices and in designing and maintaining engineering structures.
7. Determine the suitability of soils for cross-country movement of vehicles and construction equipment.
8. Supplement other published information, such as maps, reports, and aerial photographs, that is used in preparation of engineering reports for a specific area.

With the soil map for identification of soil areas, the engineering interpretations reported here can be useful for many purposes. *It should be emphasized, however, that these interpretations may not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and excavations deeper than the depths of layers here reported.*

Some of the terms used by soil scientists have a special meaning in soil science that may not be familiar to engineers. These terms are defined in the Glossary.

Engineering classification systems

Two systems of classifying soils for engineering purposes are in general use: the AASHO system and the Unified system.

Most highway engineers classify soil material in accordance with the system approved by the American Association of State Highway Officials (AASHO) (*1*). In this system all soil material is classified in seven principal groups. The groups range from A-1, which consists of soils that have the highest bearing capacity, to A-7, which consists of soils that have the lowest strength when wet. Within each group the relative engineering value of the soil material is indicated by a group index number. The numbers range from 0, for the best material, to 20, for the poorest.

Some engineers prefer to use the Unified soil classification system (*16*). In this system 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.

Table 3 shows the AASHO and the Unified classification of specified soils in the county, as determined by laboratory tests. Table 4 shows the estimated classification of all the soils in the county according to both systems.

TABLE. 3—*Engi-*

[Tests performed by the Pennsylvania Department of Highways in accordance with

Soil name and location	Parent material	Penn-sylvania report	Depth	Horizon	Moisture-density [1] Maximum dry density	Moisture-density [1] Optimum moisture
			Inches		*Lb./cu. ft.*	*Pct.*
Brooke silty clay loam:						
1.2 miles N. and 0.2 mile E. of Claridge. (Modal)	Limestone (Monongahela formation).	BJ–23525	8 to 19	B2	93	23
		BJ–23526	22 to 32	C1	110	16
1 mile NE. of United, at NW. corner of quarry, Mt. Pleasant Township. (Coarser textured)	Limestone and shale (Monongahela formation).	BH–15259	14 to 24	B2	98	19
		BH–15260	34 to 60	C	97	23
1 mile NE. of United, and 300 ft. S. of NE. corner of quarry. (Fine textured and shallower)	Limestone and shale (Monongahela formation).	BH–15261	7 to 18	B2	91	26
		BH–15262	18 to 25	C	96	24
Cavode silt loam:						
3 miles NW. of Latrobe. (Modal)	Shale and siltstone (Conemaugh formation).	BJ–39377	11 to 26	B2g	98	21
		BJ–39378	26 to 36	Cg	105	18
NE. corner of intersection of routes 22 and 981, New Alexandria. (Thicker clay layer closer to the surface)	Shale and siltstone (Conemaugh formation).	BJ–43066	6 to 19	B2	112	16
		BJ–43067	19 to 34	C	109	16
1.5 miles W. of Laurel Hill Tunnel on Pennsylvania Turnpike. (More shale and sandstone)	Shale (Pottsville formation).	BJ–34988	14 to 26	B2g	117	12
		BJ–34989	26 to 34	Cg	115	13
Clarksburg silt loam:						
0.5 mile S. on T. 844 and 100 ft. W. of Hannastown.	Colluvium (shale and sandstone).	BJ–23517	10 to 20	B21	109	18
		BJ–23518	41 to 63	Cg	106	20
50 ft. W. and 190 ft. S. of SW. corner of barn on Westmoreland County Fair Association Farm. (Modal)	Colluvium (shale, sandstone, and limestone).	BJ–23521	24 to 32	B22g	108	16
		BJ–23522	53 to 65	Cg	110	18
200 ft. S. of intersection of routes 64010 and 734 and 3.5 miles N. of Markle. (Darker brown subsoil)	Colluvium (Conemaugh formation).	BJ–34992	12 to 20	B2	102	18
		BJ–34993	20 to 52	C	110	16
0.3 mile E. of Robbins Station. (Heavier textured lower subsoil)	Colluvium (Monongahela formation).	BJ–39832	17 to 30	B2g	105	19
		BJ–39831	30 to 48	C	107	18
Dekalb very stony loam:						
1500 ft. E. of route 64153 and 4 miles SE. of Youngstown. (Modal)	Sandstone (Pottsville formation).	BJ–43068	6 to 12	B1	113	14
		BJ–43069	25 to 38	C2	108	14
0.125 mile W. of Donegal on route 31. (B2 horizon) (Coarse)	Westernport sandstone (Conemaugh formation).	BJ–34986	10 to 24	B2	115	14
		BJ–34987	24 to 38	C1	122	11
0.5 mile W. of route 64013 at head of Linn Run. (More podzolization)	Pocono sandstone.	BJ–34990	11 to 17	B1	96	23
		BJ–34991	17 to 24	C	117	13
Ernest silt loam:						
1 mile W. of route 981 and N. of route 22. (Modal)	Colluvium (Conemaugh formation).	BJ–43064	7 to 20	B21	100	18
		BJ–43065	28 to 40	C1	116	16
0.25 mile E. of route 896 and 100 ft. N. of route 860. (Shallow)	Colluvium (Conemaugh formation).	BJ–39375	7 to 19	B1	111	17
		BJ–39376	19 to 38	C	114	14
0.5 mile S. and 50 ft. W. of Millwood on route 860. (Fragipan) [6]	Colluvium (Pottsville sandstone).	BJ–34984	13 to 21	B22	107	18
		BJ–34985	21 to 42	C	110	16
Guernsey silt loam:						
0.4 mile S. on T. 844 and 800 feet W. of Hannastown. (Modal)	Interbedded shale, sandstone, and limestone.	BJ–23519	21 to 32	B22g	106	19
		BJ–23520	42 to 49	Cg	108	18
1 mile N. of Norvelt. (Fine)	Interbedded shale, sandstone, and limestone.	BJ–23523	19 to 27	B22	93	23
		BJ–23524	42 to 73	Cg	101	22

See footnotes at end of table.

neering test data

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

Mechanical analysis [2]										Liquid limit	Plasticity index	Classification	
Percentage passing sieve [3]						Percentage smaller than [3]						AASHO	Unified [4]
3-in.	3/4-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
100	95	92	91	90	89	88	80	62	51	65	28	A-7-5(19)	MH.
------	------	------	100	99	98	97	85	58	40	39	14	A-6(10)	ML-CL.
100	99	99	99	95	90	89	75	51	40	52	27	A-7-6(17)	CH.
------	100	99	96	89	81	79	73	58	46	53	26	A-7-6(17)	MH-CH.
100	94	94	93	93	91	91	87	69	58	74	42	A-7-5(20)	CH.
100	72	71	71	68	63	62	58	46	36	54	27	A-7-6(14)	CH.
------	------	------	100	99	98	98	94	75	60	53	21	A-7-5(15)	MH.
------	------	------	------	100	98	98	94	74	61	50	22	A-7-6(15)	ML-CL.
100	97	88	81	76	66	63	50	35	26	34	10	A-4(6)	ML-CL.
100	84	67	62	59	57	56	50	27	19	39	9	A-4(4)	ML.
100	96	88	84	80	61	56	42	23	15	24	4	A-4(5)	ML-CL.
100	94	82	77	74	61	55	40	22	15	26	5	A-4(5)	ML-CL.
------	100	99	97	90	84	83	64	35	22	32	8	A-4(8)	ML-CL.
------	------	100	98	95	90	89	75	48	37	43	17	A-7-6(11)	ML-CL.
100	99	96	92	85	71	67	55	36	25	32	6	A-4(7)	ML.
100	92	77	70	62	47	44	35	26	21	36	11	A-6(3)	SM-SC.
------	------	100	99	96	92	76	46	35	26	40	14	A-6(10)	ML-CL.
------	100	96	91	79	70	67	54	33	26	38	14	A-6(9)	ML-CL.
100	98	89	85	78	68	66	55	40	31	44	16	A-7-6(10)	ML-CL.
100	95	93	88	83	76	74	61	42	32	44	18	A-7-6(12)	ML-CL.
100	99	97	96	86	56	54	47	30	22	25	4	A-4(4)	ML-CL.
100	89	73	71	68	12	10	8	6	5	[5]	[5]	A-2-4(0)	SW-SM.
------	------	------	100	85	49	48	43	27	21	28	6	A-4(3)	SM-SC.
100	88	86	85	67	29	28	25	18	13	20	2	A-2-4(0)	SM.
100	82	73	71	62	38	37	28	14	9	40	[5]	A-4(1)	SM.
100	96	96	94	62	12	11	9	6	5	[5]	[5]	A-2-4(0)	SP-SM.
------	------	------	100	99	95	94	78	57	46	50	21	A-7-6(14)	ML-CL.
100	99	93	87	77	66	64	49	31	26	35	12	A-6(7)	ML-CL.
100	98	93	90	84	77	76	60	35	24	36	10	A-4(8)	ML-CL.
100	91	75	66	60	54	52	39	26	17	33	8	A-4(4)	ML-CL.
------	100	99	97	91	72	68	52	32	23	32	8	A-4(7)	ML-CL.
100	86	84	83	80	55	51	41	26	20	30	7	A-4(4)	ML-CL
------	100	99	99	97	94	93	75	43	30	39	13	A-6(9)	ML-CL.
100	99	94	88	81	76	75	64	45	35	42	15	A-7-6(10)	ML-CL.
------	------	------	100	99	97	96	86	63	52	52	18	A-7-5(14)	MH.
------	------	------	100	99	95	94	82	60	50	48	18	A-7-5(13)	ML.

TABLE 3.—*Engineering*

Soil name and location	Parent material	Pennsylvania report	Depth	Horizon	Moisture-density[1] Maximum dry density	Moisture-density[1] Optimum moisture
			Inches		*Lb./cu. ft.*	*Pct.*
2 miles W. of Lowber. (Thicker C horizon)	Shale (Monongahela formation).	BJ-43062 BJ-43063	7 to 19 19 to 34	B2 C	107 117	18 14
2 miles N. of Lowber and 0.25 mile SW. of intersection of routes 64226 and 625. (Shallow)	Interbedded shale, siltstone, and limestone. (Monongahela formation).	BJ-39830 BJ-39829	7 to 18 18 to 25	B2 C	107 109	16 17
Monongahela silt loam:						
1 mile S. of Salina on route 64029. (Modal)	Alluvium (terrace).	BJ-23515 BJ-23516	11 to 18 49 to 55	B21 Cg	111 117	17 13
3.0 miles NW. of Blairsville and 160 feet E. of T. 966. (Coarse)	Alluvium (terrace).	BJ-23529 BJ-23530	9 to 20 40 to 55	B21 C1g	110 121	16 12
SW. of New Stanton Interchange. (Lower elevation and younger terrace)	Alluvium (Conemaugh formation).	BJ-43058 BJ-43059	8 to 18 26 to 38	B21 C	108 111	18 16
NE. edge of Sutersville near intersection of routes 64226 and 318. (High iron content)	Alluvium (Youghiogheny River).	BJ-43060 BJ-43061	6 to 18 18 to 48	B2 C	114 125	15 12
Upshur silty clay loam:						
1.5 miles E. of Camp Jo-Ann, 1 mile N. of State Highway 366, and 500 feet W. of T. 638. (Modal)	Shale.	BJ-23511 BJ-23512	13 to 25 38 to 58	B22 C1	95 113	27 16
1.5 miles NE. of Markle, 0.8 mile E. of cemetery, and 170 feet N. of T. 995.	Shale.	BJ-23513 BJ-23514	9 to 17 36 to 50	B21 C1	100 116	21 15
300 feet NW. of route 995, 0.5 mile W. of route 734, and 3 miles N. of Markle. (Fine)	Shale and siltstone (Conemaugh formation).	BJ-34994 BJ-34995	14 to 21 21 to 34	B2 C	101 112	22 15
3 miles W. of Blairsville and 100 feet E. of intersection of routes 64218 and 966. (Coarse)	Shale (Conemaugh formation).	BJ-39828 BJ-39827	6 to 18 18 to 38	B2 C	110 113	18 15
Westmoreland silt loam:						
1 mile E. of Greensburg and 0.25 mile N. of route 30. (Coarse)	Interbedded shale, limestone, and sandstone.	BE-2642 BE-2643	10 to 15 22 to 36	B21 C1	112 121	16 12
400 yards S. of Serro's Diner on U.S. Highway 30 W. of Irwin. (Heavier textured).[6]	Interbedded shale, limestone, and sandstone (Monongahela formation).	BE-2644 BE-2645	17 to 28 32 to 50	B22 C1	102 106	20 20
500 yards S. of Serro's Diner on U.S. Highway 30 W. of Irwin.[6] (Modal)	Interbedded shale, limestone, and sandstone (Monongahela formation).	BE-2646 BE-2647	16 to 24 27 to 50	B2 D1	109 113	18 15
Wharton silt loam:						
2 miles W. of Pennsylvania Turnpike on east side of route 71A. (Modal)	Shale (Conemaugh formation).	BJ-39371 BJ-39372	23 to 32 32 to 40	B22 C	109 101	17 22
1 mile E. of route 64001 and 1 mile N. of Markle on route 995. (More plasticity in the subsoil)	Shale (Conemaugh formation).	BJ-34996 BJ-34997	13 to 26 26 to 32	B2 C	106 100	17 19
2 miles S. of route 66 and 22 cloverleaf and W. of route 66. (Colluvium over shale)	Shale (Conemaugh formation).	BJ-39373 BJ-39374	16 to 30 30 to 40	B2 C	104 108	18 20

[1] Based on AASHO Designation: T 99-57, Method A (*1*).

[2] Mechanical analysis according to AASHO Designation: T 88-57 (*1*). Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis data in this table are not suitable for use in naming textural classes for soil.

test data—Continued

Mechanical analysis [2]										Liquid limit	Plasticity index	Classification	
Percentage passing sieve [3]						Percentage smaller than [3]						AASHO	Unified [4]
3-in.	3/4-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
--	100	97	95	91	87	86	67	43	32	38	13	A-6(9)	ML-CL.
--	--	--	100	99	95	93	69	46	34	36	13	A-6(9)	ML-CL.
--	100	89	83	78	72	70	53	36	28	39	12	A-6(8)	ML-CL.
1	98	89	83	80	74	70	50	34	28	40	12	A-6(9)	ML.
--	--	--	100	98	86	84	65	36	24	34	9	A-4(8)	ML-CL.
--	--	--	--	100	46	42	35	27	21	26	6	A-4(2)	SM-SC.
100	98	96	93	81	66	64	53	38	28	35	11	A-6(7)	ML-CL.
100	74	63	59	35	13	12	11	10	8	23	2	A-1-b(0)	SM.
--	100	94	84	81	73	72	58	35	26[6]	36	12	A-6(8)	ML-CL.
--	100	93	72	68	56	55	42	25	17	32	9	A-4(4)	ML-CL.
--	--	--	100	94	62	60	48	30	23	28	8	A-4(5)	CL.
--	100	97	92	65	29	27	21	15	12	26	5	A-2-4(0)	SM-SC.
--	--	--	--	100	97	96	87	75	65	77	40	A-7-5(20)	MH-CH.
--	--	--	100	86	69	67	56	35	22	34	9	A-4(7)	ML-CL.
--	100	98	98	93	87	86	75	57	44	50	21	A-7-6(14)	ML-CL.
--	--	100	98	88	79	78	66	39	25	35	12	A-6-(9)	ML-CL.
--	--	--	--	100	99	98	87	67	54	52	26	A-7-6(17)	CH.
--	--	--	100	99	97	94	76	50	36	40	17	A-6(11)	CL.
--	100	95	88	77	70	69	57	41	30	39	13	A-6(8)	ML-CL.
100	98	85	74	66	61	60	48	34	24	37	10	A-4(5)	ML.
--	100	87	82	77	72	68	58	39	28	39	14	A-6(9)	ML-CL.
100	74	29	19	17	15	14	10	6	5	34	8	A-2-4(0)	GM.
100	99	96	94	92	87	85	74	50	38	45	20	A-7-6(13)	ML-CL.
100	95	94	93	92	88	86	75	50	38	44	21	A-7-6(13)	CL.
100	96	90	86	82	77	75	60	41	33	37	14	A-6(10)	ML-CL.
100	47	37	34	32	28	26	20	13	10	29	8	A-2-4(0)	GM-GC.
--	--	100	99	98	94	93	82	66	54	37	12	A-6(9)	ML-CL.
--	--	--	100	97	85	82	64	41	31	51	23	A-7-6(15)	MH-CH.
100	94	87	78	66	60	59	52	34	25	45	17	A-7-6(8)	ML-CL.
--	--	--	100	98	90	78	51	38	28	43	17	A-7-6(11)	ML-CL.
--	--	--	100	94	90	89	77	56	40	47	15	A-7-5(11)	ML.
--	100	96	91	84	80	79	67	52	37	46	15	A-7-5(11)	ML.

[3] Based on material passing 3-inch sieve. Laboratory test data not corrected for amount discarded larger than 3 inches in diameter.

[4] Soil Conservation Service and Bureau of Public Roads have agreed to consider that all soils having plasticity indexes within 2 points of A-line are to be given a borderline classification. Examples of borderline classification obtained by this use are ML-CL and MH-CH.

[5] Nonplastic.

[6] Percentage of discarded material larger than 3 inches in diameter—Ernest silt loam (Millwood location), 7 percent of C horizon. Westmoreland silt loam (400 yards S. of Serro's Diner), 1 percent of B22 horizon; and same soil (500 yards S. of Serro's Diner), 50 percent of D1 horizon.

TABLE 4.—*Estimated engineering*

Soil names and map symbols	Depth to seasonal high water table	Depth to bedrock	Depth from surface (typical profile)	Classification: USDA texture	Classification: Unified	Classification: AASHO	Coarse fraction (more than 3 inches in diameter)	Percentage passing sieve— No. 4 (4.7 mm.)
	Ft.	*Ft.*	*In.*				*Pct.*	
Atkins (At)	0 to 1	3 to 10	0 to 48	Silt loam	ML, CL or MH, CH.	A-4, A-7		95 to 100
Brinkerton (BkA, BkB2)	0 to 1	4 to 20	0 to 6	Silt loam				
			6 to 42	Silt loam, silty clay loam, and clay loam.	ML, CL	A-4, A-6		95 to 100
Brooke (BrB2, BrC2)	3+	2 to 4	0 to 8	Silty clay loam				
			8 to 40	Silty clay, channery silty clay, or silty clay loam.	MH, CH	A-7		80 to 100
Burgin (Bu)	0	3 to 10	0 to 7	Silt loam				
			7 to 42	Silt loam and silty clay loam.	ML, CL	A-4, A-6		85 to 100
Calvin, neutral substratum (CaB2, CaC2, CaD2).	3+	2 to 4	0 to 9	Silt loam				
			9 to 29	Silt loam and channery silt loam.	SM, GM	A-4		65 to 75
Calvin very stony, neutral substratum (ClB, ClD, ClE).	3+	2 to 4	0 to 8	Very stony silt loam.				
			8 to 30	Very stony silt loam.	SM, GM	A-2, A-4	0 to 20	55 to 70
Cavode (CnB, CnC2)	1 to 1½	3 to 6	0 to 6	Silt loam				
			6 to 30	Silt loam and silty clay loam.	ML-CL	A-4, A-7		90 to 100
Cavode very stony (CoB, CoD).	1 to 1½	3 to 6	0 to 6	Very stony silt loam.				
			6 to 30	Very stony silt loam and silty clay loam.	ML-CL, ML.	A-4		85 to 95
Clarksburg (CuB2, CuC2)	1 to 2½	4 to 20	0 to 8	Silt loam				
			8 to 65	Silt loam, clay loam, and silty clay.	ML-CL	A-4, A-7		90 to 100
Dekalb (DaB, DaC2, DaD2).	3+	2 to 4	0 to 10	Channery loam				
			10 to 38	Loam and channery sandy loam.	SM, GM	A-2, A-4	5 to 10	80 to 95
Dekalb very stony (DbB, DbD, DbF).	3+	2 to 4	0 to 10	Very stony loam.				
			10 to 38	Stony loam	SM, GM	A-2, A-4	10 to 20	75 to 90
Ernest (ErB, ErC)	1½ to 2½	4 to 20	0 to 9	Silt loam				
			9 to 29	Silt loam and clay loam.	ML-CL	A-6, A-4		90 to 100
			29 to 60	Channery silt loam.	ML-CL	A-4		80 to 90

See footnote at end of table.

properties of the soils

Percentage passing sieve—Continued			Permeability	Available moisture capacity	Reaction	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential	Dispersion	Corrosion potential for steel pipe
No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)								
			In./hr.	*In./in. of soil*	*pH*	*Pct.*	*Lb./cu. ft.*			
95 to 100	85 to 100	70 to 90	0. 63 to 6. 3	0. 15 to 0. 20	5. 0	19	105	Moderate	Low	High.
			0. 63 to 2. 0	. 20 to . 25	5. 5					
85 to 100	80 to 95	60 to 80	<0. 2	. 10 to . 15	6. 0	18	107	Moderate	Moderate	High.
			0. 63 to 2. 0	. 20 to . 25	6. 0					
75 to 100	70 to 95	70 to 85	0. 2 to 0. 63	. 15 to . 20	7. 0	23	95	High	Moderate	High.
			0. 2 to 0. 63	. 20 to . 25	7. 0					
85 to 95	80 to 90	70 to 80	<0. 2	. 15 to . 20	7. 0	20	103	Moderate	Moderate	High.
			2. 0 to 6. 3	. 15 to . 20	5. 5					
55 to 65	50 to 60	35 to 45	2. 0 to 6. 3	. 10 to . 15	5. 0	15	113	Low	Low	Low.
			2. 0 to 6. 3	. 10 to . 15	5. 5					
50 to 65	45 to 60	30 to 45	2. 0 to 6. 3	. 05 to . 10	5. 0	14	115	Low	Low	Low.
			0. 20 to . 63	. 20 to . 25	5. 0					
80 to 95	70 to 95	65 to 95	<0. 20	. 15 to . 20	5. 0	17	105	Moderate	High	Moderate.
			0. 20 to . 63	. 20 to . 25	5. 0					
80 to 95	75 to 90	60 to 80	<0. 20	. 15 to . 20	5. 0	15	110	Moderate	High	Moderate.
			0. 20 to . 63	. 20 to . 25	5. 5					
85 to 100	80 to 95	70 to 90	<0. 20	. 15 to . 20	6. 0	18	109	Moderate	Moderate	High.
			2. 0 to 6. 3	. 10 to . 15	5. 0					
75 to 85	45 to 75	30 to 50	2. 0 to 6. 3	. 05 to . 10	4. 5	14	117	Low	Moderate	Low.
			2. 0 to 6. 3	. 10 to . 15	5. 0					
70 to 80	40 to 70	25 to 50	2. 0 to 6. 3	. 05 to . 10	4. 5	12	120	Low	Moderate	Low.
			0. 63 to 2. 0	. 15 to . 20	5. 0					
90 to 100	85 to 95	70 to 90	0. 63 to 2. 0	. 15 to . 20	5. 0	17	107	Low	Moderate	Moderate.
70 to 90	65 to 85	55 to 65	0. 2 to 0. 63	. 15 to . 20	5. 0	13	116	Low	Moderate	Moderate.

TABLE 4.—*Estimated engineering*

Soil names and map symbols	Depth to seasonal high water table	Depth to bedrock	Depth from surface (typical profile)	Classification			Coarse fraction (more than 3 inches in diameter)	Percentage passing sieve—
				USDA texture	Unified	AASHO		No. 4 (4.7 mm.)
	Ft.	*Ft.*	*In.*				*Pct.*	
Ernest very stony (EsB, EsD).	1½ to 2½	4 to 20	0 to 9	Very stony silt loam.				
			9 to 29	Stony silt loam and clay loam.	ML	A-4	0 to 10	80 to 90
			29 to 60	Channery silt loam.	ML, GM	A-4	0 to 10	70 to 80
Gilpin (GcB2, GcC2, GcD2, GcD3, GcE2).	3+	1½ to 3	0 to 7	Channery silt loam.				
			7 to 26	Channery silt loam and channery loam.	ML, SM	A-4		80 to 95
			26 to 36	Channery loam and very channery loam.	SM, GM	A-2, A-4	5 to 15	60 to 80
Gilpin very stony (GnB, GnD, GnF).	3+	1½ to 3	0 to 9	Very stony silt loam.				
			9 to 26	Stony silt loam and loam.	ML, SM	A-4	5 to 10	70 to 90
			26 to 36	Channery loam and very channery loam.	GM, SM	A-2	10 to 20	40 to 70
Guernsey (GsB2, GsC2, GsC3, GsD2, GsD3).	1 to 3	3 to 6	0 to 13	Silt loam				
			13 to 42	Silty clay and silty clay loam.	ML, CL, MH.	A-6, A-4		90 to 100
Gullied land (GuB, GuD, GuF). (For properties of soil material, refer to Westmoreland, Guernsey, and Clarksburg soils.)	3+	1½ to 6						
Lindside (Ln)	1 to 2½	3 to 10	0 to 11	Silt loam				
			11 to 38	Silt loam	ML	A-4		95 to 100
Lindside very acid (Ls)	1½ to 2½	3 to 10	0 to 11	Silt loam				
		([1])	11 to 38	Silt loam	ML	A-4		95 to 100
Made land (MaB, MaD)	([1])	([1])	0 to 120	([1])	([1])	([1])	([1])	([1])
Melvin (Mc)	0 to 1	3 to 10	0 to 8	Silt loam				
			8 to 48	Silt loam	ML, CL	A-6		95 to 100
Mine dump (Md)	0 to 3+			([1])	([1])	([1])	([1])	([1])
Mine wash (Mm)	0 to 2	3 to 10	([1])	([1])	([1])	([1])	([1])	([1])
Monongahela (MoA, MoB2, MoC2).	1½ to 2½	4 to 10	0 to 11	Silt loam				
			11 to 37	Silt loam	ML-CL	A-4		95 to 100
			37 to 55	Loam and fine sandy loam.	SM-SC	A-2, A-4		70 to 95
Mucky peat (Mp)	0	4 to 20	0 to 21	Muck				
			21 to 38	Silty clay loam and clay loam.	CL	A-6		95 to 100

See footnote at end of table.

properties of the soils—Continued

Percentage passing sieve—Continued: No. 10 (2.0 mm.)	Percentage passing sieve—Continued: No. 40 (0.42 mm.)	Percentage passing sieve—Continued: No. 200 (0.074 mm.)	Permeability	Available moisture capacity	Reaction	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential	Dispersion	Corrosion potential for steel pipe
			In./hr.	*In./in. of soil*	*pH*	*Pct.*	*Lb./cu. ft.*			
----------	----------	----------	2. 0 to 6. 3	0. 20 to 0. 25	5. 0	----------	--------	------------	------------	
80 to 90	70 to 85	60 to 80	0. 63 to 2. 0	. 15 to . 20	5. 0	16	110	Low	Moderate	Moderate.
60 to 80	50 to 75	45 to 55	0. 2 to 0. 63	. 10 to . 15	5. 0	12	118	Low	Low	Moderate.
----------	----------	----------	2. 0 to 6. 3	. 15 to . 20	5. 5	----------	--------	------------	------------	
70 to 90	65 to 85	45 to 60	2. 0 to 6. 3	. 10 to . 15	5. 5	16	110	Low	Low	Low.
50 to 70	40 to 60	25 to 40	2. 0 to 6. 3	. 05 to . 10	5. 0	17	108	Low	Low	Low.
----------	----------	----------	2. 0 to 6. 3	. 15 to . 20	5. 5	----------	--------	------------	------------	
65 to 85	60 to 80	40 to 60	2. 0 to 6. 3	. 10 to . 15	5. 5	17	108	Low	Low	Low.
35 to 65	30 to 60	15 to 30	2. 0 to 6. 3	. 05 to . 10	5. 0	15	112	Low	Low	Low.
----------	----------	--------	0. 63 to 2. 0	. 20 to . 25	6. 0	----------	--------	------------	------------	
85 to 100	80 to 95	75 to 95	<0. 20	. 15 to . 20	6. 5	18	108	Moderate	High	Moderate.
----------	----------	----------	----------	----------	----------	----------	--------	------------	------------	
			2. 0 to 6. 3	. 20 to . 25	6. 0					
95 to 100	85 to 95	60 to 90	0. 2 to 0. 63	. 15 to . 20	6. 4	17	110	Low	Moderate	Moderate.
			2. 0 to 6. 3	. 20 to . 25	3. 0					
95 to 100	85 to 95	60 to 90	0. 2 to 0. 63	. 15 to . 20	3. 0	17	110	Low	High	Moderate.
(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	Low	High	Low.
			2. 0 to 6. 3	. 20 to . 25	6. 5					
95 to 100	90 to 100	60 to 90	0. 2 to 0. 63	. 15 to . 18	7. 0	18	107	Moderate	Low	High.
(1)	(1)	(1)	(1)	. 10 to . 15	4. 0	----------	--------	Low	High	Moderate.
(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1).
			2. 0 to 6. 3	. 15 to . 20	--------					
85 to 100	80 to 95	65 to 85	0. 20 to 6. 3	. 15 to . 20	5. 5	16	111	Low	Low	Moderate
65 to 90	40 to 70	30 to 50	0. 63 to 2. 0	. 10 to . 15	5. 0	13	118	Moderate	Moderate	Moderate.
				. 25 to . 35	4. 0					
90 to 100	85 to 95	80 to 90	<0. 2	. 15 to . 25	4. 4	19	103	High	Low	Very high.

