Series 1959, No. 23

Issued May 1963

SOIL SURVEY

York County Pennsylvania

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
THE PENNSYLVANIA STATE UNIVERSITY
College of Agriculture and Experiment Station
and
PENNSYLVANIA DEPARTMENT OF AGRICULTURE
State Soil Conservation Commission

HOW TO USE THE SOIL SURVEY REPORT

THIS SURVEY of York County will serve several groups of readers. It will help farmers to plan the kind of management that will protect their soils and provide good yields; assist engineers in selecting sites for roads, buildings, ponds, and other structures; serve as a reference for students and teachers; aid foresters in managing woodlands; help community planning and development boards to decide on future development of the area; and add to our knowledge of soils.

Locating the soils

The index to map sheets at the back of this report will help you locate areas on the detailed soil map. The index is a small map of the county on which numbered retangles have been drawn to show what part of the county is represented on each sheet of the detailed soil map. When you have found the right map sheet, you will note that the soil areas are outlined and that each soil is designated by a symbol. To locate your farm on the soil map, look for roads, streams, towns, and other familiar landmarks.

All areas marked with the same symbol are the same kind of soil. Suppose, for example, an area you have located on the map has the symbol DuA. The legend for the detailed map shows that this symbol identifies Duffield silt loam, 0 to 3 percent slopes. This soil and all the others mapped in the county are described in the section "Descriptions of the Soils."

Finding information

Different parts of this report will be of particular interest to particular groups of readers. The "Guide to Mapping Units," which is at the back of this report, shows where in the report information about particular uses of the soils can be found.

Farmers and those who work with farmers can learn about the soils in the section "Descriptions of the Soils" and about their use for cultivated crops in "Capability Groups of Soils" and "Productivity Ratings." The soils are grouped by capability units, that is, groups of soils that need similar management and respond in about the same way. Duffield silt loam, 0 to 3 percent slopes, for example, is in capability unit I–2. Suggestions for the management of this soil are given under the heading "Capability unit I–2" in the section "Capability Groups of Soils."

Persons who need only a general idea of the soils can refer to the section "General Soil Map." This section tells briefly about the principal patterns of soils in the county and how they differ from each other.

Soil scientists and others interested in the nature of soils will find information about how the soils were formed and how they are classified in the sections "Formation and Classification of Soils" and "Laboratory Determinations."

Those who are concerned with growing trees will find in the section "Woodland" information about the suitability of the soils for the production of trees of commercial value.

Engineers, builders, and community planners will find useful information in the sections "Engineering Uses of Soils" and "Suburban Uses of Soils."

Students, teachers, and other users will find various parts of the report useful, depending on their particular interests.

* * *

This soil survey was made as part of the technical assistance furnished by the Soil Conservation Service to the York County Soil Conservation District. Fieldwork for the survey was finished in 1959. Unless otherwise indicated, all statements in the report refer to conditions in the county at the time the fieldwork was in progress.

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SOIL SURVEY OF YORK COUNTY, PENNSYLVANIA

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SOILS SURVEYED BY DONALD M. HERSH, E. Z. W. COMPY, KENNETH CRAVER, L. E. ESPY, GEORGE D. MARTIN, ROBERT V. SMITH, AND ROBERT A. YOUNG, SOIL CONSERVATION SERVICE

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

YORK COUNTY is in the southeastern part of Pennsylvania (fig. 1). The southern boundary is the Mason-Dixon line, which separates Pennsylvania from Maryland. On the west, York County is bounded by Adams County, and on the northwest, by Cumberland County. The Susquehanna River flows for 48 miles along the eastern and northeastern edges of York County. The adjoining counties are Lancaster, to the east, and Dauphin,