TABLE 4.—*Estimated engineering*

Soil names and map symbols	Depth to seasonal high water table	Depth to bedrock	Depth from surface (typical profile)	Classification			Coarse fraction (more than 3 inches in diameter)	Percentage passing sieve—
				USDA texture	Unified	AASHO		No. 4 (4.7 mm.)
	Ft.	*Ft.*	*In.*				*Pct.*	
Philo silt loam (Ph)	1½ to 2½	3 to 10	0 to 10	Silt loam				
			10 to 36	Silt loam, sandy loam, and gravelly loam.	ML, CL	A-4		95 to 100
Purdy (Pu)	0	4 to 20	0 to 7	Silt loam				
			7 to 40	Silty clay loam and clay loam.	ML, CL, MH.	A-4, A-7		90 to 100
Sequatchie (SeA)	3+	4 to 20	0 to 7	Silt loam				
			7 to 48	Loam, fine sandy loam, and sandy loam.	ML, SM	A-4, A-6		100
Strip mine spoil (SmB SmD, SmF).	3+	3 to 50	(1)	(1)	(1)	(1)	(1)	(1)
Tygart (TrA)	½ to 1½	4 to 20	0 to 7	Silt loam				
			7 to 38	Silt loam, silty clay loam, and clay loam.	ML, CL	A-4, A-6		95 to 100
Upshur (UcB2, UcC2, UgB2, UgC2, UgC3, UgD2, UgD3, UgE2). (For properties of Gilpin part of UgB2, UgC2, UgC3, UgD2, UgD3, and UgE2, see Gilpin series.)	3+	2 to 6	0 to 8	Silty clay loam				
			8 to 38	Silty clay and clay.	CL, ML, CH.	A-6, A-7		95 to 100
Weikert (WeB, WeC, WeD, WhF).	3+	1 to 2	0 to 6	Shaly silt loam				
			6 to 14	Very shaly silt loam.	GM	A-1, A-2	0 to 15	35 to 50
Weikert very rocky (WkF)	3+	1 to 1½	0 to 12	Shaly silt loam	GM	A-1, A-2	30 to 50	35 to 50
Westmoreland (WmB2, WmB3, WmC2, WmC3, WmD2, WmD3, WmE2).	3+	2 to 5	0 to 7	Silt loam				
			7 to 23	Silt loam and silty clay loam.	ML-CL	A-6, A-7		85 to 95
			23 to 51	Shaly silty clay loam and very channery silt loam.	GM, GC	A-2	5 to 20	50 to 60
Wharton (WrB2, WrC2, WrC3, WrD2, WrD3).	2 to 3	3 to 6	0 to 8	Silt loam				
			8 to 48	Silt loam and silty clay loam.	ML-CL, ML.	A-4, A-7		90 to 100

[1] Variable.

properties of the soils—Continued

Percentage passing sieve—Continued: No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	Permeability	Available moisture capacity	Reaction	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential	Dispersion	Corrosion potential for steel pipe
			In./hr.	*In./in. of soil*	*pH*	*Pct.*	*Lb./cu. ft.*			
---	---	---	2. 0 to 6. 3	0. 20 to 0. 25	5. 2	---	---	---	---	
95 to 100	95 to 100	60 to 85	0. 63 to 2. 0	. 15 to . 20	5. 0	18	105	Low	Moderate	Moderate.
---	---	---	2. 0 to 6. 3	. 15 to . 20	5. 0	---	---	---	---	
90 to 100	90 to 100	70 to 95	<0. 2	. 15 to . 20	4. 0	19	105	Moderate	High	High.
---	---	---	2. 0 to 6. 3	. 20 to . 25	5. 0	---	---	---	---	
100	95 to 100	40 to 60	0. 63 to 6. 3	. 10 to . 20	5. 0	14	119	Low	Moderate	Low.
[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1].
---	---	---	0. 63 to 2. 0	. 15 to . 20	5. 0	---	---	---	---	
95 to 100	90 to 100	75 to 90	<0. 2	. 15 to . 20	5. 0	16	113	Moderate	High	Moderate.
---	---	---	0. 2 to . 63	. 20 to . 25	6. 0	---	---	---	---	
90 to 100	80 to 95	70 to 90	<0. 2	. 15 to . 20	7. 0	18	110	High	Moderate	Moderate.
---	---	---	2. 0 to 6. 3	. 15 to . 20	5. 5	---	---	---	---	
30 to 40	25 to 35	15 to 30	2. 0 to 6. 3	. 08 to . 10	5. 0	14	119	Low	Low	Low.
30 to 40	25 to 35	15 to 30	2. 0 to 6. 3	. 05 to . 10	5. 0	14	119	Low	Low	Low.
---	---	---	2. 0 to 6. 3	. 15 to . 25	---	---	---	---	---	
80 to 90	75 to 85	70 to 80	0. 2 to . 63	. 15 to . 20	5. 5	18	108	Low	Low	Low.
45 to 55	20 to 35	15 to 30	0. 63 to 2. 0	. 10 to . 15	6. 5	16	113	Low	Low	Low.
---	---	---	2. 0 to 6. 3	. 20 to . 25	5. 5	---	---	---	---	
80 to 100	65 to 95	60 to 90	<0. 2	. 15 to . 20	5. 0	20	103	Moderate	Moderate	Moderate.

Engineering test data

Soil samples taken from 10 soil types in the county were tested in accordance with standard procedures to help evaluate the soils for engineering purposes. The samples tested represent modal types and extremes within the named series. Table 3 gives the results of these tests.

The engineering classifications given in table 3 are based on the data obtained by mechanical analysis and on the liquid limit and plasticity index. The mechanical analysis was made by combined sieve and hydrometer methods.

Table 3 also gives moisture-density, or compaction, data for the soils tested. If soil material is compacted at successively higher moisture content and the compactive effort remains constant, the dry density of the compacted material increases as the moisture content increases, until the optimum moisture content is reached. After that, the dry density decreases as the moisture content increases. The highest dry density obtained is the *maximum dry density*, and the corresponding moisture content is the *optimum moisture*. Moisture-density data are important in earthwork because, as a rule, optimum stability is obtained if the soil is compacted to about the maximum dry density at approximately optimum moisture content.

Liquid limit and plasticity index indicate the effect of water on the consistence of the soil material. As the moisture content of a clayey soil increases from a very dry state, the material changes from semisolid to plastic. As the moisture content is further increased, the material changes from plastic to liquid. The plastic limit is the moisture content at which the material changes from semisolid to plastic. The liquid limit is the moisture content at which the material changes from plastic to liquid. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil is plastic.

Estimated engineering properties of the soils

Table 4 lists all of the soils in the county and gives estimates of soil properties that are significant in engineering. For the soils that have been sampled and tested, the average values from table 3 are shown. For the others, the estimates are based on test data for similar soils in this county or other counties and on past experience in engineering construction. The estimates are given for the specified layers of a profile typical of the series; consequently, considerable variation from these estimates should be anticipated. Estimates of some properties are not given for the uppermost layer, because the material in this layer generally is unsuitable for use in engineering structures, though it can be used for topdressing in selected areas to promote the growth of vegetation. Some of the items in this table need no explanation; others are explained in the following paragraphs.

TABLE 5.—*Engineering*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			Soil features affecting—
			Topsoil	Sand and gravel	Road fill	Highway location
Atkins (At)	Poor	High	Fair	Unsuitable	Fair	High water table; flooding.
Brinkerton (BkA, BkB2)	Poor	High	Poor	Unsuitable	Poor	High water table; frost heaving.
Brooke (BrB2, BrC2)	Poor	Moderate	Fair	Unsuitable	Poor	High shrink-swell potential; instability; depth to bedrock.
Burgin (Bu)	Poor	High	Fair	Unsuitable	Poor	High water table; instability.
Calvin neutral substratum (CaB2, CaC2, CaD2, C1B, C1D, C1E).	Fair	Moderate	Fair	Unsuitable	Fair	Depth to shale
Cavode (CnB, CnC2, CoB, CoD)	Poor	High	Fair; poor on stony phases.	Unsuitable	Poor	Seasonal high water table; instability.
Clarksburg (CuB2, CuC2)	Poor	Moderate	Fair	Unsuitable	Fair	Seasonal high water table.
Dekalb (DaB, DaC2, DaD2, DbB, DbD, DbF).	Good	Low	Poor	Poor	Good	Moderately deep to bedrock.

See footnote at end of table.

Permeability indicates the rate at which water moves downward through undisturbed soil material. The rate depends largely on the texture, porosity, and structure of the soil. A rate of less than 0.2 inch per hour is slow; 0.2 to 0.63 inch, moderately slow; 0.63 to 2 inches, moderate; 2 to 6.3 inches, moderately rapid; and more than 6.3 inches, rapid.

Available moisture capacity is the amount of water in the soil that is available to plants between the field capacity and the wilting point. When the soil is air dry, this amount of water will wet the soil material described to a depth of 1 inch without deeper percolation. Available moisture is affected by the texture, structure, and organic-matter content of the soil.

Reaction, the degree of acidity or alkalinity, is expressed as pH value. In soils that have been cropped and have received large applications of lime over a period of several years, the reaction may be higher than the value shown in table 4.

The shrink-swell potential indicates the volume change to be expected with a change in moisture content. The estimates are based primarily on the amount and type of clay in the soil. In general, soils that are classified as CH and A–7 have a moderate to high shrink-swell potential. Clean sand and gravel and other soils that contain small amounts of nonplastic to slightly plastic fines have a low shrink-swell potential.

Dispersion is the degree to which and the speed at which soil structure breaks down or slakes in water. A dispersed soil is highly erodible. The estimates are based on past experience with the soils in the county.

In the estimates of corrosion potential for steel pipe, the factors considered are total acidity, soil drainage, and soil texture.

Estimates of the suitability of the soils for various engineering uses are given in table 5. These estimates are based on test data and on the judgment of engineers and soil scientists who have had experience with the soils in this county and other counties.

Susceptibility of soils to frost action and suitability for winter grading depend on the texture of the soil, the depth to the water table, and the conditions common in the county in winter.

The suitability of soils as sources of topsoil, sand and gravel, and road fill depends on the texture, thickness, and location of the soils; the depth to the water table; and the number of rocks and boulders in the soil material. Soils in poorly drained areas contain too much organic matter to be suitable for use as road fill. Such material needs to be removed and replaced with suitable material. In areas that are frequently flooded or poorly drained, roadways should be built on embankments so that the surface of the pavement is at least 3 feet above the level of the water table.

interpretations

Soil features affecting—Continued					
Pipeline construction and maintenance	Impoundment		Agricultural drainage	Irrigation	Terraces, waterways, and diversions
	Reservoir area	Embankment			
High water table; flooding.	Flooding; some gravel lenses.	Stable with selective placement; high water table.	Outlets few; subject to flooding.	High water table.	Flooding; high water table.
High water table	No special problems	Fair stability	Slow permeability; high water table.	Slow permeability; high water table.	High water table; difficult to establish vegetation.
Depth to bedrock	Depth to bedrock	Instability; high shrink-swell potential.	Not needed	Slow infiltration; low to moderate available moisture capacity.	Depth to bedrock.
High water table	Some ledges and possible leakage.	Instability; good core material.	Slow permeability; high water table.	High water table; slow permeability.	High water table; difficult to establish vegetation.
Depth to shale bedrock.	Depth to shale bedrock; pervious substratum.	Subject to piping; fair stability.	Not needed	Low available moisture capacity.	Depth to shale bedrock; erodibility.
Seasonal high water table.	Some areas stony	Moderate shrink-swell potential; instability; good core material; some areas stony.	Slow permeability; seasonal high water table.	Slow permeability	Seasonal high water table; erodibility; some stony areas.
Seasonal high water table.	Possible pervious layers in substratum; ledges.	Difficult to compact.	Slow permeability	Slow infiltration; slow permeability.	Seepage on top of fragipan.
Moderately deep to bedrock.	Stoniness; pervious substratum; moderate depth to bedrock.	Pervious material; stoniness.	Not needed	Seasonal high water table; low available moisture capacity.	Difficult to establish vegetation; stony areas; moderate depth to bedrock.

TABLE 5.—*Engineering*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			Soil features affecting—
			Topsoil	Sand and gravel	Road fill	Highway location
Ernest (ErB, ErC, EsB, EsD)	Poor	Moderate	Fair; poor on very stony phases.	Unsuitable	Fair	Seasonal high water table; seepage on top of fragipan.
Gilpin (GcB2, GcC2, GcD2, GcD3, GcE2, GnB, GnD, GnF).	Fair	Moderate	Fair; poor on stony phases.	Unsuitable	Fair	Depth to shale bedrock.
Guernsey (GsB2, GsC2, GsC3, GsD2, GsD3).	Poor	High	Fair	Unsuitable	Poor	Seasonal high water table; soil slips common on cut slopes.
Gullied land (GuB, GuD, GuF)	Variable	Variable	Unsuitable.	Unsuitable	Variable	Variable
Lindside (Ln, Ls)	Poor	Moderate	Good	Unsuitable	Fair	Seasonal high water table; flooding.
Made land (MaB, MaD)	(1)	(1)	(1)	(1)	(1)	(1)
Melvin (Mc)	Poor	High	Good	Unsuitable	Poor	High water table; flooding.
Mine dump (Md)	(1)	(1)	(1)	(1)	(1)	(1)
Mine wash (Mm)	Poor	Variable	Unsuitable	Unsuitable	Variable	Variable
Monongahela (MoA, MoB2, MoC2)	Poor	Moderate	Fair	Poor	Fair	Seasonal high water table; seepage on top of fragipan.
Mucky peat (Mp)	Unsuitable	High	Unsuitable; good for mulch.	Unsuitable	Unsuitable	High water table; subsidence.
Philo (Ph)	Poor	High	Fair	Unsuitable	Fair	Flooding; seasonal high water table.
Purdy (Pu)	Poor	High	Poor	Unsuitable	Poor	High water table; instability.
Sequatchie (SeA)	Good	Low	Good	Fair	Good	No special problems
Strip mine spoil (SmB, SmD, SmF)	(1)	(1)	(1)	(1)	(1)	(1)
Tygart (TrA)	Poor	High	Fair	Unsuitable	Poor	Seasonal high water table.
Upshur (UcB2, UcC2, UgB2, UgC2, UgC3, UgD2, UgD3, UgE2). For properties of Gilpin part of UgB2, UgC2, UgC3, UgD2, UgD3, and UgE2 refer to Gilpin series.	Poor	Moderate	Fair	Unsuitable	Unsuitable	Instability; subject to slips.
Weikert (WeB, WeC, WeD, WhF, WkF).	Good	Low	Poor	Unsuitable	Fair; limited in quantity.	Depth to shale bedrock; rocky in places
Westmoreland (WmB2, WmB3, WmC2, WmC3, WmD2, WmD3, WmE2).	Fair	Moderate	Good	Unsuitable	Fair	Moderate depth to shale or limestone bedrock.
Wharton (WrB2, WrC2, WrC3, WrD2, WrD3).	Fair	High	Fair	Unsuitable	Poor	Seasonal high water table.

[1] Variable; requires onsite investigation.

interpretations—Continued

Soil features affecting—Continued					
Pipeline construction and maintenance	Impoundment: Reservoir area	Impoundment: Embankment	Agricultural drainage	Irrigation	Terraces, waterways, and diversions
Seasonal high water table.	Some areas stony	Instability; good core material; some areas stony.	Moderately slow permeability.	Seasonal high water table; stony in places.	Stoniness in places; seepage on fragipan.
Depth to shale bedrock.	Depth to shale bedrock; pervious substratum.	Fair stability; good shell material but subject to piping.	Not needed	Low to moderate available moisture capacity; depth to bedrock.	Shale exposed in places; erodibility.
Seasonal high water table.	Slow permeability; seasonal high water table.	Instability	Slow permeability	Slow infiltration; slow permeability; seasonal high water table.	Slips when saturated; seasonal high water table.
Variable	Variable	Variable	Not applicable	Not applicable	Deep gullies; ledges.
Seasonal high water table; flooding.	Flooding; pervious substratum in places.	Fair stability; piping; flooding.	Moderately slow permeability; flooding; seasonal high water table.	Flooding; high available moisture capacity; seasonal high water table.	Flooding; seasonal high water table.
[1]	[1]	[1]	[1]	[1]	[1].
Flooding; high water table.	High water table; flooding; pervious substratum in places.	Instability	Few outlets; flooding; high water table; moderately slow permeability.	High water table; flooding.	High water table.
[1]	[1]	[1]	[1]	[1]	[1].
Seasonal high water table; acidity.	Not suitable	Not suitable	Not applicable	Not applicable	Not applicable.
Seasonal high water table.	Previous sand and gravel lenses.	Fair stability; some permeable material.	Moderately slow permeability; seasonal high water table.	Moderately slow permeability; seasonal high water table.	Seepage on top of fragipan; difficult to establish vegetation; erodibility.
High water table; subsidence.	Organic matter	Subsidence; instability; high water table.	Lack of natural outlets; high water table.	Moderate to high available moisture capacity; high water table.	Not applicable.
Seasonal high water table; flooding.	Permeable lenses of sand and gravel; flooding.	Instability; good core material; flooding; stable with selective placement.	Subject to flooding; seasonal high water table.	Flooding; seasonal high water table.	Flooding; erodibility.
High water table	High water table	Instability	Slow permeability; seasonal high water table.	Slow infiltration; slow permeability.	High water table.
Corrosion potential	Moderately rapid permeability.	Susceptible to piping	Not needed	High available moisture capacity.	Erodibility.
[1]	[1]	[1]	[1]	[1]	[1].
Seasonal high water table.	Seasonal high water table.	Instability	Slow permeability; seasonal high water table.	Slow permeability; seasonal high water table.	Seasonal high water table.
High shrink-swell potential; instability.	Leakage through limestone.	Instability	Not applicable	Slow infiltration	Difficult to establish vegetation.
Depth to shale bedrock.	Depth to shale bedrock; stoniness in places; pervious bedrock.	Fair stability; limited in quantity.	Not needed	Low available moisture capacity.	Shallow over shale bedrock.
Moderate depth to shale or limestone bedrock.	Moderate depth to shale or limestone bedrock.	Moderate permeability; fair stability.	Not needed	Moderate depth to bedrock.	Few shale ledges; slips when saturated.
Seasonal high water table.	Slow permeability	Instability	Slow permeability; seasonal high water table.	Slow permeability; seasonal high water table.	Seasonal water table.

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A high water table or a prolonged wet period makes earthwork difficult in soils that are moderately well drained to poorly drained; therefore, the best time for highway work in areas of wet soils is during July and August. If highway cuts are planned at a location where the water table is high, a survey should be made to determine the need for interceptor drains and underdrains. Seepage along the back slopes of cuts is likely to cause slumping or sliding of the underlying material. Excess water below the pavement is likely to cause formation of ice lenses in the subgrade and differential volume changes, which in turn causes the pavement to break.

Features that affect pipeline construction and maintenance include soil texture, depth to bedrock, depth to the water table, flooding, acidity, and high organic matter content.

In the columns under "Impoundment," it should be noted that a particular feature that is a limitation in a reservoir area does not necessarily limit use in embankments. The interpretations given in these columns can be considered in the planning of dikes, levees, lagoons, and sedimentation pools.

Features affecting both surface and subsurface drainage are included in the column "Agricultural drainage." The main features considered are permeability, the depth to the water table, seepage zones, and availability of outlets.

TABLE 6.—*Interpretations for*

Map symbol	Soil	Degree and kind of limitation for—		
		Disposal of effluent from septic tanks	Sewage lagoons	Homesite locations with basements (3 stories or less)
At	Atkins silt loam	Severe; high water table; flooding.	Severe; flooding; high water table.	Severe; flooding; high water table.
BkA	Brinkerton silt loam, 0 to 3 percent slopes	Severe; high water table	Slight	Severe; high water table
BkB2	Brinkerton silt loam, 3 to 8 percent slopes, moderately eroded.	Severe; high water table	Moderate; slope	Severe; high water table
BrB2	Brooke silty clay loam, 3 to 8 percent slopes, moderately eroded.[1]	Severe; 2 to 4 feet to bedrock; moderately slow permeability.	Severe; 2 to 4 feet to bedrock.	Severe; 2 to 4 feet to bedrock.
BrC2	Brooke silty clay loam, 8 to 15 percent slopes, moderately eroded.[1]	Severe; 2 to 4 feet to bedrock; moderately slow permeability.	Severe; slope; 2 to 4 feet to bedrock.	Severe; 2 to 4 feet to bedrock.
Bu	Burgin and Burgin gray surface variant, silt loams.[1]	Severe; high water table; slow permeability.	Slight hazard of ground water contamination.	Severe; high water table
CaB2	Calvin silt loam, neutral substratum, 5 to 12 percent slopes, moderately eroded.	Severe; 2 to 4 feet to shale bedrock.	Severe; 2 to 4 feet to shale bedrock.	Moderate; 2 to 4 feet to rippable shale.
CaC2	Calvin silt loam, neutral substratum, 12 to 20 percent slopes, moderately eroded.	Severe; slope; 2 to 4 feet to shale bedrock.	Severe; slope	Moderate to severe; slope; 2 to 4 feet to rippable shale.
CaD2	Calvin silt loam, neutral substratum, 20 to 30 percent slopes, moderately eroded.	Severe; slope; 2 to 4 feet to shale bedrock.	Severe; slope	Severe; slope
C1B	Calvin very stony silt loam, neutral substratum, 0 to 12 percent slopes.	Severe; 2 to 4 feet to shale bedrock.	Severe; 2 to 4 feet to shale bedrock.	Moderate; 2 to 4 feet to shale bedrock; stoniness.
C1D	Calvin very stony silt loam, neutral substratum, 12 to 30 percent slopes.	Severe; slope; 2 to 4 feet to shale bedrock.	Severe; slope	Severe; slope
C1E	Calvin very stony silt loam, neutral substratum, 30 to 50 percent slopes.	Severe; slope	Severe; slope	Severe; slope
CnB	Cavode silt loam, 3 to 8 percent slopes	Severe; seasonal high water table; slow permeability.	Moderate; slope	Severe; seasonal high water table.
CnC2	Cavode silt loam, 8 to 15 percent slopes, moderately eroded.	Severe; seasonal high water table; slow permeability.	Severe; slope	Severe; seasonal high water table.
CoB	Cavode very stony silt loam, 0 to 8 percent slopes.	Severe; seasonal high water table; slow permeability.	Moderate; slope	Severe; seasonal high water table.
CoD	Cavode very stony silt loam, 8 to 25 percent slopes.	Severe; seasonal high water table; slope.	Severe; slope	Severe; seasonal high water table; slope.
CuB2	Clarksburg silt loam, 3 to 8 percent slopes, moderately eroded.	Severe; seasonal high water table; slow permeability.	Moderate; slope	Moderate; seasonal high water table.
CuC2	Clarksburg silt loam, 8 to 15 percent slopes, moderately eroded.	Severe; seasonal high water table; slow permeability.	Severe; slope	Moderate; seasonal high water table; slope.

See footnotes at end of table.

The features listed in the column "Irrigation" refer only to sprinkler type systems. Some of the features considered are soil depth, available moisture capacity, permeability, stoniness, slope, and erosion hazard.

The main features affecting the construction of terraces, diversions, and waterways are depth to bedrock, soil texture, number of boulders and cobblestones, seepage, erosion hazard, and difficulty in establishing a good vegetative cover.

Community development

Interpretations compiled from this survey can be utilized in drafting a land use plan for Westmoreland County. The detailed soil map, the estimates in table 6 in this section, and the estimates in table 5 in the section "Engineering Uses" will help determine the limitations of a particular area for specified kinds of development. These interpretations can be used as a guide, but they do not eliminate the need for detailed investigation at the site of a planned development.

Table 6 lists all of the soils in the county and shows the kind and the estimated degree of limitation of each for specified uses. Location, in relation to established centers or transportation lines, and other economic factors that are important and affect the selection of a development site were not considered in estimating the degrees of limitation shown in table 6.

recreation and community development

Degree and kind of limitation for—Continued					
Landscaping and lawns	Streets and parking lots	Athletic fields	Parks and play areas	Sanitary land fill	Cemeteries
Severe; high water table.	Severe; high water table.	Severe; high water table; flooding.	Severe; high water table.	Severe; flooding; high water table.	Severe; high water table; flooding.
Severe; high water table.	Severe; high water table.	Severe; high water table.	Severe; high water table.	Severe; high water table.	Severe; high water table.
Severe; high water table.	Severe; high water table.	Severe; high water table.	Severe; high water table.	Severe; high water table.	Severe; high water table.
Moderate; 2 to 4 feet to bedrock.	Severe; 2 to 4 feet to bedrock.	Severe; 2 to 4 feet to bedrock.	Moderate; fine texture; 2 to 4 feet to bedrock.	Severe; 2 to 4 feet to bedrock.	Severe; 2 to 4 feet to bedrock.
Moderate; slope; 2 to 4 feet to bedrock.	Severe; slope; 2 to 4 feet to bedrock.	Severe; slope; 2 to 4 feet to bedrock.	Moderate; slope; fine texture; 2 to 4 feet to bedrock.	Severe; 2 to 4 feet to bedrock.	Severe; 2 to 4 feet to bedrock.
Severe; high water table.	Severe; high water table.	Severe; high water table.	Severe; high water table.	Severe; high water table.	Severe; high water table.
Moderate; 2 to 4 feet to shale bedrock.	Moderate; 2 to 4 feet to shale bedrock.	Moderate; 2 to 4 feet to shale bedrock; slope.	Slight	Moderate; 2 to 4 feet to rippable shale.	Moderate; 2 to 4 feet to shale bedrock.
Moderate; 2 to 4 feet to shale bedrock; slope.	Severe; slope	Severe; slope	Moderate; slope	Moderate; 2 to 4 feet to shale bedrock.	Moderate; 2 to 4 feet to shale bedrock; slope.
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope.
Moderate; 2 to 4 feet to shale bedrock; stoniness.	Moderate; slope; 2 to 4 feet to shale bedrock.	Moderate; stoniness; 2 to 4 feet to shale bedrock.	Slight	Moderate; 2 to 4 feet to shale bedrock; stoniness.	Severe; stoniness.
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope; stoniness.
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope.
Moderate; seasonal high water table.	Moderate; seasonal high water table; slope.	Severe; seasonal high water table.	Moderate; seasonal high water table.	Severe; seasonal high water table.	Severe; seasonal high water table.
Moderate; seasonal high water table; slope.	Severe; slope	Severe; slope; seasonal high water table.	Moderate; seasonal high water table; slope.	Severe; seasonal high water table.	Severe; seasonal high water table.
Moderate; stoniness; seasonal high water table.	Moderate; seasonal high water table; slope.	Severe; seasonal high water table.	Moderate; seasonal high water table.	Severe; seasonal high water table.	Severe; seasonal high water table; stoniness.
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; seasonal high water table; slope.	Severe; seasonal high water table; slope.
Slight	Moderate; seasonal high water table; slope.	Moderate; seasonal high water table.	Slight	Severe; slow permeability; seasonal high water table.	Severe; seasonal high water table; slow permeability.
Moderate; slope	Severe; slope	Severe; slope	Moderate; slope	Severe; seasonal high water table; slow permeability.	Severe; seasonal high water table; slow permeability.

TABLE 6.—*Interpretations for recreation*

Map symbol	Soil	Degree and kind of limitation for—		
		Disposal of effluent from septic tanks	Sewage lagoons	Homesite locations with basements (3 stories or less)
DaB	Dekalb channery loam, 5 to 12 percent slopes	Severe; 2 to 4 feet to bedrock.	Severe; 2 to 4 feet to bedrock; moderately rapid permeability.	Severe; 2 to 4 feet to bedrock.
DaC2	Dekalb channery loam, 12 to 20 percent slopes, moderately eroded.	Severe; slope; 2 to 4 feet to bedrock.	Severe; slope	Severe; 2 to 4 feet to bedrock.
DaD2	Dekalb channery loam, 20 to 30 percent slopes, moderately eroded.	Severe; slope	Severe; slope	Severe; slope; 2 to 4 feet to bedrock.
DbB	Dekalb very stony loam, 0 to 12 percent slopes	Severe; 2 to 4 feet to bedrock.	Severe; 2 to 4 feet to bedrock.	Severe; 2 to 4 feet to bedrock.
DbD	Dekalb very stony loam, 12 to 30 percent slopes.	Severe; slope; 2 to 4 feet to bedrock.	Severe; slope	Severe; slope; 2 to 4 feet to bedrock.
DbF	Dekalb very stony loam, 30 to 80 percent slopes.	Severe; slope	Severe; slope	Severe; slope
ErB	Ernest silt loam, 3 to 8 percent slopes [1]	Severe; moderately slow permeability; seasonal high water table.	Moderate; slope	Moderate; seasonal high water table.
ErC	Ernest silt loam, 8 to 15 percent slopes	Severe; moderately slow permeability; seasonal high water table.	Severe; slope	Moderate; slope; seasonal high water table.
EsB	Ernest very stony silt loam, 0 to 8 percent slopes.	Severe; moderately slow permeability; seasonal high water table.	Moderate; slope	Moderate; seasonal high water table; stoniness.
EsD	Ernest very stony silt loam, 8 to 25 percent slopes.	Severe; slope; moderately slow permeability; seasonal high water table.	Severe; slope	Severe; slope
GcB2	Gilpin channery silt loam, 5 to 12 percent slopes, moderately eroded.	Severe; 1½ to 3 feet to shale bedrock.	Severe; 1½ to 3 feet to shale bedrock.	Moderate; 1½ to 3 feet to shale bedrock.
GcC2	Gilpin channery silt loam, 12 to 20 percent slopes, moderately eroded.	Severe; slope; 1½ to 3 feet to shale bedrock.	Severe; slope; 1½ to 3 feet to shale bedrock.	Moderate; 1½ to 3 feet to shale bedrock; slope.
GcD2	Gilpin channery silt loam, 20 to 30 percent slopes, moderately eroded.	Severe; slope	Severe; slope	Severe; slope
GcD3	Gilpin channery silt loam, 20 to 30 percent slopes, severely eroded.	Severe; slope	Severe; slope	Severe; slope
GcE2	Gilpin channery silt loam, 30 to 40 percent slopes, moderately eroded.	Severe; slope	Severe; slope	Severe; slope
GnB	Gilpin very stony silt loam; 0 to 12 percent slopes.	Severe; 1½ to 3 feet to shale bedrock.	Severe; 1½ to 3 feet to shale bedrock.	Moderate; 1½ to 3 feet to shale bedrock; stoniness.
GnD	Gilpin very stony silt loam, 12 to 30 percent slopes.	Severe; slope; 1½ to 3 feet to shale bedrock.	Severe; slope	Severe; slope
GnF	Gilpin very stony silt loam, 30 to 80 percent slopes.	Severe; slope	Severe; slope	Severe; slope
GsB2	Guernsey silt loam, 3 to 8 percent slopes, moderately eroded.	Severe; seasonal high water table; slow permeability.	Moderate; slope	Moderate; seasonal high water table.
GsC2	Guernsey silt loam, 8 to 15 percent slopes, moderately eroded.	Severe; seasonal high water table; slow permeability.	Severe; slope	Moderate; seasonal high water table; slope.
GsC3	Guernsey silt loam, 8 to 15 percent slopes, severely eroded.	Severe; seasonal high water table; moderately slow permeability.	Severe; slope	Moderate; seasonal high water table; slope.
GsD2	Guernsey silt loam, 15 to 25 percent slopes, moderately eroded.	Severe; slope	Severe; slope	Severe; slope
GsD3	Guernsey silt loam, 15 to 25 percent slopes, severely eroded.	Severe; slope	Severe; slope	Severe; slope

and community development—Continued

Degree and kind of limitation for—Continued					
Landscaping and lawns	Streets and parking lots	Athletic fields	Parks and play areas	Sanitary land fill	Cemeteries
Moderate; 2 to 4 feet to bedrock.	Severe; slope; 2 to 4 feet to bedrock.	Severe; slope; 2 to 4 feet to bedrock.	Moderate; 2 to 4 feet to bedrock.	Severe; 2 to 4 feet to bedrock.	Severe; 2 to 4 feet to bedrock.
Moderate; slope; 2 to 4 feet to bedrock.	Severe; slope; 2 to 4 feet to bedrock.	Severe; slope; 2 to 4 feet to bedrock.	Moderate; slope; 2 to 4 feet to bedrock.	Severe; 2 to 4 feet to bedrock.	Severe; 2 to 4 feet to bedrock.
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope.
Severe; coarse fragments.	Severe; 2 to 4 feet to bedrock.	Severe; 2 to 4 feet to bedrock; coarse fragments.	Severe; coarse fragments.	Severe; 2 to 4 feet to bedrock.	Severe; stoniness; 2 to 4 feet to bedrock.
Severe; slope; coarse fragments.	Severe; slope	Severe; slope	Severe; slope	Severe; slope; 2 to 4 feet to bedrock.	Severe; slope; 2 to 4 feet to bedrock.
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope.
Slight	Moderate; slope; seasonal high water table.	Moderate; slope; seasonal high water table.	Slight	Moderate; moderately slow permeability; seasonal high water table.	Moderate; seasonal high water table; moderately slow permeability.
Moderate; slope	Severe; slope	Severe; slope	Moderate; slope	Moderate; seasonal high water table; moderately slow permeability.	Moderate; seasonal high water table; moderately slow permeability.
Moderate; stoniness.	Moderate; slope; seasonal high water table.	Moderate; stoniness; slope; seasonal high water table.	Slight	Moderate; seasonal high water table; moderately slow permeability.	Severe; stoniness.
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; stoniness; slope.
Moderate; 1½ to 3 feet to shale bedrock.	Moderate; slope; 1½ to 3 feet to shale bedrock.	Moderate; slope; 1½ to 3 feet to shale bedrock.	Slight	Moderate; 1½ to 3 feet to shale bedrock.	Moderate; 1½ to 3 feet to shale bedrock.
Moderate; slope; 1½ to 3 feet to shale bedrock.	Severe; slope	Severe; slope	Moderate; slope	Moderate; 1½ to 3 feet to shale bedrock; slope.	Moderate; 1½ to 3 feet to shale bedrock; slope.
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope.
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope.
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope.
Moderate; stoniness; 1½ to 3 feet to shale bedrock.	Moderate; slope; 1½ to 3 feet to shale bedrock.	Moderate; 1½ to 3 feet to shale bedrock; stoniness.	Slight	Moderate; 1½ to 3 feet to shale bedrock; stoniness.	Severe; stoniness.
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope; stoniness.
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope.
Slight	Moderate; seasonal high water table; slope.	Moderate; seasonal high water table; slope.	Slight	Severe; seasonal high water table; slow permeability.	Severe; seasonal high water table; slow permeability.
Moderate; slope	Severe; slope	Severe; slope	Moderate; slope	Severe; seasonal high water table; slow permeability.	Severe; seasonal high water table; slow permeability.
Severe; slope; eroded.	Severe; slope	Severe; slope	Moderate; slope	Severe; seasonal high water table; slow permeability.	Severe; seasonal high water table; slow permeability.
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope.
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope.

TABLE 6.—*Interpretations for recreation*

Map symbol	Soil	Degree and kind of limitation for—		
		Disposal of effluent from septic tanks	Sewage lagoons	Homesite locations with basements (3 stories or less)
GuB	Gullied land, 0 to 12 percent slopes	(2)	(2)	(2)
GuD	Gullied land, 12 to 30 percent slopes	Severe; slope	Severe; slope	Severe; slope
GuF	Gullied land, 30 to 60 percent slopes	Severe; slope	Severe; slope	Severe; slope
Ln	Lindside silt loam	Severe; flooding; seasonal high water table.	Severe; flooding	Severe; flooding
Ls	Lindside silt loam, very acid	Severe; flooding; seasonal high water table.	Severe; flooding	Severe; flooding
MaB	Made land, 0 to 8 percent slopes	(2)	(2)	(2)
MaD	Made land, 8 to 35 percent slopes	Severe; slope	Severe; slope	Severe; slope
Mc	Melvin silt loam	Severe; flooding; high water table.	Severe; flooding	Severe; flooding; high water table.
Md	Mine dump	Severe; slope	Severe; slope	Severe; slope
Mm	Mine wash	Severe; flooding	Severe; flooding	Severe; flooding
MoA	Monongahela silt loam, 0 to 3 percent slopes [1]	Severe; moderately slow permeability.	Slight	Moderate; seasonal high water table.
MoB2	Monongahela silt loam, 3 to 8 percent slopes, moderately eroded.[1]	Severe; moderately slow permeability.	Moderate; slope	Moderate; seasonal high water table.
MoC2	Monongahela silt loam, 8 to 15 percent slopes, moderately eroded.[1]	Severe; moderately slow permeability.	Severe; slope	Moderate; seasonal high water table; slope.
Mp	Mucky peat	Severe; high water table	Severe; organic matter.	Severe; subsidence; high water table.
Ph	Philo silt loam	Severe; flooding	Severe; flooding	Severe; flooding
Pu	Purdy silt loam	Severe; high water table; slow permeability.	Slight	Severe; high water table
SeA	Sequatchie silt loam, 0 to 5 percent slopes [1]	Slight	Severe; rapid permeability.	Slight
SmB	Strip mine spoil, 0 to 8 percent slopes	(2)	(2)	(2)
SmD	Strip mine spoil, 8 to 25 percent slopes	Severe; slope	Severe; slope	Severe; slope
SmF	Strip mine spoil, 25 to 75 percent slopes	Severe; slope	Severe; slope	Severe; slope
TrA	Tygart silt loam, 0 to 3 percent slopes	Severe; seasonal high water table; slow permeability.	Slight	Severe; seasonal high water table.
UcB2	Upshur silty clay loam, 3 to 8 percent slopes, moderately eroded.	Severe; slow permeability.	Moderate; slope; depth to bedrock.	Moderate; instability
UcC2	Upshur silty clay loam, 8 to 15 percent slopes, moderately eroded.	Severe; slow permeability.	Severe; slope	Moderate; slope; instability.
UgB2	Upshur-Gilpin silty clay loams, 3 to 8 percent slopes, moderately eroded.	Severe; depth to bedrock; slow permeability.	Severe; depth to bedrock.	Moderate; depth to bedrock; instability.
UgC2	Upshur-Gilpin silty clay loams, 8 to 15 percent slopes, moderately eroded.	Severe; slow permeability; depth to bedrock.	Severe; slope	Moderate; instability; depth to bedrock.
UgC3	Upshur-Gilpin silty clay loams, 8 to 15 percent slopes, severely eroded.	Severe; slow permeability; depth to bedrock.	Severe; slope	Moderate; instability; depth to bedrock.
UgD2	Upshur-Gilpin silty clay loams, 15 to 25 percent slopes, moderately eroded.	Severe; slope	Severe; slope	Severe; slope; instability
UgD3	Upshur-Gilpin silty clay loams, 15 to 25 percent slopes, severely eroded.	Severe; slope	Severe; slope	Severe; slope
UgE2	Upshur-Gilpin silty clay loams, 25 to 35 percent slopes, moderately eroded.	Severe; slope	Severe; slope	Severe; slope
WeB	Weikert shaly silt loam, 5 to 12 percent slopes [1]	Severe; 1 foot to 2 feet to shale bedrock.	Severe; 1 foot to 2 feet to shale bedrock; moderately rapid permeability.	Moderate; 1 foot to 2 feet to shale bedrock.

See footnotes at end of table.

and community development—Continued

Degree and kind of limitation for—Continued					
Landscaping and lawns	Streets and parking lots	Athletic fields	Parks and play areas	Sanitary land fill	Cemeteries
[2]	[2]	[2]	[2]	[2]	[2].
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope.
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope.
Moderate; flooding.	Severe; flooding	Severe; flooding	Moderate; flooding	Severe; seasonal high water table; flooding.	Severe; flooding; seasonal high water table.
Severe; acid material.	Severe; flooding	Severe; flooding	Moderate; flooding; acid material.	Severe; flooding; seasonal high water table.	Severe; flooding; seasonal high water table.
[2]	[2]	[2]	[2]	[2]	[2].
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope.
Severe; high water table.	Severe; high water table; flooding.	Severe; high water table; flooding.	Severe; high water table; flooding.	Severe; high water table; flooding	Severe; high water table; flooding.
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope.
Severe; extremely acid.	Severe; flooding	Severe; flooding; extremely acid.	Severe; extremely acid; high water table.	Severe; flooding	Severe; flooding; extremely acid.
Slight	Moderate; seasonal high water table.	Moderate; seasonal high water table.	Slight	Moderate; seasonal high water table; moderately slow permeability.	Moderate; seasonal high water table; moderately slow permeability.
Slight	Moderate; slope; seasonal high water table.	Moderate; seasonal high water table; slope.	Slight	Moderate; seasonal high water table; moderately slow permeability.	Moderate; seasonal high water table; moderately slow permeability.
Moderate; slope	Severe; slope	Severe; slope	Moderate; slope	Moderate; seasonal high water table; slope; moderately slow permeability.	Moderate; seasonal high water table; slope; moderately slow permeability.
Severe; high water table.	Severe; subsidence; high water table.	Severe; subsidence; high water table.	Severe; high water table.	Severe; high water table.	Severe; high water table.
Moderate; flooding.	Severe; flooding	Severe; flooding	Moderate; flooding	Severe; flooding; seasonal high water table.	Severe; flooding; seasonal high water table.
Severe; high water table.	Severe; high water table.	Severe; high water table.	Severe; high water table.	Severe; high water table.	Severe; high water table.
Slight	Slight	Slight	Slight	Slight	Slight.
[2]	[2]	[2]	[2]	[2]	[2].
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope.
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope.
Moderate; seasonal high water table.	Moderate; seasonal high water table.	Severe; seasonal high water table.	Moderate; seasonal high water table.	Severe; seasonal high water table.	Severe; seasonal high water table.
Moderate; surface texture.	Moderate; instability; slope.	Severe; slow permeability.	Moderate; surface texture.	Severe; slow permeability.	Severe; slow permeability.
Moderate; slope; surface texture.	Severe; slope	Severe; slow permeability; slope.	Moderate; surface texture; slope.	Severe; slow permeability.	Severe; slow permeability.
Moderate; depth to bedrock; surface texture.	Severe; shallowness; depth to bedrock; instability.	Severe; instability; slow permeability.	Moderate; surface texture.	Severe; slow permeability.	Severe; slow permeability.
Moderate; slope; surface texture; depth to bedrock.	Severe; slope	Severe; slope	Moderate; slope; surface texture.	Severe; slow permeability.	Severe; slow permeability.
Severe; eroded	Severe; slope	Severe; slope	Moderate; slope; surface texture.	Severe; slow permeability.	Severe; eroded; slow permeability.
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope; slow permeability.	Severe; slow permeability.
Severe; eroded	Severe; slope	Severe; slope	Severe; slope	Severe; slope; slips; slow permeability.	Severe; slope; slow permeability; eroded.
Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope	Severe; slope.
Moderate; 1 foot to 2 feet to shale bedrock.	Moderate; 1 foot to 2 feet to shale bedrock.	Severe; 1 foot to 2 feet to shale bedrock.	Moderate; 1 foot to 2 feet to shale bedrock.	Severe; 1 foot to 2 feet to shale bedrock.	Moderate; 1 foot to 2 feet to shale bedrock.

TABLE 6.—*Interpretations for recreation*

Map symbol	Soil	Degree and kind of limitation for—		
		Disposal of effluent from septic tanks	Sewage lagoons	Homesite locations with basements (3 stories or less)
WeC	Weikert shaly silt loam, 12 to 20 percent slopes.[1]	Severe; slope; 1 foot to 2 feet to shale bedrock.	Severe; slope	Moderate; slope; 1 foot to 2 feet to shale bedrock.
WeD	Weikert shaly silt loam, 20 to 30 percent slopes.[1]	Severe; slope; 1 foot to 2 feet to shale bedrock.	Severe; slope	Severe; slope
WhF	Weikert soils, 30 to 60 percent slopes	Severe; slope	Severe; slope	Severe; slope
WkF	Weikert very rocky silt loam, 40 to 100 percent slopes.	Severe; slope	Severe; slope	Severe; slope
WmB2	Westmoreland silt loam, 5 to 12 percent slopes, moderately eroded.	Severe; 2 to 5 feet to bedrock.	Severe; 2 to 5 feet to bedrock.	Moderate; slope; 2 to 5 feet to bedrock.
WmB3	Westmoreland silt loam, 5 to 12 percent slopes, severely eroded.	Severe; 2 to 5 feet to bedrock.	Severe; 2 to 5 feet to bedrock.	Moderate; 2 to 5 feet to bedrock.
WmC2	Westmoreland silt loam, 12 to 20 percent slopes, moderately eroded.	Severe; 2 to 5 feet to bedrock.	Severe; slope	Moderate; slope; 2 to 5 feet to bedrock.
WmC3	Westmoreland silt loam, 12 to 20 percent slopes, severely eroded.	Severe; 2 to 5 feet to bedrock.	Severe; slope	Moderate; slope; 2 to 5 feet to bedrock.
WmD2	Westmoreland silt loam, 20 to 30 percent slopes, moderately eroded.	Severe; slope; 2 to 5 feet to bedrock.	Severe; slope	Severe; slope
WmD3	Westmoreland silt loam, 20 to 30 percent slopes, severely eroded.	Severe; slope; 2 to 5 feet to bedrock.	Severe; slope	Severe; slope
WmE2	Westmoreland silt loam, 30 to 40 percent slopes, moderately eroded.	Severe; slope	Severe; slope	Severe; slope
WrB2	Wharton silt loam, 3 to 8 percent slopes, moderately eroded.	Severe; slow permeability; seasonal high water table.	Moderate; slope; 3 to 5 feet to bedrock.	Moderate; seasonal high water table.
WrC2	Wharton silt loam, 8 to 15 percent slopes, moderately eroded.	Severe; slow permeability; seasonal high water table.	Severe; slope	Moderate; slope; seasonal high water table.
WrC3	Wharton silt loam, 8 to 15 percent slopes, severely eroded.	Severe; slow permeability; seasonal high water table.	Severe; slope	Moderate; slope; seasonal high water table.
WrD2	Wharton silt loam, 15 to 25 percent slopes, moderately eroded.	Severe; slope; slow permeability.	Severe; slope	Severe; slope
WrD3	Wharton silt loam, 15 to 25 percent slopes, severely eroded.	Severe; slope; slow permeability.	Severe; slope	Severe; slope

[1] Ground water may become contaminated by seepage through permeable layers and bedrock.
[2] Variable; requires onsite investigation.

Features that affect the use of soils for community development include depth to bedrock, degree of slope, rate of permeability, hazard of flooding, depth to the seasonal high water table, soil texture, and stoniness. In table 6 the limitation of each soil for specified uses is rated *slight*, *moderate*, and *severe*, and the chief limiting features are given. A rating of *slight* indicates little or no limitation. A rating of *moderate* indicates limitations that can be overcome by special practices. A rating of *severe* indicates limitations that generally are difficult to overcome, but it does not imply that the soil cannot be used for the purposes specified. Further explanation of the data shown in table 6 is given in the following paragraphs.

DISPOSAL OF EFFLUENT FROM SEPTIC TANKS.—The chief limiting features are slow permeability, steepness of slope, shallowness over bedrock, and a seasonally high water table. Furthermore, if a soil is underlain by cavernous limestone, the underground water is likely to be contaminated by seepage through rock crevices or solution channels. A rating of *slight* indicates that the soil generally has few or no limitations that affect its use as a disposal field. A rating of *moderate* indicates that the soil is borderline and should be investigated carefully at the exact site of installation. In some soils, moderate limitations can be overcome by making the disposal field larger. A rating of *severe* indicates that the soil has one or more very undesirable features and should be very carefully investigated to determine whether or not a disposal field can be expected to function adequately. If the disposal field is to be used for only a short time, during a summer camping season, for example, the limitation is likely to be less severe than is indicated in the table.

SEWAGE LAGOONS.—Slope, seepage, permeability of the substratum, depth to rock, and flood hazard are among the factors that determine the degrees of limitation of soils as sites for sewage lagoons. The limitations are much the same as those for farm ponds, as shown in table 5 in the section "Engineering Uses."

and community development—Continued

Degree and kind of limitation for—Continued					
Landscaping and lawns	Streets and parking lots	Athletic fields	Parks and play areas	Sanitary land fill	Cemeteries
Moderate; 1 foot to 2 feet to shale bedrock.	Severe; slope.	Severe; slope.	Moderate; slope; 1 foot to 2 feet to shale bedrock.	Severe; 1 foot to 2 feet to shale bedrock.	Severe; 1 foot to 2 feet to shale bedrock.
Severe; slope.	Severe; slope.	Severe; slope.	Severe; slope.	Severe; slope; a foot to 2 feet to shale bedrock.	Severe; slope; 1 foot to 2 feet to shale bedrock.
Severe; slope.	Severe; slope.	Severe; slope.	Severe; slope.	Severe; slope.	Severe; slope.
Severe; slope.	Severe; slope.	Severe; slope.	Severe; slope.	Severe; slope.	Severe; slope.
Moderate; 2 to 5 feet to bedrock.	Moderate; slope; 2 to 5 feet to bedrock.	Moderate; slope; 2 to 5 feet to bedrock.	Slight.	Moderate; 2 to 5 feet to bedrock.	Moderate; 2 to 5 feet to bedrock.
Moderate; eroded; 2 to 5 feet to bedrock.	Moderate; slope; 2 to 5 feet to bedrock.	Moderate; slope; 2 to 5 feet to bedrock.	Slight.	Moderate; 2 to 5 feet to bedrock.	Moderate; 2 to 5 feet to bedrock; eroded.
Moderate; slope; 2 to 5 feet to bedrock.	Severe; slope.	Severe; slope.	Moderate; slope.	Moderate; slope; 2 to 5 feet to bedrock.	Moderate; slope; 2 to 5 feet to bedrock.
Severe; eroded; slope.	Severe; slope.	Severe; slope.	Moderate; slope.	Severe; slope.	Severe; eroded; slope.
Severe; slope.	Severe; slope.	Severe; slope.	Severe; slope.	Severe; slope.	Severe; slope.
Severe; eroded; slope.	Severe; slope.	Severe; slope.	Severe; slope.	Severe; slope.	Severe; slope; eroded.
Severe; slope.	Severe; slope.	Severe; slope.	Severe; slope.	Severe; slope.	Severe; slope.
Slight.	Moderate; slope; seasonal high water table.	Moderate; slope; seasonal high water table.	Slight.	Severe; seasonal high water table, slow permeability.	Severe; seasonal high water table; slow permeability.
Moderate; slope.	Severe; slope.	Severe; slope.	Moderate; slope.	Severe; seasonal high water table; slow permeability.	Severe; seasonal high water table; slow permeability.
Severe; eroded; slope.	Severe; slope.	Severe; slope.	Moderate; slope.	Severe; seasonal high water table; slow permeability.	Severe; seasonal high water table; slow permeability; eroded.
Severe; slope.	Severe; slope.	Severe; slope.	Severe; slope.	Severe; slope; slow permeability.	Severe; slope; slow permeability.
Severe; eroded; slope.	Severe; slope.	Severe; slope.	Severe; slope.	Severe; slope; slow permeability.	Severe; slope; eroded.

FOUNDATIONS.—Characteristics considered in determining the degree of limitation were depth to a seasonally high water table, depth to and kind of bedrock, degree of slope, hazard of flooding, and the need for shaping and other kinds of landscaping. Where flooding occurs, the limitation is severe. For a building without a basement, the depth to rock and the depth to a high water table are less severe limitations than are indicated in the table.

LANDSCAPING AND LAWNS.—Suitable soil material in sufficient amounts is needed for good growth of desirable trees and other plants. Among the important soil properties that determine whether or not a good lawn can be established are soil depth, texture, slope, droughtiness, depth to the water table, and the number of stones or rocks. Needs for lime and fertilizer were not considered.

STREETS AND PARKING LOTS.—The soil requirements and limitations for streets and parking lots are similar to those for highways. Table 5 in the section "Engineering Uses" shows the depth to and the kind of bedrock, the depth to the water table, and the texture of each soil in the county. Table 5 also shows the suitability of each soil as material for road fill, the limitations that affect highway location, and the susceptibility to frost action. Other limiting features are flooding and steepness of slope. Soils that have a gradient of more than 8 percent are severely limited for use as streets and parking lots in subdivisions.

ATHLETIC FIELDS.—The fairly small areas needed for baseball, tennis, volleyball, and other games must be nearly level and may require considerable shaping. Normally, a soil that has a clayey or gravelly surface layer is unsuitable. Other limiting features are steep slopes, shallowness over bedrock, a high water table, rockiness or stoniness, and flooding or local ponding.

PARKS AND PLAY AREAS.—Fairly large virgin areas in this county are suitable for hiking, picnicking, and other kinds of recreation, and many small areas can be cleared and kept in sod for these purposes. The main features

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that restrict the use of soils for parks and play areas are steep slopes, flooding, a high water table, unfavorable soil texture, and rockiness or stoniness. Steep or rocky areas can be used as scenic spots or as nature trails.

SANITARY LAND FILL.—A sanitary land fill is an area in which refuse and garbage are disposed of by covering them with soil material to a depth great enough to meet the requirements of sanitation and stability. If trenches are dug, the depth to underlying rock is especially important. Among the limiting features are shallowness to rock, flooding, a high water table, and stoniness or rockiness. Sinkholes in limestone areas should not be used for refuse disposal areas because seepage from the refuse can enter solution channels and contaminate the underground water. Esthetic, economic, and sociological factors are important but are not considered in the ratings shown in table 6.

CEMETERIES.—Deep, unconsolidated soil material that is easily excavated is the main requirement for a cemetery site. Flooding and a water table within 6 feet of the surface are limitations. Stonefree, medium-textured soils are desirable so that the area can be landscaped and lawns can be established and maintained with minimum maintenance.

Descriptions of the Soils

This section describes the soil series and mapping units of Westmoreland County. The approximate acreage and the proportionate extent of each mapping unit are given in table 7.

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

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

Soil scientists, engineers, students, and others who want additional information should turn to the section "Formation and Classification of the Soils." Many terms used in the soil descriptions and other sections of the survey are defined in the Glossary.

TABLE 7.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent
	Acres	*Percent*
Atkins silt loam	7, 308	1. 1
Brinkerton silt loam, 0 to 3 percent slopes	1, 040	. 2
Brinkerton silt loam, 3 to 8 percent slopes, moderately eroded	420	. 1
Brooke silty clay loam, 3 to 8 percent slopes, moderately eroded	5, 322	. 8
Brooke silty clay loam, 8 to 15 percent slopes, moderately eroded	2, 470	. 4
Burgin and Burgin gray surface variant, silt loams	999	. 1
Calvin silt loam, neutral substratum, 5 to 12 percent slopes, moderately eroded	436	. 1
Calvin silt loam, neutral substratum, 12 to 20 percent slopes, moderately eroded	958	. 1
Calvin silt loam, neutral substratum, 20 to 30 percent slopes, moderately eroded	166	(1)
Calvin very stony silt loam, neutral substratum, 0 to 12 percent slopes	413	. 1
Calvin very stony silt loam, neutral substratum, 12 to 30 percent slopes	3, 424	. 5
Calvin very stony silt loam, neutral substratum, 30 to 50 percent slopes	5, 496	. 8
Cavode silt loam, 3 to 8 percent slopes	8, 288	1. 3
Cavode silt loam, 8 to 15 percent slopes, moderately eroded	1, 463	. 2
Cavode very stony silt loam, 0 to 8 percent slopes	3, 506	. 5
Cavode very stony silt loam, 8 to 25 percent slopes	1, 187	. 2
Clarksburg silt loam, 3 to 8 percent slopes, moderately eroded	11, 351	1. 7
Clarksburg silt loam, 8 to 15 percent slopes, moderately eroded	4, 547	. 7
Dekalb channery loam, 5 to 12 percent slopes	4, 473	. 7
Dekalb channery loam, 12 to 20 percent slopes, moderately eroded	99	(1)
Dekalb channery loam, 20 to 30 percent slopes, moderately eroded	1, 245	. 2
Dekalb very stony loam, 0 to 12 percent slopes	5, 962	. 9
Dekalb very stony loam, 12 to 30 percent slopes	16, 893	2. 6
Dekalb very stony loam, 30 to 80 percent slopes	12, 527	1. 9
Ernest silt loam, 3 to 8 percent slopes	28, 293	4. 3
Ernest silt loam, 8 to 15 percent slopes	12, 813	1. 9
Ernest very stony silt loam, 0 to 8 percent slopes	11, 112	1. 7
Ernest very stony silt loam, 8 to 25 percent slopes	12, 466	1. 9
Gilpin channery silt loam, 5 to 12 percent slopes, moderately eroded	48, 073	7. 3
Gilpin channery silt loam, 12 to 20 percent slopes, moderately eroded	51, 865	7. 9
Gilpin channery silt loam, 20 to 30 percent slopes, moderately eroded	36, 197	5. 5
Gilpin channery silt loam, 20 to 30 percent slopes, severely eroded	1, 066	. 2
Gilpin channery silt loam, 30 to 40 percent slopes, moderately eroded	26, 582	4. 1
Gilpin very stony silt loam, 0 to 12 percent slopes	6, 311	1. 0
Gilpin very stony silt loam, 12 to 30 percent slopes	19, 050	2. 9
Gilpin very stony silt loam, 30 to 80 percent slopes	5, 840	. 9
Guernsey silt loam, 3 to 8 percent slopes, moderately eroded	13, 162	2. 0
Guernsey silt loam, 8 to 15 percent slopes, moderately eroded	20, 284	3. 1
Guernsey silt loam, 8 to 15 percent slopes, severely eroded	1, 303	. 2
Guernsey silt loam, 15 to 25 percent slopes, moderately eroded	2, 462	. 4
Guernsey silt loam, 15 to 25 percent slopes, severely eroded	1, 056	. 2
Gullied land, 0 to 12 percent slopes	29	(1)
Gullied land, 12 to 30 percent slopes	353	. 1
Gullied land, 30 to 60 percent slopes	66	(1)

See footnote at end of table.

TABLE 7.—*Approximate acreage and proportionate extent of the soils—continued*

Soil	Area	Extent
	Acres	*Percent*
Lindside silt loam	2, 588	. 4
Lindside silt loam, very acid	2, 238	. 3
Made land, 0 to 8 percent slopes	1, 243	. 2
Made land, 8 to 35 percent slopes	1, 130	. 2
Melvin silt loam	1, 667	. 2
Mine dump	2, 188	. 3
Mine wash	114	(1)
Monongahela silt loam, 0 to 3 percent slopes	1, 045	. 2
Monongahela silt loam, 3 to 8 percent slopes, moderately eroded	14, 468	2. 2
Monongahela silt loam, 8 to 15 percent slopes, moderately eroded	2, 399	. 4
Mucky peat	30	(1)
Philo silt loam	16, 806	2. 6
Purdy silt loam	1, 756	. 3
Sequatchie silt loam, 0 to 5 percent slopes	695	. 1
Strip mine spoil, 0 to 8 percent slopes	1, 207	. 2
Strip mine spoil, 8 to 25 percent slopes	4, 380	. 7
Strip mine spoil, 25 to 75 percent slopes	4, 775	. 7
Tygart silt loam, 0 to 3 percent slopes	4, 279	. 7
Upshur silty clay loam, 3 to 8 percent slopes, moderately eroded	694	. 1
Upshur silty clay loam, 8 to 15 percent slopes, moderately eroded	239	(1)
Upshur-Gilpin silty clay loams, 3 to 8 percent slopes, moderately eroded	8, 281	1. 3
Upshur-Gilpin silty clay loams, 8 to 15 percent slopes, moderately eroded	15, 570	2. 4
Upshur-Gilpin silty clay loams, 8 to 15 percent slopes, severely eroded	758	. 1
Upshur-Gilpin silty clay loams, 15 to 25 percent slopes, moderately eroded	12, 863	2. 0
Upshur-Gilpin silty clay loams, 15 to 25 percent slopes, severely eroded	1, 075	. 2
Upshur-Gilpin silty clay loams, 25 to 35 percent slopes, moderately eroded	4, 976	. 8
Weikert shaly silt loam, 5 to 12 percent slopes	991	. 1
Weikert shaly silt loam, 12 to 20 percent slopes	1, 578	. 2
Weikert shaly silt loam, 20 to 30 percent slopes	1, 654	. 2
Weikert soils, 30 to 60 percent slopes	6, 399	1. 0
Weikert very rocky silt loam, 40 to 100 percent slopes	7, 283	1. 1
Westmoreland silt loam, 5 to 12 percent slopes, moderately eroded	18, 740	2. 9
Westmoreland silt loam, 5 to 12 percent slopes, severely eroded	285	(1)
Westmoreland silt loam, 12 to 20 percent slopes, moderately eroded	26, 381	4. 0
Westmoreland silt loam, 12 to 20 percent slopes, severely eroded	592	. 1
Westmoreland silt loam, 20 to 30 percent slopes, moderately eroded	14, 511	2. 2
Westmoreland silt loam, 20 to 30 percent slopes, severely eroded	809	. 1
Westmoreland silt loam, 30 to 40 percent slopes, moderately eroded	3, 164	. 5
Wharton silt loam, 3 to 8 percent slopes, moderately eroded	26, 819	4. 1
Wharton silt loam, 8 to 15 percent slopes, moderately eroded	34, 781	5. 3
Wharton silt loam, 8 to 15 percent slopes, severely eroded	1, 030	. 2
Wharton silt loam, 15 to 25 percent slopes, moderately eroded	3, 067	. 5
Wharton silt loam, 15 to 25 percent slopes, severely eroded	236	(1)
Mines and quarries	401	. 1
Slag pile	159	(1)
Total	654, 720	100. 0

[1] Less than 0.05 percent.

Atkins Series

The Atkins series consists of deep, level or nearly level, poorly drained, medium-textured soils on flood plains. These soils occupy depressions and flat areas where surface water, floodwater, and seepage water accumulate. The water table is near the surface in spring, in fall, and during wet periods. These soils are associated with the moderately well drained Philo soils.

Atkins soils developed in alluvium washed from upland soils that are underlain by shale, siltstone, and sandstone. They lack well-developed horizons because of frequent deposition of silty material by floodwater. The surface layer is grayish-brown silt loam. The subsoil is dark grayish brown to very dark gray silt loam mottled with yellowish brown and gray.

Most of the acreage is pasture or woodland.

The following representative profile of Atkins silt loam is in an idle area along the Conemaugh River near Torrance State Hospital.

Ap—0 to 7 inches, grayish-brown (2.5Y 5/2) silt loam; moderate, fine, granular structure; friable when moist; pH 5.0; clear, smooth lower boundary. 6 to 8 inches thick.

B21g—7 to 15 inches, dark grayish-brown (2.5Y 4/2) silt loam; moderate, medium, platy structure to moderate, medium, subangular blocky; slightly firm when moist; pH 5.0; gradual, smooth lower boundary. 6 to 10 inches thick.

B22g—15 to 21 inches, very dark gray (2.5Y 3/1) silt loam; common, fine, distinct, yellowish-brown (10YR 5/8) mottles; moderate, medium, subangular blocky structure; slightly firm when moist; pH 5.2; gradual, smooth lower boundary. 5 to 8 inches thick.

B23g—21 to 32 inches, very dark gray (N 3/0) silt loam; common, medium, distinct, yellowish-brown (10YR 5/8) mottles; moderate, medium, subangular blocky structure; firm when moist; pH 5.2; gradual, wavy lower boundary. 8 to 14 inches thick.