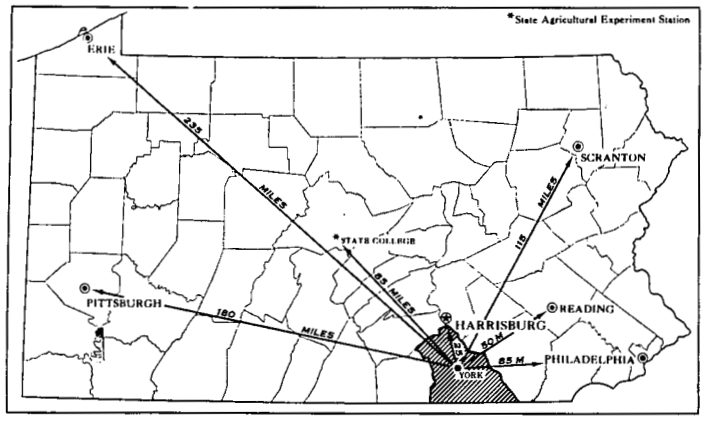

Figure 1.—**Location of York County in Pennsylvania.**

to the north. The eastern bank of the river is the boundary.

The total area of York County, according to the 1959 census of agriculture, is 911 square miles, or 583,040 acres. The distance from the northernmost point to the southern boundary is about 36 miles. At the southern boundary, the distance from the eastern boundary to the western is about 40 miles. York, the county seat, is about 25 miles southeast of Harrisburg, 20 miles southwest of Lancaster, and 40 miles north of Baltimore, Md. York is the only incorporated city in the county. In 1960, it had a population of 54,504. Of the other centers of population, the largest are the boroughs of Hanover (15,538), Red Lion (5,594), and West York (5,526). The total population of the county, in 1960, was 238,336.

How Soils Are Named, Mapped, and Classified

Soil scientists made this survey to learn what kinds of soils are in York 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 rocks; and many facts about the soils. They dug or bored 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 to the rock material that has not been changed much by leaching or by plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in other counties nearby and in places more distant. They classified and named the soils according to 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 inportant distinguishing characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first mapped. Duffield and Edgemont are two series represented in York County. All the soils in the United States that have the same series name are essentially alike in natural characteristics.

Many soil series contain soils that differ in the texture of their surface layer. Such differences in texture make it necessary to separate a series into types. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Duffield silt loam and Duffield silty clay are two types in the Duffield series. The difference in texture of their surface layer is apparent from their names.

Some soil types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use that practical suggestions about their manage-

ment 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, Duffield silt loam, 0 to 3 percent slopes, and Duffield silt loam, 3 to 8 percent slopes, are two of several phases of Duffield silt loam, a soil type that ranges in slope from level to steep.

After a fairly detailed guide for classifying and naming the soils had been worked out, the soil scientists drew soil boundaries on aerial photographs. They used for their base map aerial photos that show woodlands, buildings, field borders, trees, and other details that greatly help in drawing boundaries accurately. The soil map in the back of this report was prepared from the aerial photographs.

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

In preparing detailed maps, the soil scientist has a problem of delineating areas where different kinds of soils occur in such small areas or in such intricate association that it is not practical to show them separately on the map. Therefore, he shows this mixture of soils as one mapping unit and calls it a soil complex. Ordinarily, a soil complex is named for the major soil series in it, for example, Penn-Lansdale loams. Also, in some areas mapped there are spots where the soils have been disturbed by roadwork or other construction activities to such an extent that the original characteristics of the soils have been obliterated. These areas are shown on the soil map, but they are given descriptive names, such as Made land, and are called land types rather than soils.

Only part of the soil survey was done when the soil scientist had named and described the soil series and mapping units and had shown the location of the mapping units on the soil map. The mass of detailed information he had recorded then needed to be presented in different ways for different groups of users, among them farmers, managers of woodlands, and engineers.

To do this efficiently, he had to consult with persons in other fields of work and with them prepare groupings that would be of practical value to different users. Such groupings are the capability classes, subclasses, and units, designed mainly for those interested in producing crops and tame pasture; woodland suitability groups, for those who manage wooded tracts; and engineering characteristics and classifications, for those who build highways or structures to conserve soil and water.

General Soil Map

After study of the soils in a locality and the way they are arranged, it is possible to make a general map that shows several main patterns of soils, called soil associations. Such a map is the colored general soil map in the back of this report. Each association, as a rule, contains a few major soils and several minor soils, in a pattern that is characteristic although not strictly uniform.