B24g—32 to 48 inches +, very dark gray (2.5Y 3/1) silt loam; common, medium, distinct, yellowish-brown (10YR 5/8) mottles; moderate, coarse, subangular blocky structure; firm when moist; pH 5.0.

The color of the B horizon ranges from light gray to very dark gray. The texture of this horizon ranges from fine sandy loam to coarse silty clay loam, and there are a few lenses of gravel. The depth to bedrock ranges from 3 to 10 feet.

Atkins silt loam (At).—In places this soil contains lenses of fine sand, silt, or clay. The slope range is 0 to 3 percent. Included in mapping were small areas of very poorly drained soils.

This soil is well suited to perennial hay, pasture, and woodland. It is flooded frequently and is likely to have shallow ponds on the surface after flooding. Occasionally a crop is flooded out. Wetness is the major limitation. (Capability unit IIIw-2; woodland group 6)

Brinkerton Series

The Brinkerton series consists of deep, poorly drained, medium-textured soils at the base of slopes, in drainageways, and on terraces and fans. Generally, these soils occur just below outcrops of Pittsburgh coal. They are kept wet for long periods by the seepage of ground water from adjacent hills. In many spots these soils are adjacent to the moderately well drained Ernest soils.

Brinkerton soils formed in colluvium derived from sandstone, siltstone, and shale. The surface layer is dark grayish-brown silt loam. The subsoil is dark-gray to dark grayish-brown silty clay loam to silt loam that has distinct yellowish-brown to dark-brown mottles. At a depth of about 24 inches there is a firm, slowly permeable fragipan. The substratum consists mostly of soft shale and sandstone fragments in a silty matrix.

Most of the acreage is woodland or pasture or is idle.

The following representative profile of Brinkerton silt loam, 0 to 3 percent slopes, is in a cultivated area 2 miles west of Donegal on Route 31.

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; pH 6.0; abrupt, smooth lower boundary. 6 to 7 inches thick.

A2—6 to 11 inches, grayish-brown (10YR 5/2) silt loam; common, fine, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, medium, subangular blocky structure; friable when moist, nonsticky and nonplastic when wet; pH 5.8; gradual, smooth lower boundary. 4 to 8 inches thick.

Blg—11 to 15 inches, dark-gray (10YR 4/1) silt loam; common, medium, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, medium and coarse, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; pH 5.8; gradual, smooth lower boundary. 3 to 5 inches thick.

B2tg—15 to 24 inches, dark-gray (10YR 4/1) silty clay loam; common, coarse, distinct, yellowish-brown (10YR 5/6) mottles; moderate, coarse, prismatic structure; friable when moist, slightly sticky and plastic when wet; thick patches of clay film on ped faces and lining pores; pH 5.4; gradual, smooth lower boundary. 7 to 12 inches thick.

Bx1g—24 to 32 inches, dark-gray (10YR 4/1) clay loam; common, coarse, distinct, dark yellowish-brown (10YR 3/4) mottles; strong, very coarse, prismatic structure and platy interiors; firm when moist, sticky and plastic when wet; few patches of clay film on peds; pH 5.0; gradual, smooth lower boundary. 5 to 11 inches thick.

Bx2g—32 to 42 inches, dark grayish-brown (10YR 4/2) clay loam; common, fine, distinct, black (N 2/0) concretions; weak, medium and coarse, subangular blocky structure and platy interiors; firm when moist, slightly sticky and slightly plastic when wet; pH 5.2; diffuse, smooth lower boundary. 8 to 14 inches thick.

C—42 to 48 inches +, fragments of shale, siltstone, and sandstone in a silty matrix.

In forested areas there is a 1- to 3-inch layer of hardwood leaf litter over a 1- to 2-inch, black A1 horizon. Below this is an 8- to 14-inch layer of grayish-brown silt loam that is high in minerals. The pH ranges from 5.0 to 6.0. The depth to bedrock ranges from 4 to 20 feet.

Brinkerton silt loam, 0 to 3 percent slopes (BkA).—Runoff from the surrounding slopes collects on this soil.

This soil is suitable for perennial hay, pasture, and woodland. It is suitable for an occasional cultivated crop if the crop is part of a long rotation. It is too poorly drained to be suitable for alfalfa. Wetness is the major limitation. Erosion is only a minor problem. (Capability unit IVw-1; woodland group 7)

Brinkerton silt loam, 3 to 8 percent slopes, moderately eroded (BkB2).—This soil has lost part of its original surface layer through erosion.

This soil is suitable for perennial hay, pasture, and woodland. It is suitable for an occasional cultivated crop if the crop is part of a long rotation. It is not suitable for crops that are adversely affected by a high water table, and it is too poorly drained to be suitable for alfalfa. Only a small acreage is cultivated. Wetness is the major limitation. Further erosion is a hazard if management is poor. (Capability unit IVw-2; woodland group 7)

Brooke Series

The Brooke series consists of moderately deep to deep, well-drained, moderately fine-textured soils on uplands. These soils occur mainly on ridgetops and drainage divides on the plateau in the southwestern and western parts of the county. They are associated with Westmoreland soils.

Brooke soils developed in material weathered from limestone and calcareous, gray clay shale. The surface layer is dark-brown silty clay loam. The subsoil is brown to dark-brown channery silty clay. The substratum is greenish-gray and very dark gray silty clay loam. The profile contains many flat fragments of limestone.

Most of the acreage is farmed. A few areas are idle and are reverting to forest.

The following profile of Brooke silty clay loam, 3 to 8 percent slopes, moderately eroded, is in an idle field 1.2 miles north of Claridge.

Ap—0 to 8 inches, dark-brown (7.5YR 3/2) silty clay loam; 10 to 15 percent coarse fragments; moderate, very fine, blocky structure; friable when moist, sticky and plastic when wet; pH 7.1; clear, smooth lower boundary. 7 to 9 inches thick.

B2t—8 to 19 inches, brown (7.5YR 4/4) silty clay; 10 to 15 percent coarse fragments; strong, fine and medium, blocky structure; thick continuous clay film; very firm when moist, very sticky and very plastic when wet; pH 7.3; clear, wavy lower boundary. 10 to 13 inches thick.

B3t—19 to 22 inches, dark-brown (7.5YR 4/2) channery silty clay; 25 to 30 percent coarse limestone fragments; dark olive-gray (5YR 3/2) streaks and black coatings; strong, fine, blocky structure; thick continuous clay film; very firm when moist, very sticky and very plastic when wet; pH 7.4; clear, smooth lower boundary. 2 to 5 inches thick.

C1—22 to 32 inches, greenish-gray (5GY 6/1) silty clay loam; 30 to 35 percent coarse fragments; common, coarse, distinct, light olive-brown (2.5Y 5/6) blotches; moderate, medium and thick, platy structure that breaks to moderate, fine, blocky; thin discontinuous clay film; very firm when moist, sticky and plastic when wet; clear, wavy lower boundary. 8 to 12 inches thick.

C2—32 to 40 inches, very dark gray (5YR 3/1) silty clay loam; 10 to 15 percent coarse fragments; light-gray (5YR 7/1) coatings; massive and breaks to weak, thin, platy structure; thin discontinuous clay film; firm when moist, sticky and plastic when wet; pH 7.4; clear, wavy lower boundary. 6 to 12 inches thick.

R—40 inches +, limestone bedrock.

The surface layer ranges from brown to very dark brown in color. The subsoil ranges from brown to dark brown in color and is moderately to strongly developed. The substratum is silty clay loam or clay loam in texture and ranges from greenish gray to very dark gray in color. The solum ranges from 19 to 36 inches in thickness. The depth to rock ranges from 2 to 4 feet. The reaction is neutral or mildly alkaline.

Brooke silty clay loam, 3 to 8 percent slopes, moderately eroded (BrB2).— This soil has the profile described as representative for the series. It has lost a few inches of its original surface layer through erosion. The present plow layer is generally a mixture of what is left of the original surface layer and material from the subsoil.

This soil is suitable for general farm crops and is excellent for alfalfa. If exposed, the fine-textured subsoil is difficult to manage. Seedbed preparation is frequently difficult, and poor stands of new seedlings are common. Erosion is the major hazard. (Capability unit IIIe-1; woodland group 2)

Brooke silty clay loam, 8 to 15 percent slopes, moderately eroded (BrC2).—This soil has lost a few inches of its original surface layer through erosion. The present plow layer is generally a mixture of what is left of the original surface layer and material from the subsoil.

This soil is well suited to perennial hay and pasture. It is excellent for alfalfa. Erosion is the major hazard. (Capability unit IVe-1; woodland group 2)

Burgin Series

The Burgin series consists of deep, very poorly drained, medium-textured soils in smooth, concave areas on uplands. These soils have a high water table because of seepage from the hills and the accumulation of surface water. They occur in the southwestern and western parts of the county.

Burgin soils developed in material derived from interbedded limestone, siltstone, and calcareous shale. In plowed areas the surface layer is very dark gray silt loam. The subsoil is very dark grayish-brown or dark grayish-brown silty clay loam mottled with yellowish brown and light brownish gray.

Most of the acreage is pasture. Small areas are cropland.

The following representative profile of Burgin silt loam is 3 miles east of New Stanton.

Ap—0 to 7 inches, very dark-gray (10YR 3/1) silt loam; strong, medium, granular structure; friable when moist, nonsticky and nonplastic when wet; pH 6.8; abrupt, smooth lower boundary. 6 to 8 inches thick.

B1—7 to 11 inches, very dark grayish-brown (10YR 3/2) silty clay loam; few, fine, distinct, dark yellowish-brown (10YR 4/4) mottles; strong, coarse, granular structure; friable when moist, slightly sticky and slightly plastic when wet; effervesces with dilute hydrochloric acid; clear, smooth lower boundary. 3 to 5 inches thick.

B2tg—11 to 16 inches, dark grayish-brown (10YR 4/2) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/4) mottles; strong, medium, subangular blocky structure; firm when moist, sticky and plastic when wet; common patches of clay film on peds; effervesces with dilute hydrochloric acid; gradual, smooth lower boundary. 4 to 8 inches thick.

B3tg—16 to 27 inches, dark grayish-brown (2.5Y 4/2) silty clay loam; strong, medium, subangular blocky structure; peds coated with light brownish-gray (2.5Y 6/2) clay; firm when moist, sticky and plastic when wet; effervesces with dilute hydrochloric acid; gradual, smooth lower boundary. 8 to 14 inches thick.

C—27 to 42 inches, yellowish-brown (10YR 5/6) silt loam; common, coarse, distinct, light brownish-gray (10YR 6/2) mottles; moderate, medium, subangular blocky structure; pH 7.0; diffuse, smooth lower boundary. 12 to 17 inches thick.

R—42 inches +, siltstone, limestone, and gray clay shale.

The surface layer ranges from 6 to 10 inches in thickness. The subsoil ranges from fine silt loam to silty clay loam and generally becomes more yellow with increasing depth. The reaction is slightly acid or neutral. In places this soil is calcareous. Bedrock is at a depth of 3 to 10 feet.

In somewhat higher lying, better drained areas is a gray surface variant of the Burgin series. A representative profile is 3 miles west of Mt. Pleasant.

Ap—0 to 7 inches, gray (10YR 6/1) silt loam; moderate, medium, granular structure; friable when moist, slightly sticky and slightly plastic when wet; pH 6.6; abrupt, smooth lower boundary. 6 to 8 inches thick.

B2tg—7 to 25 inches, gray (10YR 5/1) silty clay loam; common, coarse, distinct, yellowish-brown (10YR 5/8) mottles; strong, coarse, blocky structure; coated with thick continuous clay film; firm when moist, sticky and plastic when wet; pH 6.8; gradual, smooth lower boundary. 15 to 20 inches thick.

C—25 to 46 inches, yellowish-brown (10YR 5/4) heavy silt loam; common, coarse, distinct, light brownish-gray (10YR 6/2) mottles; moderate, medium, subangular blocky structure; slightly firm when moist, slightly sticky and slightly plastic when wet; pH 7.0.

In areas where this soil receives deposition the surface layer is brownish gray. The depth to mottling ranges from 6 to 15 inches. The depth to bedrock ranges from 4 to more than 6 feet.

Burgin and Burgin gray surface variant, silt loams (Bu).—These two soils occupy different positions on the landscape. Burgin silt loam is in closed depressions and drainageways. The gray surface variant is in higher lying areas and has better surface drainage. The slope range is 0 to 5 percent.

These soils are suited to pasture. They can be used for an occasional cultivated crop. (Capability unit IIIw-4; woodland group 7)

Calvin Series

The Calvin series consists of moderately deep and deep, well-drained, medium-textured soils. These soils occur on the long, smooth slopes of Chestnut Ridge and Laurel Hill in the eastern part of the county. They are associated with Ernest soils.

Calvin soils developed in material derived from interbedded, red and olive-gray shale, siltstone, and sandstone. They have weakly developed horizons. In some areas there are boulders and coarse fragments on the surface. The surface layer is dark reddish-brown silt loam. The subsoil is reddish-brown channery silt loam that is 10 to 40 percent coarse fragments. All of the Calvin soils in this county have a neutral substratum.

Much of the acreage is wooded. A few small areas have been cultivated.

The following representative profile of Calvin silt loam, neutral substratum, 12 to 20 percent slopes, moderately eroded, is in a woodland near Kunkle Cemetery on Chestnut Ridge.

O2—1 inch to 0, dark reddish-brown (5YR 2/2) organic layer; pH 5.0; gradual, smooth lower boundary. 1 to 2 inches thick.

A1—0 to 4 inches, dark reddish-brown (5YR 3/2) silt loam; moderate, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; pH 5.2; clear, smooth lower boundary. 2 to 5 inches thick.

A2—4 to 9 inches, dark reddish-brown (5YR 3/4) silt loam; weak, medium, platy structure; friable when moist, nonsticky and nonplastic when wet; pH 5.4; clear, smooth lower boundary. 4 to 7 inches thick.

B1—9 to 15 inches, reddish-brown (2.5YR 5/4) silt loam; weak, medium, subangular blocky structure; friable when moist, nonsticky and nonplastic when wet; pH 5.4; gradual, smooth lower boundary. 4 to 7 inches thick.

B2—15 to 23 inches, reddish-brown (2.5YR 5/4) channery silt loam; 20 percent sandstone fragments; moderate, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; pH 5.8; gradual, smooth lower boundary. 5 to 10 inches thick.

B3—23 to 29 inches, dark reddish-brown (2.5YR 3/4) channery silt loam; 40 percent sandstone fragments; weak, medium, subangular blocky structure; friable when moist, nonsticky and nonplastic when wet; few thin patches of clay film; pH 5.8; gradual, smooth lower boundary. 4 to 7 inches thick.

C—29 to 40 inches, dark reddish-brown (2.5YR 3/4) very channery silt loam; 60 percent sandstone fragments; structureless; friable when moist, nonsticky and nonplastic when wet; pH 6.0; gradual, smooth lower boundary. 9 to 16 inches thick.

R—40 to 72 inches +, sandstone and red and olive, calcareous shale; pH 6.6.

The surface layer is shaly or very stony in places. It ranges from dark reddish brown to reddish brown in color. The surface layer in cultivated areas is thicker and lighter colored than that in wooded areas. The subsoil becomes more channery with increasing depth. The pH ranges from 5.0 to 6.5. The depth to hard rock ranges from 2 to 4 feet. The percentage of coarse fragments depends on the amount of sandstone in the parent material.

Calvin silt loam, neutral substratum, 5 to 12 percent slopes, moderately eroded (CaB2).—This soil has lost part of its original surface layer through erosion. The present plow layer is generally a mixture of what is left of the original surface layer and material from the subsoil. Included in mapping were some spots of slightly eroded soils and some of severely eroded soils.

Erosion is the major hazard. (Capability unit IIe-3; woodland group 2)

Calvin silt loam, neutral substratum, 12 to 20 percent slopes, moderately eroded (CaC2).—This soil has lost part of its original surface layer through erosion. The present plow layer is generally a mixture of what is left of the original surface layer and material from the subsoil. It is lighter colored than the original layer and is about 6 inches thick. Included in mapping were some spots of slightly eroded soils and some of severely eroded soils.

Most of the acreage has been cultivated. Erosion is the major hazard. (Capability unit IIIe-5; woodland group 2)

Calvin silt loam, neutral substratum, 20 to 30 percent slopes, moderately eroded (CaD2).—The present surface layer of this soil is lighter colored than that in the profile described as representative for the series, and it is only about 6 inches thick. It is generally a mixture of what is left of the original surface layer and material from the subsoil. The mixing has resulted partly from downslope movement of soil material. Included in mapping were small areas of soils that are only slightly eroded.

Most of the acreage has been cultivated. Erosion is the major hazard. (Capability unit IVe-4; woodland group 2)

Calvin very stony silt loam, neutral substratum, 0 to 12 percent slopes (ClB).—This soil is suited to pasture or woodland. It has numerous stones and boulders on the surface and throughout the profile. Stoniness is the major limitation. There is little erosion. (Capability unit VIs-2; woodland group 2)

Calvin very stony silt loam, neutral substratum, 12 to 30 percent slopes (ClD).—This soil is suited to woodland. It has numerous stones and boulders on the surface and throughout the profile. Stoniness is the major limitation. The slopes are wooded, so there is little erosion. Erosion is a hazard only during logging operations. (Capability unit VIs-2; woodland group 2)

Calvin very stony silt loam, neutral substratum, 30 to 50 percent slopes (ClE).—This soil is suited to woodland. It has numerous stones and boulders on the surface and throughout the profile. Stoniness is the major limitation. Most of the acreage is wooded, so there is little erosion. (Capability unit VIIs-1; woodland group 3)

Cavode Series

The Cavode series consists of deep, somewhat poorly drained, medium-textured soils on uplands. The topography is gently undulating. Smooth, concave slopes are cut by numerous drainageways. Generally, these soils lie below outcrops of Pittsburgh coal. They occur in most parts of the county.

Cavode soils developed in material derived from brown and gray, acid shale. The surface layer is dark grayish-brown, friable silt loam. The subsoil is chiefly light yellowish-brown to gray silty clay loam.

Most of the acreage has been farmed. Some areas have been abandoned.

The following representative profile of Cavode silt loam, 3 to 8 percent slopes, is in a cropped field 1 mile southwest of Klondike.

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; pH 5.3; clear, smooth lower boundary. 5 to 7 inches thick.

B1—6 to 10 inches, yellowish-brown (10YR 5/6) silt loam; few, medium, distinct, light yellowish-brown (10YR 6/4) mottles; moderate, medium, blocky structure; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; pH 5.4; gradual, smooth lower boundary. 3 to 5 inches thick.

B21tg—10 to 16 inches, light yellowish-brown (10YR 6/4) silty clay loam; strong-brown (7.5YR 5/8) interiors; common, fine, distinct mottles; strong, fine, angular blocky structure; hard when dry, friable when moist, slightly sticky and plastic when wet; thin, continuous clay films; pH 5.6; clear, smooth lower boundary. 4 to 8 inches thick.

B22tg—16 to 30 inches, gray (10YR 6/1) silty clay loam; streaks of strong brown (7.5YR 5/6) and reddish brown (5YR 4/4); strong, coarse, angular blocky structure; very hard when dry, firm when moist, sticky and plastic when wet; thin, continuous clay films; pH 5.3; gradual, wavy lower boundary. 11 to 16 inches thick.

C—30 inches +, stratified, brown and gray, acid clay shale.

The color of the surface layer depends on how much organic matter has been added and how intensively the soil has been used for cultivated crops. In many places this layer contains coarse fragments. Stones are common in places. The B2 horizon ranges from light yellowish brown to gray in color. It is mottled in places. The depth to mottling ranges from 8 to 16 inches. The depth to rock is generally 3 to 6 feet or more.

Cavode silt loam, 3 to 8 percent slopes (CnB).—The plow layer of this soil is 2 to 4 inches thicker than that in the profile described as representative for the series.

In wooded areas this soil has a thin, dark-colored A1 horizon and a lighter colored A2 horizon instead of a plow layer. Included in mapping were a few areas of nearly level soils and a few areas of severely eroded soils.

This soil is fairly well suited to cultivated crops if the crops are grown as part of a long rotation. It is not well suited to alfalfa, winter grain, or other plants that are adversely affected by a high water table. Wetness is the major limitation. Erosion is a hazard in cultivated areas unless conservation practices are used. Most of the acreage is woodland. (Capability unit IIIw-3; woodland group 5)

Cavode silt loam, 8 to 15 percent slopes, moderately eroded (CnC2).—The present plow layer of this soil is generally a mixture of what is left of the original surface layer and material from the subsoil. Included in mapping were small areas of slightly eroded soils, a few areas of severely eroded soils, and some areas of moderately well drained soils that have a lighter colored surface layer.

This soil can be used for cultivated crops if the crops are part of a long rotation. It is not suited to alfalfa and winter grain because of wetness. Erosion is the major hazard. Wetness is a limitation. (Capability unit IIIe-2; woodland group 5)

Cavode very stony silt loam, 0 to 8 percent slopes (CoB).—Runoff from surrounding slopes collects on this soil, and there are numerous stones and boulders on the surface and throughout the profile. This soil has a thicker surface layer, is slightly more mottled in the lower part of the subsoil, and in some areas has mottles nearer the surface than the soil described as representative for the series. Included in mapping were areas of poorly drained soils that have a darker colored surface layer and are mottled directly below the surface.

This soil is too stony for cultivation. Permanent pastures produce some forage. Stoniness is the major limitation. There is little or no erosion. Most of the acreage is woodland. (Capability unit VIs-1; woodland group 5)

Cavode very stony silt loam, 8 to 25 percent slopes (CoD).—The surface layer of this soil is thicker than that in the profile described as representative for the series, and there are numerous stones and boulders on the surface and throughout the profile. Included in mapping were areas of moderately well drained soils that have a lighter colored surface layer.

This soil is suited to permanent pasture and woodland. Stoniness is the major limitation. There is little or no erosion. Erosion is a hazard only during logging operations. Most of the acreage is woodland. (Capability unit VIs-1; woodland group 5)

Clarksburg Series

The Clarksburg series consists of deep, moderately well drained and somewhat poorly drained soils on the lower part of smooth, concave slopes, in drainageways, and along streams. Generally, these soils occur at elevations above the Pittsburgh coal seam. Seepage water from this formation tends to keep the soils wet for long periods. These soils are associated mainly with Westmoreland and Guernsey soils.

Clarksburg soils developed in colluvium derived from interbedded sandstone, shale, and limestone. The surface layer is dark grayish-brown, friable silt loam. The uppermost part of the subsoil is yellowish-brown, friable silt loam. Directly below this layer is a firm, brittle, slowly permeable fragipan. The substratum is light olive-brown clay loam mixed with coarse fragments of shale and sandstone.

Most of the acreage is farmed.

The following representative profile of Clarksburg silt loam, 3 to 8 percent slopes, moderately eroded, is in a hayfield on the Westmoreland County Fair Association Farm in Mt. Pleasant Township.

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; less than 2 percent sandstone fragments; weak, fine, granular structure; friable when moist, slightly plastic and slightly sticky when wet; pH 5.2; abrupt, smooth lower boundary. 7 to 9 inches thick.

AB—8 to 12 inches, dark grayish-brown (10YR 4/2) and yellowish-brown (10YR 5/4) silt loam; material from Ap and B1 horizons mixed by subsoiling operations; structure is weak, fine, granular and moderate, fine, subangular blocky; friable when moist, sticky and plastic when wet; pH 5.0; abrupt, broken lower boundary. 3 to 5 inches thick.

B1—12 to 16 inches, yellowish-brown (10YR 5/4) silt loam; less than 2 percent sandstone fragments; some brown (10YR 4/3) coatings; moderate, medium, subangular blocky structure; friable when moist, sticky and plastic when wet; pH 4.9; clear, wavy lower boundary. 3 to 5 inches thick.

Bx1—16 to 24 inches, yellowish-brown (10YR 5/6) clay loam; less than 2 percent sandstone fragments; black coatings and common, medium, distinct, grayish-brown (10YR 5/2) and strong-brown (7.5YR 5/8) mottles in lower part; weak, medium, prismatic structure that breaks to weak, medium and thin, platy; few discontinuous clay films; very firm in place when moist, sticky and plastic when wet; pH 4.9; gradual, irregular lower boundary. 5 to 11 inches thick.

Bx2—24 to 32 inches, clay loam; 5 percent sandstone fragments; peds have grayish-brown (10YR 5/2) faces and yellowish-brown (10YR 5/6) interiors; common, coarse, prominent, dark-brown (10YR 4/3), gray (10YR 6/1), and strong-brown (7.5YR 5/8) mottles; common black coatings; moderate, medium, prismatic structure that breaks to weak, medium, platy; thin, discontinuous clay films; very firm when moist, sticky and plastic when wet; pH 5.0; gradual, wavy lower boundary. 4 to 12 inches thick.

Bx3—32 to 38 inches, silty clay; 10 percent sandstone fragments; fragments form a line at bottom of horizon; peds have gray (10YR 6/1) faces and brown (10YR 5/3) interiors; many, medium, prominent, strong-brown (7.5YR 5/8) and gray (10YR 6/1) mottles; moderate, medium, prismatic structure breaking to weak, thin and medium, platy; common, continuous clay films; very firm in place when moist, sticky and plastic when wet; pH 5.0; gradual, wavy lower boundary. 3 to 9 inches thick.

Bx4—38 to 53 inches, yellowish-brown (5YR 5/6) clay loam; 15 percent sandstone fragments; few, coarse, light brownish-gray (10YR 6/2) and many strong-brown (7.5YR 5/8) mottles; many black coatings and concretions; weak, coarse, prismatic structure breaking to weak, thin and medium, platy; few, thick discontinuous clay films on prism faces; firm when moist, sticky and plastic when wet; pH 5.0; gradual, irregular lower boundary. 10 to 18 inches thick.

C—53 to 65 inches, light olive-brown (2.5Y 5/4) clay loam; 25 percent sandstone fragments; few, medium, prominent, strong-brown (7.5YR 5/8) and gray (10YR 6/1) mottles; many black coatings and concretions; weak, medium, platy structure; firm when moist, sticky and plastic when wet; pH 6.0.

The texture of the surface layer ranges from silt loam to silty clay loam. The color ranges from very dark gray to dark grayish brown. The texture of the Bx horizon ranges from silt loam to silty clay, and the color from yellowish brown to brown. The mottles in the subsoil are light gray, light brownish gray, and strong brown. The pH ordinarily ranges from 5.0 to 6.0 but is 4.5 in areas where this soil is affected by acid fumes from local industries. The depth to bedrock ranges from 4 to 20 feet.

Clarksburg silt loam, 3 to 8 percent slopes, moderately eroded (CuB2).—The profile of this soil is that described as representative for the series. Included in mapping were small areas of level and gently sloping, uneroded soils.

This soil is suitable for most general farm crops if they are grown in a moderately long rotation. It is not suitable for winter grain, which tends to winterkill. Erosion is the major hazard. A seasonal high water table is a limitation. (Capability unit IIe-1; woodland group 5)

Clarksburg silt loam, 8 to 15 percent slopes, moderately eroded (CuC2).—The surface layer of this soil is thinner than that in the profile described for the series, and the depth to bedrock is somewhat less. The plow layer is generally a mixture of what is left of the original surface layer and material from the subsoil. Included in mapping were areas of severely eroded soils and areas where the soils have been made extremely acid by the fumes from coke ovens.

This soil is suitable for general farm crops grown in a long rotation. Crops that are adversely affected by a seasonal high water table do not yield well. Most of the acreage has been farmed. Erosion is the major hazard. (Capability unit IIIe-3; woodland group 5)

Dekalb Series

The Dekalb series consists of moderately deep to deep, well-drained, medium-textured soils. These soils are coarser textured than most other soils in the county. They occupy convex slopes in mountainous areas in the eastern part of the county. They are associated with Gilpin and Cavode soils.

Dekalb soils formed in material weathered from sandstone. They have indistinct horizons. In wooded areas, the surface is covered with a thin layer of leaves and twigs and the surface layer consists of a very dark brown to black organic mat over channery loam. The upper part of the mineral soil is brown to black, and the lower part is brown. The subsoil is strong-brown loam that contains a few sandstone fragments. In cultivated areas the plow layer is dark brown and directly overlies the strong-brown subsoil. The substratum is strong-brown channery sandy loam and is 30 percent sandstone fragments.

Most of the acreage is woodland. Only a small part has been cultivated.

The following representative profile of Dekalb channery loam, 5 to 12 percent slopes, is in a woodlot a quarter of a mile west of Donegal.

O2—1 to 0 inches, very dark brown (10YR 2/2) mor-type organic matter; pH 4.0; abrupt, smooth lower boundary. 1 to 2 inches thick.

A1—0 to 3 inches, dark-brown (7.5YR 4/2) channery loam; 15 to 20 percent sandstone fragments; weak, medium, granular structure; very friable when moist, nonsticky and nonplastic when wet; pH 4.2; clear, smooth lower boundary. 2 to 3 inches thick.

A2—3 to 10 inches, brown (7.5YR 4/4) channery loam; 15 to 20 percent sandstone fragments; weak, thin, platy structure to weak, fine, subangular blocky; very friable when moist, nonsticky and nonplastic when wet; pH 4.6; gradual, wavy lower boundary. 5 to 8 inches thick.

B2—10 to 24 inches, strong-brown (7.5YR 5/6) loam; 7 percent sandstone fragments; weak, medium, subangular blocky structure; friable when moist, nonsticky and nonplastic when wet; pH 4.2; clear, wavy lower boundary. 10 to 16 inches thick.

C1—24 to 38 inches, strong-brown (7.5YR 5/8) channery sandy loam; 30 percent sandstone fragments; weak, fine, subangular blocky structure; very friable when moist, nonsticky and nonplastic when wet; pH 4.0; diffuse, wavy lower boundary. 11 to 17 inches thick.

C2—38 to 48 inches +, strong-brown (7.5YR 5/8) very channery sandy loam; 75 percent sandstone fragments; structureless; friable when moist, nonsticky and nonplastic when wet; pH 4.0.

This soil is 10 to 50 percent or more coarse fragments. The A1 horizon ranges from channery loam to silt loam in texture and contains varying numbers of coarse fragments. It ranges from brown to dark brown in color, depending on the organic-matter content. The A2 horizon is grayer in areas where the soil is coarser textured than that in the profile described. The B horizon ranges from loam to silt loam in texture and from strong brown to yellowish brown in color. The C horizons are generally lighter colored and coarser textured than the rest of the profile. The depth to bedrock ranges from 2 to 4 feet.

Dekalb channery loam, 5 to 12 percent slopes (DaB).—This soil has the profile described as representative for the series. In areas that have been cleared of trees, the organic mat is lacking and there are fewer stones in the surface layer. Included in mapping were small areas of moderately eroded soils and of level and gently sloping, slightly eroded soils.

About half of the acreage is woodland. Where cleared, this soil is suited to alfalfa, fruits, and vegetables. It warms up early in spring and can be tilled earlier than most other soils in the county. (Capability unit IIe-3; woodland group 2)

Dekalb channery loam, 12 to 20 percent slopes, moderately eroded (DaC2).—This soil has lost part of its original surface layer through erosion. The present surface layer is lighter colored than that in the profile described for the series and is generally a mixture of the rest of the original surface layer and material from the subsoil. Included in mapping were small, severely eroded areas.

This soil is suited to a rotation of general farm crops, including alfalfa. Most of the acreage is cultivated. Erosion is the major hazard. (Capability unit IIIe-5; woodland group 2)

Dekalb channery loam, 20 to 30 percent slopes, moderately eroded (DaD2).—Because of erosion, the solum of this soil is thinner and the surface layer lighter colored than that in the profile described for the series. The present plow layer is generally a mixture of the rest of the original surface layer and material from the subsoil. The mixing has resulted partly from the downslope movement of soil material. Included in mapping were small areas of severely eroded soils.

This soil is easily managed if it is used for perennial hay and woodland. It should be used only occasionally for cultivated crops. Nevertheless, most of the acreage has been cultivated. Erosion is the major hazard. (Capability unit IVe-4; woodland group 2)

Dekalb very stony loam, 0 to 12 percent slopes (DbB).—This soil has numerous stones and boulders on the surface and throughout the profile. The surface layer has a higher content of sand than that in the profile described for the series. Included in mapping were areas on Laurel

Hill that are only about 10 feet in diameter and have a gray surface layer.

This soil is well suited to woodland. Most of the acreage is wooded, and the rest is pastured. Stoniness is the major limitation. There is very little erosion. (Capability unit VIs–2; woodland group 2)

Dekalb very stony loam, 12 to 30 percent slopes (DbD).—This soil has numerous stones and boulders on the surface and throughout the profile. The surface layer has a higher content of sand than that in the profile described for the series.

This soil is suitable for woodland and pasture. Stoniness is the major limitation. There is little erosion because most of the acreage is wooded. Erosion is a hazard only during logging operations. (Capability unit VIs–2; woodland group 2)

Dekalb very stony loam, 30 to 80 percent slopes (DbF).—This soil has numerous stones and boulders on the surface and throughout the profile. The surface layer has a higher content of sand than that in the profile described for the series.

This soil is suitable for woodland, and most of the acreage is wooded. Stoniness is the major limitation. There is little or no erosion. (Capability unit VIIs–1; woodland group 3)

Ernest Series

The Ernest series consists of deep, moderately well drained, medium-textured soils on smooth, generally concave slopes where colluvial material has accumulated along drainageways and streams to form benches and fans. These soils generally lie at elevations below the Pittsburgh coal seam and are kept wet by seepage water from this formation. They have a moderately slowly permeable fragipan. They are associated with most of the major soils in the county but are most commonly associated with Gilpin and Brinkerton soils.

Ernest soils developed in material derived from acid shale, siltstone, and sandstone. The surface layer is dark grayish-brown silt loam. The subsoil is yellowish-brown to grayish-brown silt loam to clay loam that is 10 to 25 percent coarse fragments. Below a depth of about 18 inches it is mottled with pale brown and grayish brown.

Much of the acreage is cleared, but part of it is still woodland.

The following representative profile of Ernest silt loam, 3 to 8 percent slopes, is in a cultivated field 6 miles south of New Florence.

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; 10 percent coarse fragments; moderate, medium, granular structure; friable when moist, nonsticky and slightly plastic when wet; pH 5.6; abrupt, smooth lower boundary. 7 to 8 inches thick.

B1—9 to 18 inches, yellowish-brown (10YR 5/4) silt loam; 12 percent coarse fragments; moderate, medium, subangular blocky structure; firm when moist, slightly sticky and slightly plastic when wet; pH 5.6; gradual, wavy lower boundary. 9 to 12 inches thick.

B2t—18 to 29 inches, yellowish-brown (10YR 5/8) clay loam; 10 percent coarse fragments; common, coarse, distinct, pale-brown (10YR 6/3) and grayish-brown (10YR 5/2) mottles; prismatic structure breaking to strong, coarse, blocky; firm when moist, slightly sticky and slightly plastic when wet; common patches of clay film; pH 5.2; diffuse, lower boundary. 9 to 14 inches thick.

Bxg—29 to 60 inches, grayish-brown (10YR 5/2) channery silt loam; 20 percent coarse fragments; common, coarse, distinct, yellowish-brown (10YR 5/8) mottles; black coatings on ped faces; strong, coarse, prismatic structure with platy interiors; very firm when moist, nonsticky and nonplastic when wet; pH 5.0.

The surface layer ranges from shaly silt loam to fine silt loam in texture and from very dark grayish brown to dark brown in color. In places this soil is stony. The depth to mottling ranges from 18 to 30 inches. The depth to bedrock is generally more than 6 feet. It ranges from 4 to 20 feet.

Ernest silt loam, 3 to 8 percent slopes (ErB).—This soil has the profile described as representative for the series. Included in mapping were areas of moderately eroded soils and small areas of nearly level, uneroded soils.

This soil is suitable for general farm crops. Most of the acreage has not been cultivated, so there has been little or no past erosion. Nevertheless, erosion is the major hazard. (Capability unit IIe–4; woodland group 5)

Ernest silt loam, 8 to 15 percent slopes (ErC).—Included with this soil in mapping were small areas of severely eroded soils.

This soil is suitable for most general farm crops. It is not suitable for winter grains, which tends to winterkill. Erosion is the major hazard. Most of the acreage is woodland. (Capability unit IIIe–4; woodland group 5)

Ernest very stony silt loam, 0 to 8 percent slopes (EsB).—In mountainous areas this soil developed in material derived mainly from sandstone. It has numerous stones and boulders on the surface and throughout the profile. Its surface layer is darker colored than that in the profile described as representative for the series. Included in mapping was approximately 30 acres of a very stony, very poorly drained soil on Laurel Hill.

Stoniness is the major limitation. There is little or no erosion. Most of the acreage is woodland. (Capability unit VIs–1; woodland group 5)

Ernest very stony silt loam, 8 to 25 percent slopes (EsD).—In mountainous areas this soil developed in material derived mainly from sandstone. It has numerous stones and boulders on the surface and throughout the profile. Its surface layer is darker colored than that in the profile described as representative for the series.

Stoniness is the major limitation. There is little erosion. Most of the acreage is woodland. (Capability unit VIs–1; woodland group 5)

Gilpin Series

The Gilpin series consists of moderately deep, well-drained, medium-textured soils on rough, benched or washboard slopes. The topography is hilly to rolling.

Gilpin soils developed in material derived from interbedded gray acid shale, siltstone, and sandstone. The surface layer is very dark grayish-brown, friable channery silt loam. The subsoil is yellowish-brown channery silt loam to channery loam that is 30 to 45 percent coarse fragments. The substratum is olive-brown very channery loam that is 50 percent or more siltstone and sandstone fragments.

Most of the acreage is cultivated. The part that is not well suited to crops is woodland or is idle.

The following representative profile of Gilpin channery silt loam, 20 to 30 percent slopes, moderately eroded, is in a cultivated field near Bulltown schoolhouse.

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) channery silt loam; 20 percent siltstone and sandstone fragments; moderate, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; pH 5.3; abrupt, smooth lower boundary. 6 to 8 inches thick.

B2t—7 to 18 inches, yellowish-brown (10YR 5/4) channery silt loam; 30 percent siltstone and sandstone fragments; moderate, medium, subangular blocky structure; clay films on ped faces and in pores; slightly firm when dry, friable when moist, nonsticky and nonplastic when wet; pH 5.0; clear, irregular lower boundary. 8 to 13 inches thick.

B3—18 to 26 inches, yellowish-brown (10YR 5/4) channery loam; 45 percent siltstone and sandstone fragments; moderate, medium, platy structure breaking to moderate, medium, subangular blocky; firm when moist, nonsticky and nonplastic when wet; pH 4.8; gradual, wavy lower boundary. 5 to 9 inches thick.

C—26 to 36 inches, olive-brown (2.5Y 4/4) very channery loam; 50 percent siltstone and sandstone fragments; massive; firm when moist, nonsticky and nonplastic when wet; pH 4.8; diffuse lower boundary. 7 to 14 inches thick.

R—36 to 48 inches +, light olive-brown (2.5Y 5/4) siltstone and sandstone; pH 4.5.

In wooded areas there is a 1- to 2-inch layer of hardwood leaf litter over a ½- to 2-inch black or very dark brown mineral horizon. Below this is a yellowish-brown horizon that is somewhat lighter colored than the subsoil. The interbedded shale, siltstone, and sandstone cause a wide range in texture, color, and degree of profile development. The soils underlain by sandstone generally are the deepest, have the coarsest texture, and show the least evidence of profile development. The depth to bedrock ranges from 1½ to 3 feet.

Gilpin channery silt loam, 5 to 12 percent slopes, moderately eroded (GcB2).—The profile of this soil is slightly thicker than the one described as representative for the series. The present plow layer is a mixture of what is left of the original surface layer and material from the subsoil. Included in mapping were a few small areas of moderately well drained soils, a few areas of level soils that have a thicker, darker colored surface layer than this soil, and small areas of severely eroded soils.

This soil is suited to general farm crops grown in a moderately intensive rotation. Further erosion is the major hazard; gullies have formed in places. A moderate to low available moisture capacity is a limitation. (Capability unit IIe–3; woodland group 2)

Gilpin channery silt loam, 12 to 20 percent slopes, moderately eroded (GcC2).—This soil has lost part of its original surface layer through erosion. The present plow layer is generally a mixture of what is left of the original surface layer and material from the subsoil. Included in mapping were areas of severely eroded soils and small areas of moderately well drained soils that have a thicker, darker colored surface layer than this soil.

This soil is suited to general farm crops if the crops are grown as part of a long rotation. Further erosion is the major hazard. A low to moderate available moisture capacity is a limitation. (Capability unit IIIe–5; woodland group 2)

Gilpin channery silt loam, 20 to 30 percent slopes, moderately eroded (GcD2).—This soil has the profile described as representative for the series. The present plow layer is a mixture of what is left of the original surface layer and material from the subsoil.

This soil is suited to an occasional cultivated crop if the crop is rotated with long-term hay. Further erosion is the major hazard. Moderate to low available moisture capacity and steep slopes are limitations. (Capability unit IVe–4; woodland group 2)

Gilpin channery silt loam, 20 to 30 percent slopes, severely eroded (GcD3).—This soil has lost all or almost all of its original surface layer through erosion. The present plow layer is largely subsoil material mixed with crop residue. It has poorer tilth than the original surface layer. This soil has a shallower root zone and a lower available moisture capacity than the moderately eroded soils.

Erosion is the major hazard. Special practices are needed to control gully erosion. Droughtiness is a limitation. (Capability unit VIe–2; woodland group 2)

Gilpin channery silt loam, 30 to 40 percent slopes, moderately eroded (GcE2).—This soil has a profile shallower than that described as representative for the series. It has lost part of its original surface layer through erosion. The present plow layer is generally a mixture of what is left of the original surface layer and material from the subsoil. Included in mapping were narrow areas of very steep soils and a few small areas of severely eroded soils.

This soil is well suited to permanent pasture and woodland. Erosion is the major hazard. (Capability unit VIe–2; woodland group 3)

Gilpin very stony silt loam, 0 to 12 percent slopes (GnB).—This soil has numerous stones and boulders on the surface and throughout the profile. Its surface layer contains dark-colored, decayed leaf matter and is 2 to 4 inches thicker than that in the profile described as representative for the series. Included in mapping were areas of moderately well drained soils that have a darker colored surface layer than this soil.

This soil is suited to woodland and pasture. Stoniness is the main limitation. There is little, if any, erosion. Most of the acreage is woodland. (Capability unit VIs–2; woodland group 2)

Gilpin very stony silt loam, 12 to 30 percent slopes (GnD).—This soil has numerous stones and boulders on the surface and throughout the profile. Its surface layer is 2 to 4 inches thinner than that in the profile described as representative for the series. Included in mapping were areas of moderately well drained soils that have a darker colored surface layer.

Most of the acreage is woodland. Only a few small areas have been cultivated. Stoniness is the main limitation. There is little erosion. (Capability unit VIs–2; woodland group 2)

Gilpin very stony silt loam, 30 to 80 percent slopes (GnF).—This soil is suited to woodland. It has numerous stones and boulders on the surface and throughout the profile. Stoniness is the main limitation. There is little erosion. Most of the acreage is woodland. (Capability unit VIIs–1; woodland group 3)

Guernsey Series

The Guernsey series consists of deep, moderately well drained to somewhat poorly drained, medium-textured soils on uplands. These soils are on benches and drainage divides that have smooth, concave slopes cut by numerous drainageways. They are generally at elevations above the Pittsburgh coal seam. The topography is gently undulating.

Guernsey soils developed in material weathered from gray limestone, siltstone, and clay shale. The surface layer is very dark grayish-brown to dark-brown silt loam. The subsoil is olive-brown to dark yellowish-brown silty clay to silty clay loam. The lowermost part of the subsoil is yellowish brown and has dark-brown and dark-gray streaks and gray mottles. The substratum is yellowish-brown silty clay loam.

In wet seasons these soils become saturated and unstable because the underlying clay shale tends to slow down the movement of water.

The following profile of Guernsey silt loam, 3 to 8 percent slopes, moderately eroded, is in a hayfield in Mt. Pleasant Township on the Westmoreland County fairgrounds.

Ap—0 to 13 inches, very dark grayish-brown (2.5Y 3/2) silt loam; medium platy structure breaking to moderate, medium, granular; friable when moist, sticky and plastic when wet; pH 6.2; abrupt, smooth lower boundary. 11 to 15 inches thick.

B21t—13 to 19 inches, olive-brown (2.5Y 4/4) silty clay; moderate, medium, prismatic structure breaking to fine, medium, blocky; thin, continuous clay films; firm when moist, sticky and plastic when wet; thick patches of clay film; pH 6.6; gradual, wavy lower boundary. 5 to 7 inches thick.

B22t—19 to 27 inches, dark yellowish-brown (10YR 4/4) silty clay; prisms have very dark grayish-brown (2.5Y 3/2) surfaces; few, medium, strong-brown (7.5YR 5/6) and gray (10YR 5/1) mottles; moderate, medium, prismatic structure breaking to coarse and medium blocky; thick continuous clay films; firm when moist, sticky and plastic when wet; pH 6.4; gradual, wavy lower boundary. 6 to 10 inches thick.

B23tg—27 to 35 inches, olive-brown (2.5Y 4/4) silty clay loam; prism interiors have dark grayish-brown (10YR 4/2) and grayish-brown (10YR 5/2) surfaces; common, medium, strong-brown (7.5YR 5/6) and gray (10YR 5/1) mottles; moderate, medium, prismatic structure breaking to strong, coarse, blocky; thick, discontinuous clay films; firm when moist, sticky and plastic when wet; pH 6.2; gradual, wavy lower boundary. 6 to 10 inches thick.

B3tg—35 to 42 inches, yellowish-brown (10YR 5/6) silty clay; grayish-brown (10YR 5/2) prism faces and streaks of dark-brown (10YR 4/3) and dark-gray (10YR 4/1) silt loam; common, coarse, distinct, gray (10YR 6/1) mottles; moderate, medium, prismatic structure breaking to strong, coarse, blocky; thick, discontinuous clay films; firm when moist, sticky and plastic when wet; pH 6.3; gradual, wavy lower boundary. 5 to 10 inches thick.

C—42 to 73 inches, yellowish-brown (10YR 5/8) silty clay loam; bands of very dark gray (N 3/) and olive (5Y 5/3) silty clay; weak, thin, platy structure to massive; thin, discontinuous clay films; firm when moist, moderately sticky and plastic when wet; pH 6.4.

The surface layer ranges from dark brown to very dark grayish brown in color. In many places it contains coarse fragments that have moved downslope. The depth to mottling ranges from 12 to 36 inches. The depth to bedrock ranges from 3 to 6 feet or more.

Guernsey silt loam, 3 to 8 percent slopes, moderately eroded (GsB2).—This soil has the profile described as representative for the series. Part of the original surface layer has been lost through erosion. The present plow layer is a mixture of what is left of the original surface layer and material from the subsoil. Included in mapping were level and gently sloping soils that have a thicker surface layer and soils that have a fragipan and are similar to Clarksburg soils.

This soil is suitable for most general farm crops. Alfalfa tends to be short-lived. Erosion is the major hazard. A seasonal high water table and a moderately slowly permeable subsoil are limitations. (Capability unit IIe-1; woodland group 5)

Guernsey silt loam, 8 to 15 percent slopes, moderately eroded (GsC2).—The plow layer of this soil is a mixture of what is left of the original surface layer and material from the subsoil. Included in mapping were small areas of slightly eroded soils and of soils that have a fragipan and resemble Clarksburg soils.

This soil is suited to general farm crops, but it is not well suited to winter grain or alfalfa. Erosion is the major hazard. A seasonal high water table and a moderately slowly permeable subsoil are limitations. (Capability unit IIIe-3; woodland group 5)

Guernsey silt loam, 8 to 15 percent slopes, severely eroded (GsC3).—This soil has lost most of its original surface layer through erosion. The present plow layer is largely subsoil material mixed with crop residue. The available moisture capacity is lower and tilth is poorer than is typical for the series. Included in mapping were areas of gently sloping, severely eroded soils and small areas of soils that have a fragipan and are similar to Clarksburg soils.

This soil is fairly well suited to a very long rotation with long-term hay. It is not well suited to alfalfa and winter grain because of a seasonal high water table. Erosion is the major hazard. (Capability unit IVe-3; woodland group 5)

Guernsey silt loam, 15 to 25 percent slopes, moderately eroded (GsD2).—This soil has lost all but about 6 inches of its original surface layer through erosion. It has fewer mottles in the lower part of the subsoil than is typical for the series. The present plow layer is generally a mixture of what is left of the original surface layer and material from the subsoil. Included in mapping were spots that are woodland or pasture and are only slightly eroded.

This soil is suitable for an occasional cultivated crop. It is not well suited to alfalfa or winter grain because of the seasonal high water table. Erosion is the major hazard. Gullies have formed in places. (Capability unit IVe-3; woodland group 5)

Guernsey silt loam, 15 to 25 percent slopes, severely eroded (GsD3).—This soil has lost all or almost all of its original surface layer through erosion. The present plow layer is largely subsoil material mixed with crop residue. Erosion has decreased the organic-matter content, impaired the available moisture capacity, and reduced the depth of the root zone.

This soil is suitable for woodland or pasture, but it is not suitable for cultivation. Controlling erosion and improving drainage are the major problems. Gully stabilization is needed. (Capability unit VIe-3; woodland group 5)

Gullied Land

Gullied land occurs in areas where vegetation has been destroyed by toxic fumes from smelters and coke ovens. Because of the lack of protective cover in these areas, deep gullies have formed. All, or almost all, of the original surface layer is gone. In many places the gullies extend as far down as bedrock. Most of them are too deep to be crossed with farm machinery. The largest area of Gullied land is near Donora.

Gullied land, 0 to 12 percent slopes (GuB).—This land type occurs on benches and hillsides. Between gullies, there generally is an erosion pavement made up of channery fragments of sandstone and siltstone.

Some areas of this land type are used for building sites. Trees can be grown. Controlling erosion is the major problem. (Capability unit VIIe-1; woodland group 9)

Gullied land, 12 to 30 percent slopes (GuD).—This land type occurs on hillsides where gully stabilization would involve much earthmoving. It is more droughty than the less sloping site, and the erosion pavement of channery material is less evident.

Shrubs and grasses that tolerate droughty, acid conditions can be grown. Controlling erosion is the major problem. (Capability unit VIIe-1; woodland group 9)

Gullied land, 30 to 60 percent slopes (GuF).—This land type occurs on hillsides that are too steep for intensive stabilization treatment.

Shrubs and trees that tolerate droughty, acid conditions can be grown. The supply of available moisture is very low during the growing season. Controlling erosion is the major problem. (Capability unit VIIe-1; woodland group 9)

Lindside Series

The Lindside series consists of deep, moderately well drained and somewhat poorly drained soils on flood plains in the western part of the county. These soils are associated with the poorly drained Melvin soils.

Lindside soils formed in sediments washed from uplands underlain by limestone and shale. The surface layer is dark-brown, friable silt loam. It is underlain by brown to yellowish-brown silt loam. The lower part of the profile is mottled with gray and light yellowish brown. In places these soils contain thin lenses of sand and gravel.

The following representative profile of Lindside silt loam is 1 mile west of Derry in a pasture.

Ap—0 to 11 inches, dark-brown (10YR 4/3) silt loam; weak, medium, granular structure; friable when moist, nonsticky and nonplastic when wet; pH 6.0; gradual, smooth lower boundary. 9 to 11 inches thick.

C1—11 to 18 inches, brown (10YR 5/3) silt loam; weak, medium, granular structure; friable when moist, nonsticky and nonplastic when wet; pH 6.4; gradual, smooth lower boundary. 5 to 9 inches thick.

C2—18 to 38 inches+, yellowish-brown (10YR 5/4) silt loam; common, coarse, distinct, gray (10YR 5/1) and light yellowish-brown (10YR 6/4) mottles; massive; firm when moist, nonsticky and nonplastic when wet; pH 6.4. In places this horizon is underlain by stratified sand and gravel.

The Ap horizon ranges from silt loam to coarse silt loam or loam in texture. The C horizon ranges from loam to coarse silty clay loam. The depth to mottling ranges from 12 to 30 inches. The depth to rock ranges from 3 to 10 feet.

Lindside silt loam (Ln).—This soil has the profile described as typical for the series. It is flooded occasionally, and water ponds in depressions and drainageways after flooding. Occasionally, a crop is drowned or scoured out. The slope range is 0 to 3 percent.

This soil is only fairly well suited to cultivated crops, and it is too wet to be suited to alfalfa and winter grain. Most of the acreage is pasture. (Capability unit IIw-2; woodland group 4)

Lindside silt loam, very acid (Ls).—Acid drainage water from coal mines collects on this soil. There are numerous pieces of coal on the surface and throughout the profile. The slope range is 0 to 3 percent.

If well managed, this soil is suitable for cultivated crops. It is not suitable for alfalfa, winter grain, or other crops that are adversely affected by acid conditions or a seasonal high water table. Protecting this soil from acid drainage water is the main problem. (Capability unit IIw-2; woodland group 4)

Made Land

Made land consists of soil material excavated during construction of highways and airports and preparation of building sites and of the waste or overburden from stone quarries. Earthmoving operations have destroyed soil profiles and mixed the surface layer and subsoil with raw and partly weathered rock.

The characteristics of Made land are highly variable. The texture of the surface layer is generally silt loam but ranges from clay loam to cobbly loam. The depth of the disturbed material ranges from 0 to 15 feet or more. The reaction ranges from extremely acid to neutral, depending on the kind of rock that has been uncovered and incorporated into the loose material. Fertility ranges from extremely low to fairly high. Onsite investigation is needed to establish the use suitability of any given area.

Made land, 0 to 8 percent slopes (MaB).—This land type has been smoothed. Generally it has no large rocks or boulders on the surface but has many in the underlying material.

This soil material is suitable for perennial hay and grass sod and is generally suitable for alfalfa. Permeability varies. Tillage is difficult. Preserving tilth is the main problem. (Capability unit IVs-1; woodland group 9)

Made land, 8 to 35 percent slopes (MaD).—This land type is one of complex slopes and rugged relief. It has not been smoothed. The material is largely rock, and generally there are large stones and boulders on the surface.

Trees and shrubs can be grown. Internal drainage varies. The steep slopes and coarse fragments on the surface are the major limitations. (Capability unit VIIs-3; woodland group 9)

Melvin Series

The Melvin series consists of deep, level or nearly level, poorly drained soils on flood plains or in depressions along streams. These soils occur in the western part of the county. They are associated with the moderately well drained to somewhat poorly drained Lindside soils.

Melvin soils formed in sediments washed from uplands that are underlain by limestone and shale. The surface layer is dark grayish-brown silt loam. The subsoil is very dark gray to very dark grayish-brown silt loam mottled with light brownish gray and yellowish brown. In many places the lower part of the profile contains lenses of sand and gravel. In places these soils are underlain by gravel.

The following representative profile of Melvin silt loam is 2 miles north of Mt. Pleasant.

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure; friable when moist; pH 6.4; clear, smooth lower boundary. 7 to 9 inches thick.

B21g—8 to 18 inches, dark grayish-brown (10YR 4/2) silt loam; common, medium, distinct, light brownish-gray (10

YR 6/2) mottles; moderate, medium, subangular blocky structure; friable when moist; pH 6.6; gradual, smooth lower boundary. 7 to 12 inches thick.

B22g—18 to 25 inches, very dark gray (10YR 3/1) silt loam; common, fine, distinct, yellowish-brown (10YR 5/8) mottles; moderate, medium, subangular blocky structure; slightly firm when moist; pH 6.6; gradual, smooth lower boundary. 5 to 10 inches thick.

B23g—25 to 36 inches, very dark grayish-brown (10YR 3/2) silt loam; common, medium, distinct, yellowish-brown (10YR 5/8) mottles; moderate, medium, subangular blocky structure; firm when moist; pH 7.2; gradual, wavy lower boundary. 8 to 15 inches thick.

B24g—36 to 48 inches, very dark gray (10YR 3/1) silt loam; common, coarse, distinct, yellowish-brown (10YR 5/8) mottles; moderate, medium, subangular blocky structure; firm when moist; pH 7.0.

The surface layer ranges from very dark grayish brown to dark gray in color and from fine silt loam to loam in texture. The subsoil ranges from very dark grayish brown to light gray in color and from sandy loam to silty clay loam in texture. In places it contains lenses of sand and gravel. The depth to bedrock ranges from 3 to 10 feet or more.

Melvin silt loam (Mc).—This soil has the profile described as typical for the series. It is flooded occasionally, and water ponds in depressions after flooding. Occasionally, a crop is flooded out. The slope range is 0 to 3 percent.

This soil is suited to perennial hay, pasture, and woodland. In places it is suited to cultivated crops, but not to crops that are likely to be adversely affected by flooding or a high water table. Wetness is the major limitation. (Capability unit IIIw–2; woodland group 6)

Mine Dump

Mine dump (Md) consists of piles of low-grade coal that has been separated from the commercial coal and dumped near the mine opening. The piles generally are cone shaped and have very steep slopes. Some of the material in these dumps is being reworked to obtain the fine coal that is used for commercial purposes. Frequently the dumps catch fire and burn slowly for months, or even years. The burned material is used for capping unpaved roads.

Nothing of economic value can be grown in these areas. (Capability unit VIIIs–1; woodland group 10)

Mine Wash

Mine wash (Mm) consists of areas on flood plains and colluvial slopes that are frequently covered with drainage water from coal mines. This water carries sulfur and iron in solution. The sulfur and iron react chemically with compounds in the air and in the soil and cause toxic conditions that are unfavorable for plant growth.

Liberal amounts of lime and fertilizer would be needed to establish a vegetative cover in these areas. Toxicity is the major limitation. (Capability unit VIIIs–1; woodland group 10)

Monongahela Series

The Monongahela series consists of deep, medium-textured, nearly level to sloping, moderately well drained soils. These soils occur in two distinct topographic positions. They are on low-lying flats close to streams and on high terraces about 30 feet or more above the valley floor. On the higher and older terraces, the soils are somewhat browner in the uppermost horizons, are brighter colored and more reddish in the subsoil, and are likely to have more sand and gravel in the lower part of the profile. Monongahela soils are associated with the somewhat poorly drained Tygart soils and the poorly drained Purdy soils. Also nearby are the Atkins and Philo soils of the flood plain.

Monongahela soils developed in old alluvium derived mainly from acid soil material. The surface layer is dark grayish-brown silt loam. The upper part of the subsoil is yellowish-brown, heavy silt loam mottled with dark brown and light brownish gray. The lower part is a firm, brittle, moderately slowly permeable fragipan. It is yellowish-brown light silt loam or loam mottled with gray and light brownish gray. The substratum is yellowish-red fine sandy loam that is 10 percent gravel.

Most of the acreage is cropland or pasture. There are scattered woodlots.

The following representative profile of Monongahela silt loam, 3 to 8 percent slopes, moderately eroded, is in a hayfield in Bell Township 1 mile south of Salina.

Ap—0 to 11 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; pH 5.3; abrupt, smooth lower boundary. 10 to 12 inches thick.

B21t—11 to 18 inches, yellowish-brown (10YR 5/6) heavy silt loam; dark grayish-brown (10YR 4/2) coatings; moderate, medium, subangular blocky structure; thin, discontinuous clay films; firm to friable when moist, slightly sticky and slightly plastic when wet; pH 4.8; gradual, wavy lower boundary. 5 to 9 inches thick.

B22t—18 to 24 inches, yellowish-brown (10YR 5/4) heavy silt loam; 2 percent rounded gravel; common, medium, distinct, light brownish-gray (10YR 6/2) and dark-brown (10YR 4/3) mottles; common black coatings; moderate, medium, prismatic structure breaking to moderate, medium, platy; thin, continuous clay films; firm when moist, slightly sticky and plastic when wet; pH 4.6; gradual, wavy lower boundary. 4 to 8 inches thick.

Bx1—24 to 37 inches, yellowish-brown (10YR 5/6) light silt loam; 3 percent rounded gravel; common, medium, distinct, light brownish-gray (10YR 6/2) and brown (7.5YR 5/4) mottles; coarse prismatic structure breaking to strong, medium, platy; thick, discontinuous clay films; firm when moist, slightly sticky and slightly plastic when wet; pH 4.7; gradual, wavy lower boundary. 10 to 17 inches thick.

Bx2—37 to 49 inches, light yellowish-brown (10YR 6/4) loam; 5 percent rounded gravel; many, medium, distinct, gray (5Y 6/1) mottles; yellowish-brown (10YR 5/4) coatings; strong, coarse, prismatic structure; very thick, discontinuous clay films; firm when moist, slightly sticky and slightly plastic when wet; pH 4.6; gradual, wavy lower boundary. 9 to 15 inches thick.

C—49 to 55 inches +, yellowish-red (5YR 5/6) fine sandy loam; 10 percent rounded gravel; many, medium, distinct, pale-brown (10YR 6/3) mottles; weak, medium, platy structure; friable when moist, slightly sticky and slightly plastic when wet; pH 4.6.

The surface layer ranges from silt loam to heavy silt loam or loam in texture and from very dark grayish brown to grayish brown in color. The subsoil ranges from loam through gravelly clay loam to silty clay loam in texture and from yellowish brown to yellowish red in color. The depth to the fragipan ranges from 18 to 36 inches. The thickness of the pan ranges from 12 to 36 inches. In many places the soil is underlain by a mixture of stratified sand and gravel and fine-textured material. Bedrock is at a depth of 4 to 10 feet.

Monongahela silt loam, 0 to 3 percent slopes (MoA).—The surface layer of this soil is thicker and darker colored than that in the profile described as representative for the series. Included in mapping were a few areas of moderately eroded soils.