The soils within any one association are likely to differ from each other in some properties; for example, slope, depth, stoniness, or natural drainage. Thus, the general soil map shows, not the kind of soil at any particular place, but patterns in each of which there are several different kinds of soil.

Each soil association is named for the major soil series in it, but, as already noted, soils of other series may also be present. The major soils of one soil association may also be present in other associations but in different patterns.

The general map showing patterns of soils is useful to people who want a general idea of the soils, who want to compare different parts of a county, or who want to know the possible location of good-sized areas suitable for a certain kind of farming or other land use.

1. Manor-Glenelg association

Shallow and moderately deep, mostly moderately steep to very steep soils underlain by schist or phyllite

This association, locally called South York Hills, constitutes about 9 percent of the county. It occurs in the southeastern part of the county, principally along the Susquehanna River and Muddy Creek. It is bordered mostly by the Chester-Elioak-Glenelg association. The topography is hilly, but ridges are few and rather narrow.

The Manor soils, which are the most extensive soils in this association, are shallow, well drained to excessively drained, moderately sloping to moderately steep, and generally stony. The Glenelg soils, which are somewhat deeper than the Manor soils, are well drained and are moderately sloping to moderately steep. Of minor extent in this association are the Glenville soils, which occur on gentle slopes along drainageways and near the base of the steeper slopes. The Glenville soils are deep and moderately well drained and are mottled in the lower part of the subsoil. The Worsham soils, which are poorly drained and are mottled almost to the surface, also occupy a minor acreage. The somewhat poorly drained Chewacla and the poorly drained Wehadkee are the principal soils on the narrow, inextensive flood plains. There is a very small acreage of the well-drained Congaree soils.

This association is unimportant agriculturally. It is about two-thirds woodland; the rest is mostly orchard and pasture, though there is some cropland. There are few towns but many summer cabins.

2. Chester-Elioak-Glenelg association

Deep and moderately deep soils underlain by schist or phyllite

This association constitutes about 20 percent of the county. It occurs in the south and southeastern parts of the county and is bordered by the hillier Manor-Glenelg association. The topography is characterized by broad, gently rounded ridges (fig. 2).

The Chester and Elioak soils are well drained and are nearly level to moderately sloping. The Chester soils have a yellowish-brown silty clay loam subsoil, and the Elioak have a somewhat firmer, reddish silty clay loam subsoil. The Glenelg soils are moderately deep, well drained, and generally moderately sloping.

Small scattered areas of the shallow Manor soils occur, generally on the few steeper slopes. Small areas of the deep, moderately well drained Glenville soils and the poorly drained Worsham soils also occur, mainly in depressions or on the lower part of slopes. A few areas of the Glenville soils are on ridges. The Glenville soils are mottled in the lower part of the subsoil, and the Worsham

Figure 2.—**Typical landscape in association 2.**

soils are mottled almost to the surface. The principal soils on the narrow, inextensive flood plains in this association are the somewhat poorly drained Chewacla and the poorly drained Wehadkee. There is a very small acreage of the well-drained Congaree soils.

This is the most important agricultural area in York County. Nearly all the acreage is occupied by full-time farms. The farming is highly diversified. Grain, canning crops, potatoes, orchard crops, and hay are the main crops. Many of the farms have pastures for dairy and beef cattle or ranges for poultry.

Excellent highways serve this area. Towns are small and widely scattered. Red Lion is the largest town.

3. Glenelg-Manor association

Shallow and moderately deep, mostly moderately sloping to moderately steep soils underlain by schist or phyllite

This association constitutes about 13 percent of the county. It occurs mostly in the south-central part. The topography is hilly and is characterized by long slopes and moderately broad ridges (fig. 3).

The Glenelg soils, which are the most extensive, are well drained, moderately deep, and usually gently or moderately sloping. The Manor soils are shallow, well drained to excessively drained, and mostly moderately steep.

Of minor extent in this association are the Glenville and the Worsham soils, which occupy depressions on the lower part of hillsides and are affected by seepage. The Glenville soils are moderately well drained and are mottled in the lower part of the subsoil. The Worsham soils are poorly drained and are mottled almost to the surface.

Figure 3.—**Typical landscape in association 3.**

The somewhat poorly drained Chewacla and the poorly drained Wehadkee are the principal soils on the narrow flood plains in this association. There is a small acreage of the well-drained Congaree soils. On terraces there are small areas of the well drained Wickham and the moderately well drained Altavista soils.

Although somewhat droughty, the soils in this association are good for agriculture. About 90 percent of the acreage has been cleared, and most of it is occupied by full-time farms. Grain, potatoes, orchard fruits, and hay are the main crops. Pastures for dairy and beef cattle are common, and also poultry ranges.

Excellent highways serve this part of the county, and towns are scattered throughout this association.

4. Cardiff-Whiteford association

Shallow and moderately deep soils underlain by slate, hard shale, or hard phyllite

This association constitutes about 2 percent of the county. The largest single area is in the extreme southeastern corner of the county and is locally known as South York Slate Lands. In this area the soils are underlain by slate. Other areas, in which the soils are underlain by shale or phyllite, are near Spring Grove and near York. The topography is hilly and is characterized by moderately long slopes and rather narrow ridges.

The Cardiff and Whiteford soils are the most extensive. The Cardiff are shallow to moderately deep and gently sloping to steep. They have a subsoil of dark yellowish-brown slaty silt loam. The Whiteford soils are deep and gently sloping. They have a subsoil of yellowish-red silty clay loam. Of minor extent in the association are the Glenville soils, which occur on the lower part of slopes and are affected by seepage. The Glenville soils are moderately well drained and are mottled in the lower part of the subsoil.

The soils in this association are low in productivity, especially the Cardiff soils, which are very droughty if eroded. Nevertheless, most of the acreage has been cleared and farmed. General farm crops, orchard crops, and pasture are grown. Some of the association is in urban areas. There is some idle land, mostly around slate quarries. Most of the quarries have been abandoned and are reforesting. High piles of slate near the quarries are characteristic features of the landscape.

5. Hagerstown-Duffield association

Deep, nearly level to moderately steep soils underlain by limestone

This association constitutes about 4 percent of the county. Most of it is in low-lying areas in the central part of the county. The city of York is near the middle of the largest area, which extends northeast toward Wrightsville and southwest toward Hanover. Smaller areas are located near New Market, south and east of Emigsville, and at New Holland.

Both the Duffield and the Hagerstown soils are deep well drained, and nearly level to moderately steep. The Duffield soils have a yellowish-brown subsoil, and the Hagerstown soils have a reddish-brown to red subsoil that is finer textured, firmer, and more sticky and plastic when wet.

Of minor extent in this association are the Elk, Bedford, Lawrence, Guthrie, Huntington, Lindside, and Melvin soils. The Elk soils are deep and well drained; they occur on terraces along the main streams. The Huntington, Lindside, and Melvin soils are on flood plains. The Huntington are well drained; the Lindside are moderately well drained and are mottled in the lower part of the subsoil; and the Melvin are poorly drained and are mottled almost to the surface. The Bedford, Lawrence, and Guthrie soils occur on uplands, in depressions, and on colluvial slopes. The Bedford are moderately well drained and are mottled in the lower part of the subsoil; the Lawrence are somewhat poorly drained and are mottled in the upper part of the subsoil; and the Guthrie are poorly drained and are mottled to the surface.

This association is important agriculturally. Except for those that are poorly drained, the soils are highly productive. Practically all of the acreage has been cleared. Stones and outcrops are few. Grain, pasture, and vegetables are the main crops. A considerable acreage is in residential and industrial developments, and near York there are large limestone quarries. U.S. 30, the principal east-west highway in the county, runs through this association.

6. Conestoga-Duffield-Bedford-Lawrence association

Deep and moderately deep soils underlain by impure limestone or calcareous schist

This association constitutes about 5 percent of the county. It is in low areas, mostly in the southwestern part of the county but extending in a narrow, discontinuous band northeastward to Wrightsville. The topography is gently to moderately sloping.