This soil is suitable for general farm crops. Slow surface drainage and the fragipan are the main limitations. (Capability unit IIw–1; woodland group 5)

Monongahela silt loam, 3 to 8 percent slopes, moderately eroded (MoB2).—This soil has the profile described as typical for the series. The present plow layer is generally a mixture of what is left of the original surface layer and material from the subsoil.

This soil is suitable for general farm crops. Erosion is the major hazard. (Capability unit IIe–4; woodland group 5)

Monongahela silt loam, 8 to 15 percent slopes, moderately eroded (MoC2).—The present plow layer of this soil is generally a mixture of what is left of the original surface layer and material from the subsoil. It is less friable than the original material and is difficult to work into a good seedbed. Included in mapping were small areas of severely eroded soils.

This soil is suitable for most general farm crops. Winter grain tends to freeze out. Erosion is the major hazard. (Capability unit IIIe–4; woodland group 5)

Mucky Peat

Mucky peat occurs as nearly level areas of very poorly drained organic soils in depressions on top of Laurel Hill. These soils formed in accumulations of organic matter. The water table is at or near the surface. The depth to mineral soil material is about 21 inches.

The following representative profile of Mucky peat is in a depression on Laurel Hill at the head of Linn Run.

O1—0 to 9 inches, very dark gray (10YR 3/1) peat derived from moss and sedge; pH 3.8; clear, smooth lower boundary. 6 to 10 inches thick.

O21—9 to 18 inches, very dark brown (10YR 2/2) muck; massive; pH 4.2; gradual, smooth lower boundary. 7 to 20 inches thick.

O23—18 to 21 inches, very dark brown (10YR 2/2) muck; weak, medium, granular structure; friable when moist, slightly sticky when wet; pH 4.4; clear, smooth lower boundary. 3 to 7 inches thick.

IIB1—21 to 31 inches, very dark grayish-brown (10YR 3/2) silty clay loam; moderate, medium, granular structure; friable when moist, sticky and plastic when wet; pH 4.4; gradual, smooth lower boundary. 8 to 12 inches thick.

IIB2g—31 to 38 inches +, very dark gray (10YR 3/1) clay loam; massive; firm when moist, sticky and plastic when wet; pH 4.4.

The organic layers vary in thickness and in degree of decomposition. The depth to mineral soil material ranges from 18 to 48 inches. The texture of the mineral soil ranges from loam to silty clay loam.

Mucky peat (Mp).—This soil material is suitable for woodland. It could be cleared, drained, and used for special crops, but the areas are small and the cost would be high. Wetness is the major limitation. (Capability unit VIIw–1; woodland group 10)

Philo Series

The Philo series consists of deep, level or nearly level, moderately well drained soils on flood plains. Theses oils are along all of the major streams in the county and along smaller streams that drain areas of acid rocks and soils. They are associated with the poorly drained Atkins soils on flood plains, the Sequatchie soils on high bottoms, and the Monongahela soils on adjacent terraces.

Philo soils formed in alluvium derived from acid sandstone and shale. The surface layer is very dark grayish-brown, friable silt loam. It is underlain by dark yellowish-brown silt loam. The lower part of the profile is dark yellowish-brown sandy loam and yellowish-brown gravelly loam mottled with light brownish gray and very dark grayish brown. In many places the profile contains sandy and gravelly lenses.

The following representative profile of Philo silt loam is 3 miles west of New Alexandria.

Ap—0 to 10 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; pH 5.2; gradual, smooth lower boundary. 7 to 11 inches thick.

C1—10 to 18 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; pH 5.4; diffuse lower boundary. 6 to 10 inches thick.

C2—18 to 26 inches, dark yellowish-brown (10YR 4/4) sandy loam; common, coarse, distinct, light brownish-gray (10YR 6/2) mottles; weak, medium, subangular blocky structure; friable when moist, nonsticky and nonplastic when wet; pH 5.2; clear, smooth lower boundary. 7 to 12 inches thick.

C3—26 to 36 inches +, yellowish-brown (10YR 5/6) gravelly loam; common, coarse, distinct, very dark grayish-brown (10YR 3/2) and brown (10YR 5/3) mottles; massive; firm when moist, nonsticky and nonplastic when wet; pH 5.2. This horizon is underlain by stratified sand and gravel.

The surface layer ranges from very dark grayish brown to dark yellowish brown in color. The dark color results partly from fine coal particles in the deposits. The texture in all horizons ranges from sandy loam to silty clay loam. Gravelly and cobbly phases are common in mountainous areas. The depth to mottling ranges from 16 to 30 inches. The pH ranges from 4.5 to 5.2. The depth to bedrock is generally 3 to 10 feet or more.

Philo silt loam (Ph).—This soil has the profile described as typical for the series. It is frequently flooded, and water ponds in the depressions and drainageways after flooding. Occasionally, a crop is flooded out. On much of the acreage along Jacobs Creek, the surface layer is sandy loam. The slope range is 0 to 5 percent. Included in mapping were frequently flooded areas of colluvial material.

This soil is suitable for general farm crops. Flooding and wetness are the major limitations. (Capability unit IIw–2; woodland group 4)

Purdy Series

The Purdy series consists of deep, poorly drained soils on terraces and upland flats that are near present streams or old lakebeds. These soils are associated with the moderately well drained Monongahela soils and the somewhat poorly drained Tygart soils.

Purdy soils developed in fine sediments derived for the most part from acid shale, siltstone, and sandstone. The sediments were laid down in slack water. Now that the streams have cut downward, the soils are above the flood level. The plow layer is dark grayish-brown, mellow silt loam. The subsoil is gray silty clay loam that has many, distinct, yellowish-brown mottles. At a depth of about 19 inches there is a firm, brittle fragipan.

The following representative profile of Purdy silt loam is 3 miles northwest of Blairsville.

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure; friable when moist, sticky and plastic when wet; pH 6.0; abrupt, smooth lower boundary. 7 to 8 inches thick.

B2tg—7 to 19 inches, gray (10YR 6/1) silty clay loam; common, coarse, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, subangular blocky structure; thin, continuous, gray (10YR 7/1) clay films; firm when moist, sticky and plastic when wet; pH 5.0; clear, smooth lower boundary. 10 to 15 inches thick.

Bxg—19 to 28 inches, gray (10YR 5/1) and yellowish-brown (10YR 5/6), streaked silty clay loam; common iron and manganese concretions; weak, coarse, prismatic structure breaking to moderate, coarse, subangular blocky; thick, continuous, gray (10YR 7/1) clay films; firm when moist, sticky and plastic when wet; pH 5.2; gradual, smooth lower boundary. 7 to 14 inches thick.

Cg—28 to 40 inches +, gray (10YR 5/1) clay loam; massive; firm when moist, slightly sticky and slightly plastic when wet; pH 5.2.

The surface layer ranges from dark grayish brown to dark brown in color and from silt loam to loam in texture. The subsoil ranges from light gray to dark gray in color and from silty clay loam to loam in texture. In areas where there are accumulations of soil material washed from higher slopes, the surface layer is thicker and darker colored. The depth to rock ranges from 4 to 20 feet.

Purdy silt loam (Pu).—This soil has the profile described as typical for the series. The slope range is 0 to 3 percent.

This soil is suitable for an occasional cultivated crop. Wetness is the major limitation. There is little or no erosion. (Capability unit IVw–1; woodland group 7)

Sequatchie Series

The Sequatchie series consists of deep, level to nearly level, well-drained soils on low terraces. These soils are along major streams but are not subject to flooding. They are associated with the moderately well drained Monongahela and Philo soils and the poorly drained Atkins soils.

Sequatchie soils formed in sediments washed chiefly from uplands underlain by sandstone and shale. Most of the parent rock was acid. The surface layer is dark yellowish-brown, mellow silt loam. The subsoil is strong-brown loam and fine sandy loam. In places the lower part of the profile contains lenses of sand and gravel. In age and profile development these soils are intermediate between Philo and Monongahela soils.

The following representative profile of Sequatchie silt loam, 0 to 5 percent slopes, is 1 mile south of New Alexandria.

Ap—0 to 7 inches, dark yellowish-brown (10YR 3/4) silt loam; moderate, medium and fine, granular structure; friable when moist, nonsticky and nonplastic when wet; pH 5.4; abrupt, smooth lower boundary. 7 to 8 inches thick.

B2t—7 to 14 inches, strong-brown (7.5YR 5/8) loam; moderate, medium, subangular blocky structure; slightly firm when moist, slightly sticky and slightly plastic when wet; thin clay films; pH 5.9; clear, wavy lower boundary. 6 to 11 inches thick.

B3—14 to 28 inches, strong-brown (7.5YR 5/6) fine sandy loam; weak, medium, subangular blocky structure; friable when moist, nonsticky and nonplastic when wet; pH 5.9; clear, wavy lower boundary. 10 to 17 inches thick.

C—28 to 48 inches +, strong-brown (7.5YR 5/6) sandy loam; massive; friable when moist, nonsticky and nonplastic when wet; pH 4.6.

The surface layer is silt loam or loam in texture and ranges from dark yellowish brown to dark brown in color. The subsoil ranges from strong brown to brown in color and from silt loam to sandy loam in texture. The depth to rock ranges from 4 to 20 feet.

Sequatchie silt loam, 0 to 5 percent slopes (SeA).—This soil has the profile described as typical for the series.

This soil is suited to truck crops and general farm crops, including alfalfa. It is suitable for irrigation. Leaching of plant nutrients is a hazard. (Capability unit I–1; woodland group 1)

Strip Mine Spoil

Strip mine spoil consists of soil material that has been disturbed by coal mining operations. The surface layer and subsoil of the original profile have been mixed with raw and partly weathered rock. The relief in these areas ranges from smooth to rugged, and the gradient from gently sloping and undulating to very steep. The trenches from the mines are used as diversion ditches. Some mine openings and prospecting sites were included in mapping. The high wall, or exposed face, of the mine pit is indicated by an escarpment symbol on the detailed soil map.

The material piled up during strip mine operations varies in content of coarse fragments. The surface texture is generally channery silt loam, but it ranges from clay loam through the coarser textures to fragments the size of boulders. In places the disturbed material is more than 25 feet deep.

The chemical properties vary also. Where sulfuric acid is released from pyrites into the soil solution, the reaction is extremely acid. Where bases, calcium for the most part, are released from limestone, the reaction is neutral. The amounts of available phosphorus and potassium vary, depending on chemical and biological activity in the soil.

Strip mine spoil, 0 to 8 percent slopes (SmB).—This land type is on benches and hilltops. It has been smoothed. Generally there are no large stones or boulders on the surface.

Trees can be grown. Tilth and acidity are the main limitations. (Capability unit VIIs–3; woodland group 9)

Strip mine spoil, 8 to 25 percent slopes (SmD).—This land type is one of complex slopes and rugged relief. It occurs on benches and back slopes in strip mine areas. Generally it has not been smoothed. In most places there are large stones and boulders on the surface.

Trees can be grown. Tilth and acidity are the main limitations. (Capability unit VIIs–3; woodland group 9)

Strip mine spoil, 25 to 75 percent slopes (SmF).—This land type occurs as back slopes and steep walls. It has not been filled or smoothed. In most places there are large stones and boulders on the back slopes.

Trees can be grown. Tilth and acidity are the main limitations. (Capability unit VIIs–3; woodland group 9)

Tygart Series

The Tygart series consists of deep, level and nearly level, somewhat poorly drained soils on terraces and flats adjacent to streams. These soils are associated with the moderately well drained Monongahela soils and the poorly drained Purdy soils.

Tygart soils developed in fine-textured, slack-water deposits derived from acid shale, siltstone, and sandstone. The surface layer is dark grayish-brown silt loam. The subsurface layer is light yellowish-brown heavy silt loam. The upper part of the subsoil is light yellowish-brown silty clay loam mottled with yellowish brown and gray. The lower part is light-gray, brownish-yellow, and yellowish-red clay loam mottled with gray and brownish yellow.

The following representative profile of Tygart silt loam, 0 to 3 percent slopes, is 3½ miles northwest of Blairsville.

Ap—0 to 7 inches, dark grayish-brown (2.5Y 4/2) silt loam; weak, fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; pH 5.6; abrupt, smooth lower boundary. 6 to 8 inches thick.

A2—7 to 10 inches, light yellowish-brown (2.5Y 6/4) heavy silt loam; moderate, fine, granular structure; friable when moist, slightly sticky and plastic when wet; pH 5.4; gradual, smooth lower boundary. 2 to 5 inches thick.

B21t—10 to 18 inches, light yellowish-brown (2.5Y 6/4) silty clay loam; few, medium, distinct, yellowish-brown (10YR 5/4) mottles; moderate, medium, blocky structure; firm when moist, slightly sticky and plastic when wet; thin clay films on ped faces and lining pores; pH 5.0; clear, smooth lower boundary. 6 to 10 inches thick.

B22t—18 to 24 inches, light yellowish-brown (2.5Y 6/4) silty clay loam; common, coarse, distinct, yellowish-brown (10YR 5/8) mottles; moderate, coarse, blocky structure; firm when moist, sticky and plastic when wet; thick clay films on ped faces and lining pores; pH 5.0; clear, smooth lower boundary. 5 to 9 inches thick.

B23g—24 to 38 inches, light-gray (5Y 7/1) and brownish-yellow (10YR 6/6) variegated clay loam; weak, coarse, prismatic structure breaking to moderate, medium, platy; firm when moist, sticky and plastic when wet; pH 5.0; diffuse lower boundary. 12 to 16 inches thick.

B24g—38 inches +, gray (5Y 5/1) and yellowish-red (5YR 5/8) variegated clay loam; weak, coarse, prismatic structure breaking to moderate, thick, platy; firm when moist, sticky and plastic when wet; pH 5.0.

The surface layer ranges from dark grayish brown to very dark grayish brown in color. The upper part of the subsoil ranges from silty clay to silty clay loam in texture. The lower part ranges from yellowish brown to gray in color and from silt loam to silty clay loam in texture. In spots there are strata of sandy loam. The depth to mottling ranges from 8 to 18 inches. The depth to bedrock ranges from 4 to 20 feet.

Tygart silt loam, 0 to 3 percent slopes (TrA).—This soil has the profile described as typical for the series. Included in mapping were areas where this soil is moderately well drained.

This soil is suitable for pasture. It is also suitable for some cultivated crops, some hay crops, and spring grain if the crops are part of a long rotation. It is not suitable for corn and alfalfa. There is little or no erosion. Wetness is the main limitation. Tile drainage is rarely satisfactory because of slow permeability. (Capability unit IIIw-1; woodland group 5)

Upshur Series

The Upshur series consists of moderately deep to deep, gently sloping to moderately steep, moderately fine textured, well-drained soils. These soils are on benches produced by differential weathering of the underlying red beds, which are about 25 feet thick and crop out along the hillside. The surface of the benches is undulating. These soils are mainly in the northwestern corner of the county, generally at elevations above the Pittsburgh coal seam. They are unstable when wet. Slips are common.

Upshur soils developed in residuum derived mainly from red and bluish-gray, neutral or calcareous shale, and partly from limestone, of which only a few thin strata occur. The plow layer is weak-red silty clay loam. The subsoil is weak-red silty clay to clay that is sticky and very plastic when wet. The lowermost part of the subsoil is mottled with pale olive and light gray. The substratum is 10 percent or more coarse fragments.

In some parts of Westmoreland County, Upshur soils are mapped as a complex with Gilpin soils, which are described under the heading "Gilpin Series."

The following representative profile of Upshur silty clay loam, 3 to 8 percent slopes, moderately eroded, is in an idle field in Washington Township 1½ miles east of Camp Jo-Ann.

Ap—0 to 8 inches, weak-red (2.5YR 4/2) silty clay loam; weak, fine, granular structure; friable when moist, sticky and plastic when wet; pH 4.4; abrupt, smooth lower boundary. 7 to 10 inches thick.

B21t—8 to 13 inches, weak-red (10R 4/3) silty clay; strong, medium, blocky structure; thick patches of clay film; firm when moist, sticky and very plastic when wet; pH 4.4; clear, smooth lower boundary. 3 to 7 inches thick.

B22t—13 to 25 inches, weak-red (10R 4/3) clay; moderate, fine, blocky structure; thick clay films; firm when moist, sticky and very plastic when wet; pH 4.4; gradual, wavy boundary. 9 to 14 inches thick.

B23t—25 to 38 inches, weak-red (10R 4/3) silty clay; common, coarse, distinct, pale-olive (5Y 6/4) and light-gray (5Y 7/2) streaks and blotches; moderate, very fine, blocky structure; thick clay films; firm when moist, sticky and very plastic when wet; pH 4.5; gradual, wavy lower boundary. 10 to 15 inches thick.

C1—38 to 58 inches, dusky-red (10R 3/2), gritty silty clay loam; streaks and blotches of pale olive (5Y 6/4) and light gray (5Y 7/2); massive; thin, discontinuous clay films in pores and root channels; friable when moist, slightly sticky and plastic when wet; pH 5.4; diffuse, irregular lower boundary. 15 to 25 inches thick.

C2—58 to 70 inches, reddish-gray (10R 5/1), weathered clay shale; 10 percent coarse fragments; grayish-brown (2.5Y 5/2) streaks and blotches; massive; thin, discontinuous clay films in pores and root channels; friable when moist, nonsticky and nonplastic when wet; pH 7.6; diffuse, irregular lower boundary. 8 to 16 inches thick.

R—70 inches +, red and gray calcareous shale.

The surface layer ranges from silty clay loam to clay loam in texture and from weak red through dusky red to reddish brown in color. The subsoil ranges from weak red to dusky red in color and from silty clay loam to clay in texture. It is 10 to 20 percent coarse fragments. The reaction ranges from extremely acid to medium acid in the B horizon and from strongly acid to mildly alkaline in the C horizon. The depth to bedrock is 2 to 6 feet.

Upshur silty clay loam, 3 to 8 percent slopes, moderately eroded (UcB2).—This soil has the profile described as typical for the series. The present plow layer is generally a mixture of what is left of the original surface layer and material from the subsoil.

This soil is suitable for general farm crops. It is excellent for alfalfa. Erosion is the major hazard. Slow permeability is a limitation. (Capability unit IIIe-1; woodland group 2)

Upshur silty clay loam, 8 to 15 percent slopes, moderately eroded (UcC2).—The present plow layer of this soil is generally a mixture of what is left of the original surface layer and material from the subsoil.

This soil is well suited to perennial hay and is excellent for alfalfa. It is suited to an occasional cultivated crop if the crop is part of a very long rotation. This soil is susceptible to mass movement or slipping. Erosion is the major hazard. (Capability unit IVe-1; woodland group 2)

Upshur-Gilpin silty clay loams, 3 to 8 percent slopes, moderately eroded (UgB2).—This mapping unit consists mainly of Upshur soils. Erosion has removed part of the original surface layer from these soils. The present plow layer is a mixture of the rest of the original surface layer and material from the subsoil. Erosion is the major hazard. (Capability unit IIIe-1; woodland group 2)

Upshur-Gilpin silty clay loams, 8 to 15 percent slopes, moderately eroded (UgC2).—This mapping unit consists mainly of Upshur soils. Erosion has removed part of the original surface layer from these soils. The present plow layer is a mixture of the rest of the original surface layer and material from the subsoil.

These are good soils for alfalfa. Because of the slope, they are susceptible to mass movement and slipping. Erosion is the major hazard. (Capability unit IIIe-5; woodland group 2)

Upshur-Gilpin silty clay loams, 8 to 15 percent slopes, severely eroded (UgC3).—This mapping unit consists mainly of Upshur soils. Erosion has removed all or almost all of the original surface layer from these soils. The present plow layer is largely subsoil material. The available moisture capacity is lower, tilth is poorer, and the root zone thinner than in the moderately eroded soils.

South-facing slopes are droughty. Erosion and slippage are the major hazards. (Capability unit IVe-1; woodland group 2)

Upshur-Gilpin silty clay loams, 15 to 25 percent slopes, moderately eroded (UgD2).—This mapping unit consists mainly of Upshur soils. Erosion has removed part of the original surface layer from these soils. The present plow layer is generally a mixture of the rest of the original surface layer and material from the subsoil. Erosion and slippage are the major hazards. (Capability unit IVe-1; woodland group 2)

Upshur-Gilpin silty clay loams, 15 to 25 percent slopes, severely eroded (UgD3).—This mapping unit consists mainly of Upshur soils. Erosion has removed all or almost all of the original surface layer from these soils. The present plow layer is largely subsoil material mixed with crop residue. The available moisture capacity is lower, tilth is poorer, and the root zone is thinner than in the moderately eroded soils. Erosion and slippage are the major hazards. (Capability unit VIe-2; woodland group 2)

Upshur-Gilpin silty clay loams, 25 to 35 percent slopes, moderately eroded (UgE2).—This mapping unit consists mainly of Upshur soils. Erosion has removed all but 3 inches of the original surface layer from these soils. The plow layer is a mixture of what is left of the original surface layer and material from the subsoil. The use of farm equipment is difficult on these steep slopes. Erosion and slippage are the major hazards. (Capability unit VIe-2; woodland group 3)

Weikert Series

The Weikert series consists of shallow, well-drained, shaly soils on uplands. These soils are on the steeper slopes in the areas underlain by shale. For the most part, they are at elevations below the Pittsburgh coal seam. Slopes are short and convex. These soils are closely associated with Gilpin soils.

Weikert soils developed in residuum derived from sandstone and shale. The surface layer is dark yellowish-brown shaly silt loam that is 30 percent coarse fragments. The subsoil is yellowish-brown to strong-brown very shaly silt loam that is about 65 percent coarse fragments.

Most of the acreage is idle. Only a small part is cultivated.

The following representative profile of Weikert shaly silt loam, 5 to 12 percent slopes, is 4 miles north of New Alexandria.

Ap—0 to 6 inches, dark yellowish-brown (10YR 4/4) shaly silt loam; 30 percent shale fragments; weak, fine, granular structure; very friable when moist, nonsticky and nonplastic when wet; pH 5.4; clear, smooth lower boundary. 5 to 8 inches thick.

B2—6 to 10 inches, yellowish-brown (10YR 5/6) very shaly silt loam; 60 percent shale fragments; weak, fine, subangular blocky structure breaking to moderate and weak, fine, granular; friable when moist, nonsticky and nonplastic when wet; pH 5.6; gradual, wavy lower boundary. 3 to 8 inches thick.

B3—10 to 14 inches, strong-brown (7.5YR 5/6) very shaly silt loam; 70 percent shale fragments; weak, fine, granular structure; friable when moist, nonsticky and nonplastic when wet; pH 5.4; clear, wavy lower boundary. 3 to 10 inches thick.

R—14 to 48 inches +, light olive-brown (2.5Y 5/4) and grayish-brown (10YR 5/2) shale; pH 5.0.

The surface layer ranges from dark yellowish brown to dark brown in color and from shaly silt loam to very shaly silt loam in texture. The color and texture vary, depending on the degree of erosion. The structure throughout the profile ranges from weak to moderate. The profile is 50 to 75 percent coarse fragments. The depth to shale is 1 foot to 2 feet.

Weikert shaly silt loam, 5 to 12 percent slopes (WeB).—This soil is about 18 inches thick over bedrock. It has lost part of its original surface layer through erosion. The present surface layer is a mixture of the rest of the surface layer, material from the subsoil, and crop residue.

This soil is suited to general farm crops if the crops are part of a long rotation. Pasture yields are low during dry periods. The available moisture capacity is low. Erosion is the major hazard. (Capability unit IIIe-6; woodland group 8)

Weikert shaly silt loam, 12 to 20 percent slopes (WeC).—This soil is generally shallower than the soil described as typical for the series. It has lost most of its original surface layer through erosion. The present plow layer is a mixture of the rest of the surface layer, material from the subsoil, and crop residue.

This soil is suited to long-term hay and an occasional cultivated crop. Pasture yields are low during dry periods. The available moisture capacity is very low. Erosion is the major hazard. (Capability unit IVe-4; woodland group 8)

Weikert shaly silt loam, 20 to 30 percent slopes (WeD).—This soil is only about 10 inches thick over shale. It has lost all or almost all of its original surface layer through erosion. The present plow layer is a mixture of the rest of the surface layer, material from the subsoil, and crop residue.

This soil generally is not suited to field crops; it is better suited to pasture. The available moisture capacity is very low. Erosion is the major hazard. (Capability unit VIe–2; woodland group 8)

Weikert soils, 30 to 60 percent slopes (WhF).—These soils are 10 inches thick over bedrock. They have lost all or almost all of the original surface layer through erosion. The layer just above bedrock is thin, yellowish-brown, very shaly subsoil material.

Trees grow slowly on these soils. The available moisture capacity is very low. Droughtiness is the major limitation. (Capability unit VIIs–2; woodland group 8)

Weikert very rocky silt loam, 40 to 100 percent slopes (WkF).—This soil occurs as escarpments cut into shale and siltstone bedrock by streams. It occupies bluffs along the larger streams and water gaps. Slopes are long and smooth.

Most of the acreage is woodland, but trees grow slowly. Downslope movement keeps the soil material churned. Bedrock is exposed in places. Shallowness is the major limitation. (Capability unit VIIs–2; woodland group 8)

Westmoreland Series

The Westmoreland series consists of moderately deep to deep, well-drained, medium-textured soils on uplands. These soils are mainly in the central and southwestern parts of the county and occur at elevations above the Pittsburgh coal seam. Slopes are long, smooth, and convex. These soils are associated with the well-drained Brooke soils and the somewhat poorly drained Guernsey soils.

Westmoreland soils developed in residuum derived from interbedded gray, calcareous shale, sandstone, and limestone. The surface layer is dark-brown silt loam. The subsoil is strong-brown to yellowish-brown silt loam to silty clay loam. The substratum is yellowish-brown very channery silt loam. Shale fragments are to be found throughout the profile.

Most of the moderately sloping parts are farmed.

The following representative profile of Westmoreland silt loam, 20 to 30 percent slopes, moderately eroded, is in an abandoned field in North Huntingdon Township one-half mile west of Irwin.

Ap—0 to 7 inches, dark-brown (10YR 3/3) silt loam; 5 percent shale chips; 5 to 10 percent coarse fragments; weak, thin, platy structure breaking to weak, fine, granular; friable when moist, nonsticky and nonplastic when wet; pH 4.5; abrupt, smooth lower boundary. 6 to 9 inches thick.

B1—7 to 10 inches, brown (7.5YR 4/4) silt loam; 10 to 15 percent coarse fragments; weak, fine and medium, subangular blocky structure; partial clay films; friable when moist, slightly sticky and nonplastic when wet; pH 5.2; clear, wavy lower boundary. 3 to 5 inches thick.

B21t—10 to 16 inches, strong-brown (7.5YR 5/6) silt loam; 10 to 15 percent shale fragments; weak, fine and medium, prismatic structure breaking to weak, medium, subangular blocky; thin clay films; friable when moist, slightly sticky and slightly plastic when wet; pH 5.7; gradual, wavy lower boundary. 5 to 8 inches thick.

B22t—16 to 23 inches, yellowish-brown (10YR 5/6) silty clay loam; 20 to 25 percent coarse fragments; weak, medium, prismatic structure breaking to moderate, medium, subangular blocky; distinct clay films; friable when moist, slightly sticky and plastic when wet; pH 5.7; clear, wavy lower boundary. 5 to 10 inches thick.

B23t—23 to 26 inches, yellowish-brown (10YR 5/4) shaly silty clay loam; 40 to 45 percent coarse fragments; moderate, medium, subangular blocky structure; prominent clay coatings; slightly firm when moist, slightly sticky and plastic when wet; clear, irregular lower boundary. 12 to 16 inches thick.

C1—26 to 37 inches, yellowish-brown (10YR 5/6) very channery silt loam; 55 to 60 percent coarse fragments of light olive-brown (2.5Y 5/4) shale; massive; discontinuous clay coatings; slightly firm when moist, sticky and plastic when wet; pH 5.8; clear, wavy lower boundary. 8 to 14 inches thick.

C2—37 to 51 inches, yellowish-brown (10YR 5/4) very channery silt loam; massive; 55 percent coarse fragments; slightly firm when moist, sticky and plastic when wet; pH 5.5.

In wooded sites there is a 1- to 2-inch layer of hardwood leaf litter over a 1- to 2-inch A1 horizon of very dark brown or black organic and mineral material. The surface layer ranges from very dark brown to dark yellowish brown in color and from silt loam to coarse silt loam in texture. This layer is 5 to 15 percent shale fragments. The upper part of the subsoil is yellowish-brown silt loam. The main part of the subsoil ranges from yellowish brown to strong brown in color and from silt loam to silty clay loam in texture. It is 10 to 50 percent coarse fragments. The substratum ranges from brown to yellowish brown in color and is 40 to 75 percent coarse fragments. The depth to rock ranges from 2 to 5 feet.

Westmoreland silt loam, 5 to 12 percent slopes, moderately eroded (WmB2).—The original surface layer of this soil was thicker than that in the profile described as representative for the series, but all but about 9 inches has been lost through erosion. The present plow layer is generally a mixture of what is left of the original surface layer and material from the subsoil. The subsoil is deeper than that in the profile described.

Erosion is the major hazard. (Capability unit IIIe–5; woodland group 2)

Westmoreland silt loam, 5 to 12 percent slopes, severely eroded (WmB3).—Erosion has removed all or almost all of the original surface layer from this soil. The present plow layer is largely subsoil material. The available moisture capacity is lower, tilth is poorer, and the root zone is thinner than in the moderately eroded soils.

Erosion is the major hazard. (Capability unit IIIe–6; woodland group 2)

Westmoreland silt loam, 12 to 20 percent slopes, moderately eroded (WmC2).—The profile of this soil is deeper over bedrock than the one described as typical for the series. The present surface layer is a mixture of the original surface layer, material from the subsoil, and crop residue.

Erosion is the major hazard. (Capability unit IIIe–6; woodland group 2)

Westmoreland silt loam, 12 to 20 percent slopes, severely eroded (WmC3).—Erosion has removed all or almost all of the original surface layer from this soil. The present plow layer is largely subsoil material. The available moisture capacity is lower and the root zone is thinner than in the moderately eroded soils.

Erosion is the major hazard. (Capability unit IVe–5; woodland group 2)

Westmoreland silt loam, 20 to 30 percent slopes, moderately eroded (WmD2).—This soil has the profile described as representative for the series. Erosion has removed part of the original surface layer. The present plow layer is generally a mixture of the rest of the original surface layer and material from the subsoil. It is about 5 percent shale chips.

Risk of erosion is the major hazard. (Capability unit IVe-5; woodland group 2)

Westmoreland silt loam, 20 to 30 percent slopes, severely eroded (WmD3).—Erosion has removed all or almost all of the original surface layer from this soil. The present plow layer is largely subsoil material. The available moisture capacity is lower and the root zone is thinner than in the moderately eroded soils. Downslope movement tends to mix the soil material.

Erosion in the major hazard. (Capability unit VIe-2; woodland group 2)

Westmoreland silt loam, 30 to 40 percent slopes, moderately eroded (WmE2).—Included with this soil in mapping were areas where the soils are severely eroded and small areas where the slope is more than 40 percent.

Erosion is the major hazard. (Capability unit VIe-2; woodland group 3)

Wharton Series

The Wharton series consists of deep, moderately well drained soils on benches and drainage divides. The topography is gently undulating. The smooth, concave slopes are cut by numerous drainageways. For the most part these soils are at elevations below the Pittsburgh coal seam. They are associated mainly with Gilpin and Cavode soils.

Wharton soils developed in residuum derived mainly from siltstone and acid clay shale and partly from limestone and calcareous shale. The surface layer is dark-brown silt loam and contains a few sandstone and shale fragments. The upper part of the subsoil is strong-brown through yellowish-brown to reddish-yellow silt loam to silty clay loam. The lower part is light brownish-gray to light olive-brown silty clay loam mottled with brownish yellow and light brownish gray. The substratum is light olive-brown silty clay loam.

Most of the acreage has been cultivated. Part of it is still wooded.

The following representative profile of Wharton silt loam, 3 to 8 percent slopes, moderately eroded, is 2 miles west of New Stanton.

Ap—0 to 8 inches, dark-brown (10YR 4/3) silt loam; moderate, medium, granular structure; very friable when moist, nonsticky and nonplastic when wet; pH 6.6; clear, smooth lower boundary. 7 to 9 inches thick.

B1—8 to 10 inches, strong-brown (7.5YR 5/6) silt loam; moderate, fine, subangular blocky structure; very friable when moist, nonsticky and nonplastic when wet; pH 6.2; clear, smooth lower boundary. 2 to 4 inches thick.

B21t—10 to 15 inches, yellowish-brown (10YR 5/6) silt loam; moderate, medium, subangular blocky structure; friable when moist, nonsticky and nonplastic when wet; thin patches of clay film; pH 5.4; gradual, smooth lower boundary. 3 to 6 inches thick.

B22t—15 to 23 inches, reddish-yellow (7.5YR 6/6) silty clay loam; strong, coarse, subangular blocky structure; thin clay film on ped faces; firm when moist; slightly sticky and slightly plastic when wet; pH 5.8; clear, smooth lower boundary. 6 to 10 inches thick.

B23t—23 to 27 inches, light brownish-gray (10YR 6/2) silty clay loam; common, fine, distinct, brownish-yellow (10YR 6/8) mottles; strong, medium, prismatic structure breaking to strong, coarse, blocky; thick patches of clay film and iron coatings; firm when moist, slightly sticky and slightly plastic when wet; pH 5.4; gradual, smooth lower boundary. 3 to 7 inches thick.

B3—27 to 38 inches, light olive-brown (2.5Y 5/4) silty clay loam; coatings of light brownish gray (2.5Y 6/2) on ped interiors; strong, coarse, prismatic structure breaking to strong, coarse, blocky; firm when moist, sticky and plastic when wet; pH 5.0; gradual, smooth lower boundary. 8 to 14 inches thick.

C—33 to 48 inches, light olive-brown (2.5Y 5/4) silty clay loam; weak, coarse, prismatic structure or massive; firm when moist, slightly sticky and slightly plastic when wet; pH 5.0; underlain by clay shale.

The surface layer ranges from dark brown to dark grayish brown in color. The depth to mottling ranges from 18 to 36 inches. The depth to bedrock ranges from 3 to 6 feet.

Wharton silt loam, 3 to 8 percent slopes, moderately eroded (WrB2).—This soil has the profile described as typical for the series. The present plow layer is generally a mixture of what is left of the original surface layer, material from the subsoil, and crop residue. Included in mapping were areas of somewhat poorly drained soils and areas of nearly level, slightly eroded soils.

This soil is suitable for most general farm crops. Alfalfa tends to be short lived because of the seasonally high water table. Erosion is the major hazard. (Capability unit IIe-4; woodland group 5)

Wharton silt loam, 8 to 15 percent slopes, moderately eroded (WrC2).—Erosion has removed part of the original surface layer from this soil. The present plow layer is generally a mixture of the rest of the original surface layer and material from the subsoil. Included in mapping were areas of well-drained soils that have a lighter colored surface layer than this soil and a few areas of slightly eroded soils.

This soil is suitable for most general farm crops. Alfalfa freezes out and is short lived. Erosion is the major hazard. A seasonal high water table is a limitation. (Capability unit IIIe-4; woodland group 5)

Wharton silt loam, 8 to 15 percent slopes, severely eroded (WrC3).—Erosion has removed all or almost all of the original surface layer from this soil. The present plow layer is largely subsoil material mixed with crop residue. The available moisture capacity is lower and the root zone is thinner than in the moderately eroded soils. Included in mapping were areas of gently sloping soils.

This soil is suited to an occasional cultivated crop. It is not well suited to alfalfa because of the seasonal high water table. Erosion is the major hazard. The seasonal high water table is a limitation. (Capability unit IVe-2; woodland group 5)

Wharton silt loam, 15 to 25 percent slopes, moderately eroded (WrD2).—Erosion has removed part of the original surface layer from this soil. The present plow layer is generally a mixture of the rest of the original surface layer, material from the subsoil, and crop residue. Included in mapping were areas of well-drained soils that have a lighter colored surface layer than this soil.

This soil is suited to an occasional cultivated crop. Alfalfa stands are short lived because of the seasonal high water table. Erosion is the major hazard. The high water table is a limitation. Part of the acreage is woodland and is uneroded. (Capability unit IVe-2; woodland group 5)

Wharton silt loam, 15 to 25 percent slopes, severely eroded (WrD3).—Erosion has removed all or almost all of the original surface layer from this soil. The present plow layer is largely subsoil material mixed with crop residue. The available moisture capacity is lower and the root zone is thinner than in the moderately eroded soils.

Included in mapping were areas of soils steeper than 25 percent.

This soil is suited to pasture or woodland. Erosion is the major hazard. A seasonal high water table is a limitation. (Capability unit VIe-1; woodland group 5)

Formation and Classification of the Soils

The first part of this section describes the factors that influence soil formation. The second part explains some of the soil-forming processes. The last part shows the classification of the soils of Westmoreland County by series and higher categories.

Factors of Soil Formation

Soil is a mixture of varying quantities of weathered rock, primary minerals, secondary minerals, organic matter, water, and air. Soil forms through the action of plants and animals on chemically and physically weathered geologic material. The characteristics of the soil depend on (1) the climate; (2) the plant and animal life; (3) the nature of the parent material; (4) the relief, or lay of the land; and (5) the length of time the soil material has been exposed. These five factors and their effects on the soils of this county are described in the following paragraphs.

Climate

Climate influences the weathering processes. The climate of Westmoreland County is the humid, temperate, continental type that is characteristic of the Middle Atlantic States. Its effect on the development of the soils has been relatively uniform throughout the county. The slight variations that affect individual soils result from differences in relief. As is typical in areas that have this type of climate, most of the soils are acid and are leached of bases.

Plant and animal life

Plants and animals effect physical and chemical changes in the soil. For the most part, the soils in this county developed under forest vegetation. Hardwood forests of the oak-hickory type covered most of the county. The sugar maple-beech-yellow birch type covered some areas, and hemlock and white pine covered the cooler, wetter sites at the higher elevations.

In undisturbed areas the soils have a layer of leaf litter over a 1- to 3-inch black horizon. Below this is a 1- to 2-inch dark-colored horizon underlain by a 5- to 9-inch light-colored horizon. As areas were cleared and farmed, the organic layers were incorporated into the plow layer. In places, as the forests were cleared, these layers were burned off. In many places exposure of the soil to wind and rain has resulted in accelerated erosion. Cultivation, fertilization, artificial drainage, and other activities of man have had major effects on soils and will continue to affect the rate and direction of soil development.

Parent material

The soils of Westmoreland County formed mainly in residuum weathered from shale, siltstone, sandstone, and limestone. The Westmoreland, Guernsey, Brooke, Clarksburg, and Burgin soils formed in the residuum weathered from sandstone, siltstone, calcareous shale, and limestone. The Gilpin, Wharton, and Cavode soils formed primarily in the residuum weathered from acid siltstone, sandstone, and clay shale. The Dekalb soils were derived from acid sandstone, and the Calvin soils from weakly calcareous red shale or siltstone. The Sequatchie, Philo, Atkins, Melvin, and Lindside soils formed in sediments deposited by streams on terraces and flood plains.

Relief

Relief influences soil development through its effect on drainage, aeration, runoff, erosion, and exposure to sun and wind. The relief of an area depends to a large extent on the kind of bedrock that underlies the soils. The rocks most resistant to weathering form the highest ridges; Dekalb soils, for example, generally occur on high ridges. Streams dissect and erode the soils. The material carried by runoff and deposited at the foot of slopes is an important factor in the formation of the Ernest, Brinkerton, and Clarksburg soils.

Time

Time is required for all of the processes of soil formation. The soils are constantly changing, but it is only after long periods that changes become apparent. The Philo, Atkins, Melvin, and Lindside soils generally have fewer and less distinct horizons than many of the upland soils in this county, because the parent material has been in place for a shorter period. The horizons of Weikert, Calvin, and Sequatchie soils show that some changes have taken place, but profile development in these soils has been slowed down by the effects of relief and parent material. The Westmoreland, Upshur, Tygart, and Monongahela soils are examples of soils that have well-developed profiles.

Soil-Forming Processes

As weathering proceeds and plants develop on a young soil, several processes combine to form layers, or horizons, in the soil (*13*). Gains occur as leaves and plant remains accumulate on the surface, and organic matter, nutrients, and mineral material are brought in by animals, or by floods, wind, or gravity. Losses occur as minerals decompose and some of the products of weathering are leached from the soil. Losses also occur as nutrients are removed in harvested plants, fine particles of soil are removed by erosion, and gases escape as organic matter decomposes.

The transfer of material from one part of the soil to the other is common in most soils. Organic matter is moved in suspension or solution from the upper part of the profile to the lower part. Calcium is leached from the surface layer and is held by the clay of the subsoil. Bases and nutrients are moved when they are absorbed by plant roots and rise in the stem to be stored in the leaves and twigs of plants. When the plants die and decay, the nutrients are returned to the soil. Transformations occur as chemical weathering takes place and iron, aluminum, calcium, and other elements are released from the primary and secondary minerals in the soil. Colors change as iron compounds are weathered and oxidized.

Classification of the Soils

Two systems of classifying soils are now in general use in the United States. One of these is the 1938 system (*2*), with later revisions. The other, the current system (*14*), has been used by the National Cooperative Soil Survey since 1965.

The current system 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. In this system the criteria for classification are the observable or measurable properties. The properties are so chosen that soils of similar mode of origin are grouped together. Placement of some soil series in the current system of classification, particularly in families, may change as more precise information becomes available. Readers interested in the development of this system should search the latest available literature (*9*).

The 1938 system, with later revisions, also has six categories, the most inclusive of which is the order. The next two categories, the suborder and the family, have never been fully developed and consequently have been little used. Attention has been centered largely on the great soil group, the soil series, and the soil type.

Table 8 shows the classification of each soil series of Westmoreland County by family, subgroup, and order of the current classification system, and according to the great soil group of the 1938 system.

TABLE 8.—*Soil series classified according to the current classification and the 1938 system with its later revisions*

Series	Current classification			1938 classification
	Family	Subgroup	Order	Great soil group
Atkins	Fine-loamy, mixed, nonacid, mesic	Fluventic Haplaquepts.	Inceptisols	Low-Humic Gley soils.
Brinkerton	Fine-loamy, mixed, mesic	Typic Fragiaqualfs.	Alfisols	Low-Humic Gley soils.
Brooke	Fine, mixed, mesic	Mollic Hapludalfs.	Alfisols	Gray-Brown Podzolic soils.
Burgin	Fine, mixed, noncalcareous, mesic	Typic Argiaquolls.	Mollisols	Humic Gley soils.
Calvin	Loamy, skeletal, mixed, mesic	Typic Dystrochrepts.	Inceptisols	Sols Bruns Acides.
Cavode	Clayey, mixed, mesic	Aquic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Clarksburg	Fine-loamy, mixed, mesic	Aquic Fragiudalfs.	Alfisols	Gray-Brown Podzolic soils.
Dekalb	Coarse-loamy, mixed, mesic	Typic Dystrochrepts.	Inceptisols	Sols Bruns Acides.
Ernest	Fine-loamy, mixed, mesic	Aquic Fragiudults.	Ultisols	Gray-Brown-Red-Yellow Podzolic soils.
Gilpin	Fine-loamy, mixed, mesic	Typic Hapludults.	Ultisols	Gray-Brown-Red-Yellow Podzolic soils.
Guernsey	Fine, mixed, mesic	Aquic Hapludalfs.	Alfisols	Gray-Brown-Red-Yellow Podzolic soils.
Lindside	Fine-loamy, mixed, mesic	Aquic Fluventic Eutrochrepts.	Inceptisols	Alluvial soils.
Melvin	Fine-silty, mixed nonacid, mesic	Fluventic Haplaquepts.	Inceptisols	Low-Humic Gley soils.
Monongahela	Fine-silty, mixed, mesic	Aquic Fragiudults.	Ultisols	Gray-Brown-Red-Yellow Podzolic soils.
Mucky peat			Histosols	Organic soils.
Philo	Coarse-loamy, mixed, acid, mesic	Aquic Fluventic Dystrochrepts.	Inceptisols	Alluvial soils.
Purdy	Fine-silty, mixed, thermic [1]	Typic Fragiaquults.	Ultisols	Low-Humic Gley soils.
Sequatchie	Coarse-loamy, siliceous, thermic [1]	Typic Hapludults.	Ultisols	Gray-Brown Podzolic-Alluvial soils.
Tygart	Clayey, mixed, mesic	Aquic Hapludults.	Ultisols	Red-Yellow Podzolic-Low-Humic Gley soils.
Upshur	Fine, mixed, mesic	Typic Hapludalfs.	Alfisols	Gray-Brown Podzolic soils.
Weikert	Loamy, skeletal, mixed, mesic	Lithic Dystrochrepts.	Inceptisols	Lithosols.
Westmoreland	Fine-loamy, mixed, mesic	Typic Hapludalfs.	Alfisols	Gray-Brown-Red-Yellow Podzolic soils.
Wharton	Clayey, mixed, mesic	Aquic Hapludults.	Ultisols	Gray-Brown-Red-Yellow Podzolic soils.

[1] Used here because of small extent, and mesic equivalent not yet defined.

Laboratory Determinations

The physical and chemical properties of selected soils of six series in Westmoreland County are shown in tables 9 and 10. The series sampled are the Brooke, Clarksburg, Guernsey, Monongahela, Upshur, and Westmoreland. The sample profiles were taken in areas that were most nearly representative in slope, erosion, and dominant use. Samples were collected from each horizon that could be recognized in a pit dug through the solum and into the parent material.

TABLE 9.—*Physical prop-*

[Samples were collected and tests were made by R. P. Matelski and C. F. Engle, Soil Characterization Laboratory, Pennsylvania Agricul- data indicates determi-

Soil type, location of samples, and sample numbers	Horizon	Depth	Particle-size distribution: Very coarse sand (2.0 to 1.0 mm.)	Coarse sand (1.0 to 0.5 mm.)	Sand (0.5 to 0.25 mm.)
		In.	*Pct.*	*Pct.*	*Pct.*
Brooke silty clay loam (1.2 mile north of Claridge).					
S62 Pa 64-14-1	Ap	0 to 8	0.5	1.6	1.4
S62 Pa 64-14-2	B2t	8 to 19	.1	.4	.9
S62 Pa 64-14-3	B3t	19 to 22	1.3	1.1	.9
S62 Pa 64-14-4	C1	22 to 32	.3	.5	.4
S62 Pa 64-14-5	C2	32 to 40	<.1	.3	.6
Clarksburg silt loam (Westmoreland County Fair Association Farm).					
S62 Pa 64-12-1	Ap	0 to 8	3.0	3.2	3.6
S62 Pa 64-12-2	B1	12 to 16	2.4	3.9	4.1
S62 Pa 64-12-3	Bx1	16 to 24	3.2	6.2	7.2
S62 Pa 64-12-4	Bx2	24 to 32	2.6	4.1	5.2
S62 Pa 64-12-5	Bx3	32 to 38	2.8	4.1	4.9
S62 Pa 64-12-6	Bx4	38 to 53	3.0	3.5	3.6
S62 Pa 64-12-7	C	53 to 65	7.8	7.0	6.7
Guernsey silt loam (Westmoreland County Fair Association Farm).					
S62 Pa 64-13-1	Ap	0 to 13	2.1	2.7	2.9
S62 Pa 64-13-2	B21t	13 to 19	.4	.4	.6
S62 Pa 64-13-3	B22t	19 to 27	.5	1.1	1.5
S62 Pa 64-13-4	B23tg	27 to 35	.1	.2	.4
S62 Pa 64-13-5	B3tg	35 to 42	.1	.2	.4
S62 Pa 64-13-6	C	42 to 73	.2	.5	.7
Monongahela silt loam (1 mile S. of Salina on route 64029, Bell Township).					
S62 Pa 64-9-1	Ap	0 to 11	.6	1.3	3.2
S62 Pa 64-9-2	B21t	11 to 18	.5	1.2	3.1
S62 Pa 64-9-3	B22t	18 to 24	.6	2.0	18.0
S62 Pa 64-9-4	Bx1	24 to 37	.1	.4	3.6
S62 Pa 64-9-5	Bx2	37 to 49	.1	.2	2.4
S62 Pa 64-9-6	C	49 to 55	0	.1	3.6
Upshur silty clay loam (1½ miles east of Camp Jo-Ann, Washington Township).					
S62 Pa 64-7-1	Ap	0 to 8	.2	1.5	2.0
S62 Pa 64-7-2	B21t	8 to 13	.1	.4	.8
S62 Pa 64-7-3	B22t	13 to 25	0	.3	.8
S62 Pa 64-7-4	B23t	25 to 38	.5	4.0	5.1
S62 Pa 64-7-5	C1	38 to 58	6.3	18.0	9.8
S62 Pa 64-7-6	C2	58 to 70	9.6	21.3	12.0
Westmoreland silt loam (½ mile west of Irwin).					
S58 Pa 64-2-1	Ap	0 to 7	1.1	1.5	2.5
S58 Pa 64-2-2	B1	7 to 10	1.4	1.9	2.7
S58 Pa 64-2-3	B21t	10 to 16	1.4	1.6	2.6
S58 Pa 64-2-4	B22t	16 to 23	2.2	2.3	2.2
S58 Pa 64-2-5	B33t	23 to 26	4.5	3.8	2.2
S58 Pa 64-2-6	C1	26 to 37	7.6	6.2	3.5
S58 Pa 64-2-7	C2	37 to 51	7.9	6.2	3.0

erties of selected soils

tural Experiment Station. The samples analyzed were taken from the profiles described in the section "Descriptions of the Soils." Lack of nation was not made]

Particle-size distribution—Continued				Coarse fragments (more than 2 mm.)	Bulk density	Moisture held at tension of—			Available moisture
Fine sand (0.25 to 0.10 mm.)	Very fine sand (0.10 to 0.05 mm.)	Silt (0.05 to 0.002 mm.)	Clay (less than 0.002 mm.)			1/3 atmosphere: Core	1/3 atmosphere: Fragments (less than 2 mm.)	15 atmospheres	
Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct. by weight*	*Gr./cu. cm.*	*Pct.*	*Pct.*	*Pct.*	*In./in. of soil*
1. 2	1. 2	51. 3	42. 8	21	1. 14	36. 3	36. 1	21. 3	0. 17
1. 1	. 9	49. 0	47. 6	23	1. 32	30. 4	34. 8	20. 4	. 13
1. 0	. 9	43. 1	51. 7	46	----------	----------	37. 0	21. 2	. 08
. 3	. 4	70. 9	27. 2	56	1. 82	16. 0	21. 4	11. 5	. 09
1. 3	2. 4	60. 3	35. 1	23	1. 76	18. 9	24. 4	14. 0	----------
4. 4	6. 6	56. 6	22. 6	11	1. 40	23. 7	29. 1	9. 9	. 19
5. 0	6. 7	53. 1	24. 8	8	1. 62	21. 7	27. 6	11. 5	. 17
7. 7	8. 0	45. 2	22. 5	6	1. 66	19. 6	26. 4	10. 8	. 15
7. 1	11. 4	44. 3	25. 3	15	1. 75	17. 6	25. 7	11. 7	. 10
7. 3	13. 0	42. 4	25. 5	48	1. 75	18. 0	25. 5	11. 9	. 11
6. 7	11. 1	36. 8	35. 3	21	1. 79	16. 8	29. 6	15. 1	. 03
9. 9	11. 2	28. 8	28. 6	40	----------	----------	26. 2	13. 1	----------
3. 1	5. 8	67. 3	16. 1	13	1. 39	24. 4	29. 2	9. 7	. 20
1. 1	2. 4	47. 2	47. 9	7	1. 48	25. 3	37. 6	20. 7	. 07
1. 9	2. 7	49. 6	42. 7	4	1. 45	28. 9	36. 3	19. 0	. 14
. 7	1. 8	38. 3	58. 6	17	1. 52	28. 6	38. 9	22. 6	. 09
. 9	2. 3	39. 5	56. 7	13	1. 51	30. 4	36. 2	21. 7	. 13
1. 2	3. 5	45. 1	48. 8	17	1. 59	25. 0	30. 5	18. 7	. 10
6. 3	6. 6	65. 4	16. 6	1	1. 30	25. 0	28. 3	7. 4	. 23
6. 8	7. 1	61. 1	20. 2	1	1. 47	23. 8	26. 4	8. 9	. 22
5. 1	4. 2	44. 0	26. 1	9	1. 73	17. 9	22. 7	9. 8	. 14
15. 9	17. 5	34. 2	28. 3	4	1. 80	15. 7	22. 2	10. 6	. 09
21. 0	22. 0	32. 3	22. 0	1	1. 79	15. 0	18. 5	8. 3	. 12
37. 6	18. 5	20. 6	19. 6	2	1. 73	15. 1	18. 0	7. 9	. 12
2. 0	1. 5	61. 4	31. 4	2	1. 34	27. 7	32. 6	13. 6	. 29
. 8	. 8	45. 5	51. 6	0	1. 39	30. 1	44. 2	18. 5	. 16
1. 1	1. 0	31. 7	65. 1	19	1. 33	35. 9	38. 4	22. 8	. 17
3. 3	2. 4	47. 9	36. 8	6	1. 49	27. 2	26. 1	15. 8	. 17
3. 1	1. 2	38. 6	23. 0	15	1. 79	15. 2	16. 7	11. 5	. 07
4. 0	1. 4	31. 5	20. 2	63	----------	----------	12. 9	9. 1	----------
1. 4	2. 6	74. 5	16. 4	12. 5	----------	----------	13. 4	8. 1	----------
1. 7	2. 6	72. 6	17. 1	22. 4	1. 13	26. 9	13. 5	7. 3	. 22
1. 4	2. 6	69. 1	21. 3	19. 8	1. 44	20. 9	15. 1	9. 6	. 16
1. 3	2. 4	60. 2	29. 4	43. 2	1. 54	16. 4	15. 2	13. 2	. 05
1. 3	1. 7	59. 2	27. 3	69. 1	1. 57	20. 5	20. 4	16. 5	. 06
1. 3	1. 8	55. 4	24. 2	94. 1	1. 53	20. 7	20. 2	11. 5	. 14
1. 3	1. 8	54. 7	25. 1	80. 0	----------	----------	23. 4	19. 1	----------

TABLE 10.—*Chemical prop-*

[Samples were collected and tests were made by R. P. Matelski and C. F. Engle, Soil Characterization Laboratory, Pennsylvania Agri- of data indicates determi-

Soil type, location of samples, and sample numbers	Horizon	Depth	Organic carbon	Nitrogen	Carbon-nitrogen ratio	Calcium-magnesium ratio
		In.	*Pct.*	*Pct.*		
Brooke silty clay loam (1.2 miles north of Claridge).						
S62 Pa 64-14-1	Ap	0 to 8	3.62	0.249	15	17
S62 Pa 64-14-2	B2t	8 to 19	1.49	.112	13	22
S62 Pa 64-14-3	B3t	19 to 22	.92	.158	6	27
S62 Pa 64-14-4	C1	22 to 32	.20	.055	----------	28
S62 Pa 64-14-5	C2	32 to 40	.30	.044	7	24
Clarksburg silt loam (Westmoreland County Fair Association Farm).						
S62 Pa 64-12-1	Ap	0 to 8	1.53	.124	12	----------
S62 Pa 64-12-2	B1	12 to 16	.41	.059	7	4
S62 Pa 64-12-3	Bx1	16 to 24	.32	.054	6	2
S62 Pa 64-12-4	Bx2	24 to 32	.22	.047	5	2
S62 Pa 64-12-5	Bx3	32 to 38	.12	----------	----------	1
S62 Pa 64-12-6	Bx4	38 to 53	.14	----------	----------	2
S62 Pa 64-12-7	C	53 to 65	----------	----------	----------	2
Guernsey silt loam (Westmoreland County Fair Association Farm).						
S62 Pa 64-13-1	Ap	0 to 13	1.37	.131	10	10
S62 Pa 64-13-2	B21t	13 to 19	.50	.060	8	7
S62 Pa 64-13-3	B22t	19 to 27	.46	.062	7	9
S62 Pa 64-13-4	B23tg	27 to 35	.41	.068	6	6
S62 Pa 64-13-5	B3tg	35 to 42	.26	.085	3	7
S62 Pa 64-13-6	C	42 to 73	.22	----------	----------	7
Monongahela silt loam.						
S62 Pa 64-9-1	Ap	0 to 11	1.41	.080	18	2
S62 Pa 64-9-2	B21t	11 to 18	.22	.042	5	----------
S62 Pa 64-9-3	B22t	18 to 24	.12	----------	----------	----------
S62 Pa 64-9-4	Bx1	24 to 37	.18	----------	----------	1
S62 Pa 64-9-5	Bx2	37 to 49	.08	----------	----------	----------
S62 Pa 64-9-6	C	49 to 55	.06	----------	----------	----------
Upshur silty clay loam (1½ miles east of Camp Jo-Ann, Washington Township).						
S62 Pa 64-7-1	Ap	0 to 8	1.45	.143	10	----------
S62 Pa 64-7-2	B21t	8 to 13	.42	.064	7	6
S62 Pa 64-7-3	B22t	13 to 25	.24	----------	----------	4
S62 Pa 64-7-4	B23t	25 to 38	.08	----------	----------	8
S62 Pa 64-7-5	C1	38 to 58	.07	----------	----------	13
S62 Pa 64-7-6	C2	58 to 70	.08	----------	----------	15
Westmoreland silt loam (½ mile west of Irwin).						
S58 Pa 64-2-1	Ap	0 to 7	1.37	.136	10	----------
S58 Pa 64-2-2	B1	7 to 10	.49	.048	10	3
S58 Pa 64-2-3	B21t	10 to 16	.34	.032	12	5
S58 Pa 64-2-4	B22t	16 to 23	.30	.026	11	5
S58 Pa 64-2-5	B23t	23 to 26	.28	----------	----------	4
S58 Pa 64-2-6	C1	26 to 37	.32	----------	----------	4
S58 Pa 64-2-7	C2	37 to 51	.29	----------	----------	4

erties of selected soils

cultural Experiment Station. The samples analyzed were taken from the profiles described in the section "Descriptions of the Soils." Lack nation was not made]

Extractable cations (Milliequivalents per 100 grams of soil)					Cation-exchange capacity (sum)	Base saturation (sum)	Reaction: (soil-water ratio of 1:1)	Mineral composition of clay fraction					
Calcium	Magnesium	Sodium	Potassium	Hydrogen				Kaolinite	Illite	Vermiculite	Chlorite	Montmorillonite	Interstratified
					Meq./100 gm.	*Pct.*	*pH*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
28. 0	1. 7	0. 3	0. 8	0. 1	30. 9	100	7. 1	10	45	20	--------	10	15
28. 7	1. 3	. 3	. 6	0	30. 9	100	7. 3	10	45	20	--------	10	15
40. 7	1. 5	. 4	. 7	0	43. 3	100	7. 4	--------	--------	--------	--------	--------	--------
30. 7	1. 1	. 3	. 5	0	32. 6	100	7. 5	5	60	10	--------	5	20
36. 6	1. 5	. 3	. 5	0	38. 9	100	7. 4	--------	--------	--------	--------	--------	--------
6. 2	. 9	. 1	. 5	9. 7	17. 4	44	5. 2	20	40	25	5	--------	10
4. 6	1. 2	. 1	. 3	11. 3	17. 5	35	4. 9	20	50	10	5	--------	15
4. 2	1. 9	. 1	. 3	12. 4	18. 9	34	4. 9	20	50	10	--------	10	10
5. 8	3. 8	. 1	. 3	8. 2	18. 2	55	5. 0	--------	--------	--------	--------	--------	--------
8. 4	5. 8	. 2	. 3	7. 1	21. 8	67	5. 0	10	50	15	--------	15	10
11. 5	7. 8	. 2	. 2	5. 3	25. 0	79	6. 0	--------	--------	--------	--------	--------	--------
10. 5	6. 2	. 2	. 2	4. 2	21. 3	80	6. 0	10	50	15	5	15	5
12. 2	1. 2	. 2	. 3	6. 3	20. 2	69	6. 2	20	30	35	5	--------	10
22. 7	3. 3	. 3	. 4	7. 8	34. 5	77	6. 6	--------	--------	--------	--------	--------	--------
20. 4	2. 4	. 3	. 3	4. 4	27. 8	84	6. 4	10	40	15	5	10	20
20. 4	3. 3	. 3	. 4	4. 1	28. 5	86	6. 2	5	50	5	5	10	25
20. 8	3. 2	. 4	. 5	4. 4	29. 3	85	6. 3	--------	--------	--------	--------	--------	--------
19. 1	2. 7	. 2	. 4	1. 6	24. 0	93	6. 4	5	60	5	5	5	20
3. 9	2. 6	. 1	. 2	8. 6	15. 4	44	5. 3	30	20	30	5	--------	15
2. 8	. 4	. 1	. 2	7. 5	11. 0	32	4. 8	--------	--------	--------	--------	--------	--------
2. 9	. 9	. 1	. 2	6. 5	10. 5	39	4. 6	40	30	10	--------	10	10
1. 5	1. 6	. 1	. 2	6. 2	9. 6	35	4. 7	40	30	5	5	5	15
. 8	1. 8	. 1	. 1	4. 4	7. 2	39	4. 6	--------	--------	--------	--------	--------	--------
. 6	1. 4	. 1	. 1	3. 8	6. 0	37	4. 6	40	30	5	5	5	15
4. 4	. 7	. 1	. 5	17. 0	22. 7	25	4. 4	30	20	30	--------	10	10
6. 5	1. 1	. 1	. 4	25. 2	33. 3	24	4. 4	--------	--------	--------	--------	--------	--------
10. 2	2. 3	. 1	. 5	27. 9	41. 0	32	4. 4	20	10	40	--------	10	20
17. 1	2. 1	. 2	. 4	14. 4	34. 2	58	4. 5	--------	--------	--------	--------	--------	--------
25. 7	2. 0	. 2	. 3	10. 3	38. 5	73	5. 4	20	30	10	--------	--------	40
31. 6	2. 1	. 2	. 3	0	34. 2	100	7. 6	--------	--------	--------	--------	--------	--------
2. 9	. 6	. 3	. 4	13. 8	18. 0	23	4. 5	--------	--------	--------	--------	--------	--------
3. 0	1. 0	. 5	. 4	8. 1	13. 0	38	5. 2	--------	--------	--------	--------	--------	--------
6. 3	1. 2	. 3	. 4	7. 0	15. 2	54	5. 7	25	45	20	--------	--------	10
9. 1	1. 9	. 3	. 4	6. 6	18. 3	64	5. 7	--------	--------	--------	--------	--------	--------
11. 0	3. 1	. 4	. 6	10. 7	25. 8	58	5. 8	15	60	10	--------	--------	15
14. 3	3. 7	. 4	. 6	9. 9	28. 9	66	5. 8	--------	--------	--------	--------	--------	--------
16. 3	4. 3	. 4	. 7	9. 7	31. 4	69	5. 5	5	70	5	--------	--------	20

Methods of Analysis

The laboratory methods used at the Pennsylvania Soil Characterization Laboratory were as follows:

In preparation of laboratory analysis, air-dry samples were crushed with a rolling pin. Care was taken not to break nonsoil material into fragments small enough to pass the 2-millimeter sieve. All the determinations except those for bulk density and moisture retention at tension of one-third atmosphere were made on the fraction of the sample that passed the 2-millimeter sieve.