The Conestoga and Duffield soils are deep, well drained, and nearly level to moderately steep. The subsoil of the Conestoga soils is more friable and micaceous than that of the Duffield soils. The Bedford soils, which are in depressions and on toe slopes, are deep, nearly level to gently sloping, moderately well drained, and mottled in the lower part of the subsoil. The Lawrence soils are nearly level and somewhat poorly drained; they are mottled in the upper part of the subsoil and are slowly permeable in the lower part of the subsoil.

Of minor extent in this association are the Pequea, Guthrie, Lindside, Huntington, and Melvin soils. The Pequea soils, which are underlain by calcareous schist, are shallow, well drained, gently sloping to steep, and erosive. The Guthrie soils are nearly level and poorly drained; they have a slowly permeable subsoil and are mottled to the surface. The well drained Huntington soils, the moderately well drained Lindside soils, and the poorly drained Melvin soils are on the flood plains.

A sizable acreage in this association is in urban and industrial developments. Much of the rest is used for dairy farming and livestock farming. Corn, small grain, and canning crops are the principal tilled crops.

7. Penn-Lansdale-Readington association

Shallow to deep, mostly nearly level or gently sloping soils underlain by Triassic sandstone or shale

This association constitutes about 9 percent of the county. It is in the central part of the county, north of York, mostly in the area locally known as Dover Plains, and it includes the boroughs of Dover, Manchester, and Mount Wolf. The topography is predominantly nearly level or gently sloping, but there are some short, moderately steep slopes along drainageways.

The Penn soils are shallow to moderately deep and have a reddish subsoil. The Lansdale soils have a yellowish-brown to grayish-brown subsoil. The Readington soils are deep and moderately well drained and are mottled in the lower part of the subsoil. Of minor extent in this association are the poorly drained Croton soils, which occur in depressions; the well drained Bermudian soils, the moderately well drained Rowland soils, and the poorly drained Bowmansville soils, all of which are on flood plains. There are very small areas of the well drained Birdsboro soils, the moderately well drained Raritan soils, and the poorly drained Lamington soils, all of which occur on terraces.

This association is important agriculturally. Most of the acreage is used to grow crops, principally corn, small grain, hay, and vegetables. There are also some orchards. Only the steeper slopes and the poorly drained areas are used for pasture. Crop yields are good if lime and fertilizer are applied liberally and if rainfall is normal or above. Since the soils are shallow to only moderately deep, yields are reduced in dry years. Dairy cattle, beef cattle, and poultry are increasing in importance. Transportation facilities are very good.

8. Penn-Readington association

Shallow to deep, mostly gently sloping to strongly sloping soils underlain by Triassic sandstone or shale

This association constitutes about 7 percent of the county. It occurs as several scattered areas in the northern part of the county. The topography is rolling and is characterized by moderately broad to narrow ridges and by short, steep slopes next to streams and drainageways.

The Penn soils are shallow to moderately deep and have a reddish subsoil. The Readington soils are nearly level or gently sloping and moderately well drained; they are reddish brown in the upper part of the subsoil and mottled in the lower part of the subsoil.

Of minor extent in the association are the Croton, Birdsboro, Raritan, Lamington, Bermudian, Rowland, and Bowmansville soils. The Croton soils are in depressions; they are nearly level and poorly drained. The well drained Birdsboro soils, the moderately well drained Raritan soils, and the poorly drained Lamington soils are on terraces, mostly along Conewago Creek. On the flood plains along Conewago Creek and the smaller streams are the well drained Bermudian soils, the moderately well drained Rowland soils, and the poorly drained Bowmansville soils.

Most of the acreage is cleared and is used for grain, hay, or orchards. Some of the steeper slopes are wooded. Part-time farming is common, and in some locations farmland is idle and reverting to woodland. Low wet areas and short steep slopes are used as pasture or are idle.

9. Penn association

Shallow to moderately deep, mostly stony soils underlain by Triassic sandstone or shale

This association constitutes about 7 percent of the county. There are two areas. The larger one is in the Conewago Mountains. It extends from near Strinestown, which is in the north-central part of the county, south-

westward to the boundary between York County and Adams County. This area varies from less than half a mile to more than 3 miles in width. The other area is small. It is located south of U.S. 30, near Pigeon Hills.