Particle size was determined by the pipette method, with dispersion by sodium hexametaphosphate, and by mechanical shaking, using the procedures developed by Kilmer and Alexander (*4*, *5*).

Bulk density was determined on 1- by 2-inch cylindrical core samples taken with a Salinity Laboratory Modified Uhland core sampler (*11*, *12*).

Moisture retention at a tension of one-third atmosphere was determined by testing core samples on porous plate (*11*). Moisture retention at a tension of 15 atmospheres was determined by testing fragmented samples in pressure membrane apparatus (*11*).

The reaction was determined by a Beckman pocket pH meter at sampling time, using a soil-water ratio of 1:1.

Organic carbon was determined by a modification of the Walkley-Black wet-combustion method (*6*).

Total nitrogen was determined by the Kjeldahl method (*6*), modified by adsorbing ammonia in a boric acid solution and titrating with sulfuric acid.

Extractable calcium, magnesium, sodium, and potassium were determined by extraction with neutral normal ammonium acetate (*6*). Extractable hydrogen was determined with a barium chloride solution buffered at pH 8.1 with triethanolamine (*6*). Cation exchange capacity was determined by summation of extracted cations, including hydrogen.

Clay minerals were identified by means of a Norelco X-ray spectrometer equipped with a Geiger counter and chart recorder and using a copper target. Flat-oriented clay samples (less than 2 microns) in the form of a thin film on a glass slide, were analyzed as magnesium saturated-water solvated, as magnesium saturated-glycerol solvated, and as potassium saturated-water solvated specimens. Prior to saturation, organic matter was removed from the clay by treatment with 10 percent hydrogen peroxide, and free iron oxides were removed by the method developed by Jeffries (*3*). The clay mineral types designated chlorite refer to 14-angstrom clay material that does not collapse upon potassium saturation.

Summary of Data

The following paragraphs summarize and explain the data reported in tables 9 and 10.

Brooke soil.—The sample shows a low content of sand and a high content of silt and clay. The soil, however, behaves like a coarser textured soil because the high organic-matter content and high base saturation of the surface soil contribute to a stable structure. Base saturation is 100 percent throughout the profile. Fragments of limestone and calcareous shale are common in all horizons. The particle-size distribution indicates very poorly graded material. This soil is very high in natural fertility. It is the highest in extractable calcium and potassium of any of the soils analyzed, and is the lowest in extractable hydrogen. It is high in nitrogen and organic carbon. The reaction is neutral or mildly alkaline.

Clarksburg soil.—The sample shows a predominance of silt in most horizons and the largest clay content in the lower part of the B horizon and in the C horizon. The quantity and distribution of coarse fragments are evidence that this soil formed in colluvium. Because of the quantity and distribution of this coarse material and the high percentage of sand, the material is well graded. The presence of a fragipan is reflected in an increase in bulk density with increasing depth. The moisture content at 1/3 atmosphere and at 15 atmospheres indicates that the soil should hold moderately large amounts of moisture available to plants, but the amount of available moisture above the fragipan is only moderate. The cation-exchange capacity and the base saturation are moderate to low. In comparison with other soils in the county, this soil is moderate to low in extractable calcium and potassium and moderate to high in extractable hydrogen. The strongly acid reaction in the upper part of the profile, which is not typical of Clarksburg soils, can be explained by the fact that in parts of Westmoreland County these soils are near coke ovens and are made strongly acid by the acid fumes. Normally, Clarksburg soils are only slightly acid. The analyses show illite to be the dominant clay mineral. The interstratified component consists of montmorillonite and illite. There is also vermiculite-dioctahedral chlorite in the surface layer. This soil is similar to Upshur soils in mineralogy.

Guernsey soil.—The sample shows a predominance of silt and clay throughout the profile and a concentration of coarse fragments in the lower part of the B horizon and in the C horizon. The coarse fragments in the Ap horizon have most likely come from upslope. The soil is fine textured enough to be highly retentive of moisture. It has high base saturation and high cation-exchange capacity and is high in natural fertility. The distribution of illite and vermiculite minerals throughout the horizons indicates a profile typical of weathering. The soil also contains discrete montmorillonite and interstratified illite and montmorillonite.

Monongahela soil.—The sample shows the highest content of sand of any of the soils sampled. Actually, the sample is sandier than is typical of Monongahela soils. There is little evidence of stratification, except in the lower part of the profile. The fragipan has a distinct clay bulge and high bulk density. The moisture content at 1/3 atmosphere and at 15 atmospheres indicates that the soil should store and release an adequate amount of moisture for plants, but the amount of available moisture above the fragipan is only moderate. The cation-exchange capacity is low, and base saturation is moderate to low. The calcium content is very low in the lower part of the B horizon and in the C horizon. The formation of an interstratified component of vermiculite-dioctahedral chorite in the surface soil shows the profile to be weathered to the degree of weak to moderate development. The interstratified component also includes layers of expandable montmorillonite.

Upshur soil.—The sample shows a predominance of silt and clay, which tends to make the soil unstable when wet, and a distinct clay accumulation in the B horizons. The available moisture capacity is shown as moderate. This soil is higher in extractable hydrogen than any other soil tested. The cation-exchange capacity is high, and base saturation is moderately high. The high extractable calcium values reflect the calcareous clay shale parent material. The very strong to extremely strong acidity in the B horizons indicates strong weathering and the leaching of calcium and its replacement with hydrogen. This soil has the highest lime requirement of any of the soils tested. An outstanding feature of this soil is the abundant interstratified clay component, which consists mainly of illite and montmorillonite. Weathering has taken place, but the weathered profile is not prominent. The largest amount of illite is in the C1 horizon, and the largest amount of vermiculite is in the B22t horizon. The interstratified component is more abundant in the subsoil than in the surface soil.

Westmoreland soil.—The sample shows a predominance of silt but has significant amounts of clay, sand, and coarse fragments. The clay accumulation in the B horizon is not pronounced, and the content of coarse fragments is well over 50 percent in the lower part of the B horizon and the C horizon. The cation-exchange capacity is moderate to low, and base saturation is moderate. For the most part, reaction is medium acid and strongly acid. This soil is low in extractable calcium, considering that it developed from limestone parent material. The analysis does not indicate the natural fertility that farmers claim this soil to have. The clay minerals consist mainly of illite, with lesser amounts of vermiculite, kaolinite, and interstratified material. The interstratified component contains illite and expandable layers of montmorillonite.

General Nature of the Area

The population of Westmoreland County has increased steadily during the past century. In 1850, the population was 51,726. By 1959, it had increased to 313,179, and by 1960, to 351,735. The rural population decreased from 25,534 in 1930 to 19,286 in 1950, and to 7,333 in 1960. The number of farm workers increased from 6,709 in 1940 to 6,747 in 1950, and then dropped to 4,975 in 1960. The percentage of farm workers to the total population has been fairly steady. It was 2.2 percent from 1940 to 1950, but dropped to 1.4 in 1960.

About 39.6 percent of Westmoreland County, or 259,438 acres, was in farms in 1959. The average size of farms in 1959 was 98.9 acres. Approximately 94 percent of the farm operators were either full owners or part owners.

The acreage in farms, classified according to use, was as follows:

	1959
Cropland harvested	104, 358
Open pasture	62, 005
All woodland	47, 268
All other land	45, 807
Total land in farms	259, 438

About 84 percent of the income from all farm products sold in the county in 1959 was from livestock and livestock products; 63.7 percent was from dairy products; and 12.9 percent was from poultry products. The census of livestock in the county in 1959 was as follows:

	Number
Cattle and calves	44, 431
Horses and mules	1, 345
Hogs and pigs	12, 653
Sheep and lambs	4, 777
Chickens (4 months old and over)	298, 898
Turkeys raised	51, 000

Nearly half of the cattle are milk cows, mainly Holsteins.

Among the products sold in 1959 were nearly 147 million pounds of whole milk, more than 74 thousand pounds of butterfat, 182,498 chickens, and more than 2½ million dozen eggs. In addition, 25,654 pounds of wool were shorn.

Less than 16 percent of the income from all farm products sold in the county is from crops. Most of the grain and forage produced is fed on the farm. The 1959 acreages of the main field crops were as follows:

	Acres
Corn for all purposes	18, 341
Oats, threshed or combined	17, 992
Wheat, threshed or combined	7, 982
Barley, threshed or combined	3, 461
Hay crops (land from which the hay was cut)	56, 956

Hay and forage crops are important in this county, because they provide feed for the dairy cattle and other livestock. Approximately 60 percent of the acreage in hay is used for alfalfa and alfalfa mixtures.

The county does not completely meet the demands of Pittsburgh and neighboring industrial centers for fruits, vegetables, meat, poultry, and wood products, but it produces a surplus of milk and other dairy products. The county lies within the Pittsburgh milkshed.

Climate [4]

The humid, continental climate of Westmoreland County is characterized by warm summers and cold winters. Precipitation is adequate and well distributed. The prevailing winds are from the west.

Almost daily changes in weather occur in winter and spring. From December through the early part of March, cold spells accompanied by brisk northwesterly winds occasionally last for several days. In summer and fall, changes are less frequent; the weather remains essentially the same for a few days to a week or more. For extended periods in summer, days are sunny, hot, and humid, cooled only temporarily by afternoon showers and thunderstorms, and nights are warm. Dry sunny days and cool clear nights are typical of fall.

Most of the local differences in climate within the county result from differences in topography. Because of higher elevation and more rugged terrain, the eastern part has lower temperatures and more cloudiness, precipitation, and thunderstorms than the central and western parts. Variations in the central and western parts are confined mainly to nighttime drops in temperature that result from cool air drainage. Where air drainage is relatively poor, as it is in valleys, temperatures are lower and growing seasons are shorter than on surrounding higher terrain.

Data on temperature and precipitation for Westmoreland County are given in tables 11 and 12. The data are based on records kept at the Derry weather station, which is at an elevation of 1,150 feet, and are representative of all of the county except the extreme western river valleys and the eastern mountains.

The warmest parts of the county are the valleys of the Monongahela and Youghiogheny Rivers, where the average annual temperature is 55° F. The average annual temperature is 50° in most of the central areas and 45°

[4] Prepared by Nelson M. Kauffman, State climatologist, U.S. Weather Bureau, Harrisburg, Pa.

TABLE 11.—*Temperature and precipitation*

[All data from records at Derry, Pa.]

Month	Temperature				Precipitation						
	Average daily maximum	Average daily minimum	Average extreme maximum	Average extreme minimum	Average total	One year in 10 will have— Less than—	One year in 10 will have— More than—	Average number of days with more than 0.5 inch	Snow: Average total	Snow: Average number of days with depth of— 1 inch or more	Snow: Average number of days with depth of— 6 inches or more
	° F.	° F.	° F.	° F.	In.	In.	In.	No.	In.	No.	No.
January	33	24	63	2	3. 4	1. 3	5. 0	2	9. 3	12	3
February	42	23	62	1	2. 8	1. 5	4. 2	2	10. 0	9	4
March	50	29	71	11	4. 1	2. 2	6. 7	3	8. 0	5	2
April	63	39	82	23	4. 1	1. 8	6. 6	4	1. 1	(1)	0
May	73	49	87	32	4. 7	1. 8	7. 2	3	0	0	0
June	81	58	92	42	4. 9	2. 8	7. 0	4	0	0	0
July	84	61	93	47	5. 1	2. 7	8. 3	4	0	0	0
August	81	60	92	45	4. 4	1. 9	7. 0	2	0	0	0
September	74	53	90	35	3. 2	1. 1	5. 7	3	0	0	0
October	66	43	83	26	3. 3	1. 3	4. 9	2	. 1	0	0
November	52	34	73	15	3. 1	1. 6	4. 8	2	2. 3	1	(1)
December	42	25	63	3	3. 0	1. 3	4. 2	1	9. 4	10	4
Annual	62	42	[2] 101	[3] −19	46. 1	37. 1	55. 5	32	40. 2	37	13

[1] Less than half a day. [2] Highest maximum during 1931–60. [3] Lowest minimum during 1931–60.

TABLE 12.—*Probabilities of last freezing temperature in spring and first in fall*

[All data from records at Derry, Pa.]

Probability	Dates for given probability and temperature: 16° F.	20° F.	24° F.	28° F.	32° F.
Spring:					
1 year in 10 later than	April 4	April 10	April 25	May 10	May 19
2 years in 10 later than	March 29	April 4	April 18	May 3	May 12
5 years in 10 later than	March 17	March 24	April 6	April 19	April 30
Fall:					
1 year in 10 earlier than	November 13	November 5	October 27	October 3	September 13
2 years in 10 earlier than	November 19	November 10	November 1	October 9	September 21
5 years in 10 earlier than	November 30	November 19	November 11	October 21	October 7

in the Chestnut Ridge and Laurel Hill areas in the eastern part of the county. In January, normally the coldest month, the mean temperatures across the county range from 25° to 33°, and in July, the warmest month, from 67° to 75°. There is normally an 8° differential across the county throughout the year.

Temperatures generally remain above 50° from May through September. The maximum readings normally exceed 90° on 30 days in the western river valleys, and 10 to 20 days in the central areas, and on less than 5 days in the eastern mountains. Extremes of 100° or higher are rare anywhere in the county. A minimum temperature of 32° or below may be expected on 100 days each winter in the western part of the county, and on 175 days in the eastern part. A temperature of 0° or below normally occurs on 4 to 12 days each winter.

The interval between the last 32° temperature in spring and the first in fall is known as the growing season. The average length of the growing season in Westmoreland County is 160 days. The season is normally about 180 days in the western part of the county and about 150 days in the eastern part. The longest season on record is 203 days, and the shortest is 113 days. Probabilities of freezes after specified dates in spring and before specified dates in fall are given in table 12.

Annual precipitation normally ranges from 40 inches in the western part of the county to more than 50 inches in the eastern part. The highest annual total recorded is

56 inches, and the lowest is 30 inches. Nearly half of the annual total falls between the first of May and the end of September. Between 18 and 22 inches can be expected during this period, but the amounts have ranged from less than 14 inches to nearly 28 inches. The total monthly precipitation is ordinarily 3 to 5 inches but ranges from less than 0.15 inch to more than 13 inches. Short dry spells occur, but extended severe droughts are rare.

Rainfall in summer usually comes from showers and thunderstorms and is of short duration. Thunderstorms average 15 to 25 every year. Maximum amounts of 1.57 inches in 1 hour and 2.25 inches in 2 hours have been reported once every 5 and 10 years, respectively. Occasionally, there is a steady but less intense rainfall that lasts for 6 to 24 hours. An inch or more of rainfall in 1 day can be expected in any month. A fall of 2 inches in 1 day occurs about once a year, and 3.5 inches in 1 day about once every 5 years.

Snowfalls are frequent and sometimes heavy from December through March. The ground is generally covered with snow for about one-third of the winter. In some years it is covered from December through February. The total annual snowfall throughout the county ranges from less than 25 inches in the western part of the county to 40 inches in the central part and 70 inches in the eastern part. Occasionally, more than 80 inches falls in the eastern half of the county. There are few winters when the total snowfall is less than 25 inches. Frequently, a monthly total of 10 inches is reported. The highest monthly total at Derry, Pa., was 32 inches in December 1944. The highest seasonal total was 84 inches during the winter of 1960–61.

Water Supply

Sandstone is generally a dependable source of good-quality ground water. Wells drilled at the base of the Chestnut Ridge and Laurel Hill anticlines are sometimes artesian for at least part of the season. Numerous strong springs occur at the base of the anticlines and of the escarpments that have been cut through the anticlines by streams. Several excellent springs occur along the fault line southwest of Bolivar. Wells drilled near the top of the anticlines are usually not dependable. The top of the Fayette anticline, east of Greensburg, is a poor source of ground water.

Siltstone and clay shale are poor sources of ground water, regardless of the geologic structure. These materials lack the pore space of the sandstone, through which ground water can move and accumulate. Springs are scarce and weak in areas underlain by siltstone and shale, and the water is usually of poor quality.

Coal mining has disrupted the supply of ground water in many places. It has almost depleted the supply in the synclinal valleys that are underlain by Pittsburgh coal. In places the water from mines carries enough sulfur and iron to make the ground water unpotable.

The need for water suitable for industrial and domestic use is likely to increase with increasing industrial and population growth in the county. The most dependable supply of good-quality water in the county is surface water. Except for short dry periods in summer, the recharge rate is greater and faster for surface storage than for ground water storage. The rainfall, low evaporation, and numerous sites favorable for dams and reservoirs should insure an adequate supply for the future.

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Glossary

Aeration, soil. The process by which air and other gases in the soil are exchanged. The rate of soil aeration depends largely on the size and number of pores in the soil and on the amount of water clogging the pores; a soil with many large connected pores is generally well aerated.

Aggregate, soil. Many fine soil particles held in a single mass, or cluster, such as a clod, a crumb, a block, or a prism.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Base saturation. The degree to which material that has base-exchange properties is saturated with exchangeable cations other than hydrogen, expressed as a percentage of the cation-exchange capacity.

Calcareous. A soil containing enough calcium carbonate or lime to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Cation exchange capacity. A measure of the total amount of exchangeable cations that can be held by a soil. It is expressed in terms of milliequivalents per 100 grams of soil.

Channery soil. A soil that contains thin, flat fragments of sandstone, limestone, or shale 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 textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt. (See also Texture, soil.)

Claypan. A compact, slowly permeable soil horizon that contains substantially more clay than the layer above and below it. A claypan is commonly hard when dry and plastic or stiff when wet.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent; will not hold together in a mass.

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; tends to stretch somewhat and pull apart, rather than 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.

Diversion. 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, soil. (1) The removal of excess surface or ground water from land by means of surface or subsurface drains. (2) The effect of soil characteristics that regulate the ease or rate of natural drainage. Soil is said to be well drained when the excess water drains away rapidly and poorly drained when the excess water drains away so slowly that it interferes seriously with tillage or plant growth.

Erosion. The wearing away of the land surface by wind, 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.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A dense, brittle subsurface layer that is very low in organic matter and clay but is rich in silt or very fine sand. The layer is seemingly cemented when dry, has a hard or very hard consistence, and has a high bulk density in comparison with the layer or layers 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 are generally part of the B horizon, 15 to 40 inches below the surface.

Graded strips. Crops grown in strips that are graded toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow and covered by vegetation that protects it from erosion, for the safe disposal of surface water from a field, diversion, terrace, or other structure.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes.

Loam. Soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

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 inch 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.

Parent material (soil). The weathered rock or partly weathered soil material from which a soil has formed; the horizon C in the soil profile.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability, soil. The ability of the soil to transmit air and water. Terms used to describe permeability are *slow* (less than 0.2 inch per hour), *moderately slow* (0.2 to 0.63 inch per hour), *moderate* (0.63 to 2.0 inches per hour), *moderately rapid* (2.0 to 6.3 inches per hour), *rapid* (more than 6.3 inches per hour).

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 or words as follows:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Sand. As a soil separate, individual rock or mineral fragments 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz, but sand may be any mineral composition. As a textural class, soil that is 85 percent or more sand and not more than 10 percent clay. (See also Texture, soil.)

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a textural class, soil that is 80 percent or more silt and less than 12 percent clay. (See also Texture, soil.)

Solum. The upper part of the 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.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

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 adding the words "coarse," "fine," or "very fine" to the name of the textural class.

Tilth, soil. The condition of the soil, especially of the soil structure, in relation to the growth of plants. 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 (engineering). Presumably a fertile soil or soil material, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

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.

Wilting point. The moisture content of soil, on an oven-dry basis, at which plants 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 the description of the soil series to which the mapping unit belongs.

[See table 1, p. 9, for estimated yields of the principal crops and table 7, p. 40, for approximate acreage of the soils. For facts about engineering properties, turn to the section beginning on p. 17]

Map symbol	Mapping unit	Described on page	Capability unit		Woodland group	
			Symbol	Page	Number	Page
At	Atkins silt loam	41	IIIw-2	6	6	13
BkA	Brinkerton silt loam, 0 to 3 percent slopes	42	IVw-1	7	7	13
BkB2	Brinkerton silt loam, 3 to 8 percent slopes, moderately eroded	42	IVw-2	7	7	13
BrB2	Brooke silty clay loam, 3 to 8 percent slopes, moderately eroded	43	IIIe-1	5	2	12
BrC2	Brooke silty clay loam, 8 to 15 percent slopes, moderately eroded	43	IVe-1	6	2	12
Bu	Burgin and Burgin gray surface variant, silt loams	43	IIIw-4	6	7	13
CaB2	Calvin silt loam, neutral substratum, 5 to 12 percent slopes, moderately eroded	44	IIe-3	4	2	12
CaC2	Calvin silt loam, neutral substratum, 12 to 20 percent slopes, moderately eroded	44	IIIe-5	5	2	12
CaD2	Calvin silt loam, neutral substratum, 20 to 30 percent slopes, moderately eroded	44	IVe-4	7	2	12
ClB	Calvin very stony silt loam, neutral substratum, 0 to 12 percent slopes	44	VIs-2	8	2	12
ClD	Calvin very stony silt loam, neutral substratum, 12 to 30 percent slopes	44	VIs-2	8	2	12
ClE	Calvin very stony silt loam, neutral substratum, 30 to 50 percent slopes	44	VIIs-1	8	3	13
CnB	Cavode silt loam, 3 to 8 percent slopes	44	IIIw-3	6	5	13
CnC2	Cavode silt loam, 8 to 15 percent slopes, moderately eroded	45	IIIe-2	5	5	13
CoB	Cavode very stony silt loam, 0 to 8 percent slopes	45	VIs-1	8	5	13
CoD	Cavode very stony silt loam, 8 to 25 percent slopes	45	VIs-1	8	5	13
CuB2	Clarksburg silt loam, 3 to 8 percent slopes, moderately eroded	46	IIe-1	4	5	13
CuC2	Clarksburg silt loam, 8 to 15 percent slopes, moderately eroded	46	IIIe-3	5	5	13
DaB	Dekalb channery loam, 5 to 12 percent slopes	46	IIe-3	4	2	12
DaC2	Dekalb channery loam, 12 to 20 percent slopes, moderately eroded	46	IIIe-5	5	2	12
DaD2	Dekalb channery loam, 20 to 30 percent slopes, moderately eroded	46	IVe-4	7	2	12
DbB	Dekalb very stony loam, 0 to 12 percent slopes	46	VIs-2	8	2	12
DbD	Dekalb very stony loam, 12 to 30 percent slopes	47	VIs-2	8	2	12
DbF	Dekalb very stony loam, 30 to 80 percent slopes	47	VIIs-1	8	3	13
ErB	Ernest silt loam, 3 to 8 percent slopes	47	IIe-4	5	5	13
ErC	Ernest silt loam, 8 to 15 percent slopes	47	IIIe-4	5	5	13
EsB	Ernest very stony silt loam, 0 to 8 percent slopes	47	VIs-1	8	5	13
EsD	Ernest very stony silt loam, 8 to 25 percent slopes	47	VIs-1	8	5	13
GcB2	Gilpin channery silt loam, 5 to 12 percent slopes, moderately eroded	48	IIe-3	4	2	12
GcC2	Gilpin channery silt loam, 12 to 20 percent slopes, moderately eroded	48	IIIe-5	5	2	12
GcD2	Gilpin channery silt loam, 20 to 30 percent slopes, moderately eroded	48	IVe-4	7	2	12

GUIDE TO MAPPING UNITS--CONTINUED

Map symbol	Mapping unit	Described on page	Capability unit		Woodland group	
			Symbol	Page	Number	Page
GcD3	Gilpin channery silt loam, 20 to 30 percent slopes, severely eroded	48	VIe-2	7	2	12
GcE2	Gilpin channery silt loam, 30 to 40 percent slopes, moderately eroded	48	VIe-2	7	3	13
GnB	Gilpin very stony silt loam, 0 to 12 percent slopes	48	VIs-2	8	2	12
GnD	Gilpin very stony silt loam, 12 to 30 percent slopes	48	VIs-2	8	2	12
GnF	Gilpin very stony silt loam, 30 to 80 percent slopes	48	VIIs-1	8	3	13
GsB2	Guernsey silt loam, 3 to 8 percent slopes, moderately eroded	49	IIe-1	4	5	13
GsC2	Guernsey silt loam, 8 to 15 percent slopes, moderately eroded	49	IIIe-3	5	5	13
GsC3	Guernsey silt loam, 8 to 15 percent slopes, severely eroded	49	IVe-3	6	5	13
GsD2	Guernsey silt loam, 15 to 25 percent slopes, moderately eroded	49	IVe-3	6	5	13
GsD3	Guernsey silt loam, 15 to 25 percent slopes, severely eroded	49	VIe-3	8	5	13
GuB	Gullied land, 0 to 12 percent slopes	49	VIIe-1	8	9	13
GuD	Gullied land, 12 to 30 percent slopes	50	VIIe-1	8	9	13
GuF	Gullied land, 30 to 60 percent slopes	50	VIIe-1	8	9	13
Ln	Lindside silt loam	50	IIw-2	5	4	13
Ls	Lindside silt loam, very acid	50	IIw-2	5	4	13
MaB	Made land, 0 to 8 percent slopes	50	IVs-1	7	9	13
MaD	Made land, 8 to 35 percent slopes	50	VIIs-3	8	9	13
Mc	Melvin silt loam	51	IIIw-2	6	6	13
Md	Mine dump	51	VIIIs-1	8	10	13
Mm	Mine wash	51	VIIIs-1	8	10	13
MoA	Monongahela silt loam, 0 to 3 percent slopes	52	IIw-1	5	5	13
MoB2	Monongahela silt loam, 3 to 8 percent slopes, moderately eroded	52	IIe-4	5	5	13
MoC2	Monongahela silt loam, 8 to 15 percent slopes, moderately eroded	52	IIIe-4	5	5	13
Mp	Mucky peat	52	VIIw-1	8	10	13
Ph	Philo silt loam	52	IIw-2	5	4	13
Pu	Purdy silt loam	53	IVw-1	7	7	13
SeA	Sequatchie silt loam, 0 to 5 percent slopes	53	I-1	4	1	12
SmB	Strip mine spoil, 0 to 8 percent slopes	53	VIIs-3	8	9	13
SmD	Strip mine spoil, 8 to 25 percent slopes	53	VIIs-3	8	9	13
SmF	Strip mine spoil, 25 to 75 percent slopes	53	VIIs-3	8	9	13
TrA	Tygart silt loam, 0 to 3 percent slopes	54	IIIw-1	6	5	13
UcB2	Upshur silty clay loam, 3 to 8 percent slopes, moderately eroded	54	IIIe-1	5	2	12
UcC2	Upshur silty clay loam, 8 to 15 percent slopes, moderately eroded	54	IVe-1	6	2	12
UgB2	Upshur-Gilpin silty clay loams, 3 to 8 percent slopes, moderately eroded	55	IIIe-1	5	2	12
UgC2	Upshur-Gilpin silty clay loams, 8 to 15 percent slopes, moderately eroded	55	IIIe-5	5	2	12

GUIDE TO MAPPING UNITS--CONTINUED

Map symbol	Mapping unit	Described on page	Capability unit		Woodland group	
			Symbol	Page	Number	Page
UgC3	Upshur-Gilpin silty clay loams, 8 to 15 percent slopes, severely eroded	55	IVe-1	6	2	12
UgD2	Upshur-Gilpin silty clay loams, 15 to 25 percent slopes, moderately eroded	55	IVe-1	6	2	12
UgD3	Upshur-Gilpin silty clay loams, 15 to 25 percent slopes, severely eroded	55	VIe-2	7	2	12
UgE2	Upshur-Gilpin silty clay loams, 25 to 35 percent slopes, moderately eroded	55	VIe-2	7	3	13
WeB	Weikert shaly silt loam, 5 to 12 percent slopes	55	IIIe-6	6	8	13
WeC	Weikert shaly silt loam, 12 to 20 percent slopes	55	IVe-4	7	8	13
WeD	Weikert shaly silt loam, 20 to 30 percent slopes	55	VIe-2	7	8	13
WhF	Weikert soils, 30 to 60 percent slopes	56	VIIs-2	8	8	13
WkF	Weikert very rocky silt loam, 40 to 100 percent slopes	56	VIIs-2	8	8	13
WmB2	Westmoreland silt loam, 5 to 12 percent slopes, moderately eroded	56	IIIe-5	5	2	12
WmB3	Westmoreland silt loam, 5 to 12 percent slopes, severely eroded	56	IIIe-6	6	2	12
WmC2	Westmoreland silt loam, 12 to 20 percent slopes, moderately eroded	56	IIIe-6	6	2	12
WmC3	Westmoreland silt loam, 12 to 20 percent slopes, severely eroded	56	IVe-5	7	2	12
WmD2	Westmoreland silt loam, 20 to 30 percent slopes, moderately eroded	56	IVe-5	7	2	12
WmD3	Westmoreland silt loam, 20 to 30 percent slopes, severely eroded	57	VIe-2	7	2	12
WmE2	Westmoreland silt loam, 30 to 40 percent slopes, moderately eroded	57	VIe-2	7	3	13
WrB2	Wharton silt loam, 3 to 8 percent slopes, moderately eroded	57	IIe-4	5	5	13
WrC2	Wharton silt loam, 8 to 15 percent slopes, moderately eroded	57	IIIe-4	5	5	13
WrC3	Wharton silt loam, 8 to 15 percent slopes, severely eroded	57	IVe-2	6	5	13
WrD2	Wharton silt loam, 15 to 25 percent slopes, moderately eroded	57	IVe-2	6	5	13
WrD3	Wharton silt loam, 15 to 25 percent slopes, severely eroded	57	VIe-1	7	5	13

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