The Penn soils in this association are shallow to moderately deep. The slopes range from gentle to very steep but are predominantly moderate to moderately steep. Of very minor extent in this association are the poorly drained Croton soils and the moderately well drained Readington soils, both of which occur on toe slopes and in depressions along drainageways.

Most of this association is woodland. Many fields once cleared and farmed are now idle and are reverting to forest. Some of the broad, gentle slopes are used to grow general farm crops, fruits, or pasture. Most of the acreage is stony, but small areas have been cleared of stones to permit cultivation.

This association is not important agriculturally. Generally, the soils are stony and low or moderately low in fertility, so little effort has been made to clear them. There are few towns or homes, but several good roads run north and south across the Conewago Mountains.

10. Montalto-Legore-Lehigh association

Shallow to deep upland soils underlain by diabase or porcelanite

This association constitutes about 12 percent of the county. Locally it is known as the Ironstone and Slate Hills. The largest area is between Dillsburg, Rossville, and Lewisberry. The topography is rolling and hilly. The underlying porcelanite was formerly sandstone and shale; it was baked and compressed by the intrusions of molten diabase.

The Montalto soils are deep and have a reddish, somewhat sticky subsoil. The Legore soils are gently sloping to steep; they are shallow over highly weathered diabase. The Lehigh soils are nearly level to moderately steep and are grayish and mottled in the lower part of the subsoil.

Of minor extent in this association are the Brecknock, Mount Lucas, Croton, and Watchung soils. The Brecknock soils are gently sloping to very steep, well drained, and shallow to moderately deep, and they have an olive-gray subsoil. The Mount Lucas soils are nearly level to gently sloping, deep, moderately well drained, and mottled in the lower part of the subsoil. Both the Watchung and the Croton soils are nearly level to gently sloping, poorly drained, and grayish and mottled almost to the surface. On the narrow and inextensive flood plains are the well drained Congaree soils, the moderately well drained Chewacla soils, and the poorly drained Wehadkee soils.

Much of this association, including the steep, the poorly drained, and the stony areas, is forested. Cleared areas are used to grow grain, hay, pasture, and fruits. Part-time farms are common. Many fields are idle or are reverting to forest. Towns and transportation routes are few, and in the steeper hills there are none.

11. Lewisberry-Athol-Lansdale-Arendtsville association

Deep and moderately deep soils underlain by sandstone, conglomerate, or fanglomerate

This association constitutes about 4 percent of the the county. It occurs in the northern part of the county, north of Lewisberry and west of Clear Spring. The relief is rolling and hilly.

The Lewisberry soils are deep, well-drained, somewhat droughty sandy loams that have a reddish-brown subsoil. They are underlain by sandstone and acid conglomerate. The Athol soils are similar but less droughty; they are underlain by calcareous conglomerate and sandstone. The Lansdale soils are shallow to moderately deep and well drained; they have a brownish-yellow or yellowish-brown subsoil underlain by grayish or brownish sandstone and shale. The Arendtsville soils are deep, well drained, and loamy; they are underlain by acid fanglomerate.

Of minor extent in the association are the Penn, Readington, Bermudian, Rowland, and Bowmansville soils. The Penn soils are shallow to moderately deep and well drained and have a reddish subsoil. The Readington soils are nearly level to gently sloping, deep, and moderately well drained; they are mottled in the lower part of the subsoil. On the inextensive flood plains are the well drained Bermudian soils, the moderately well drained Rowland soils, and the poorly drained Bowmansville soils.

Most of the rolling areas in this association are used to grow general farm crops. The hilly areas are stony and forested. There are many part-time farms and rural homes occupied by persons employed in or near Harrisburg.

12. Edgemont-Highfield-Murrill association

Deep and moderately deep upland soils underlain by quartzite, aporhyolite, quartz, or metabasalt; and deep colluvial soils over limestone

This association constitutes about 8 percent of the county. It occurs as separate hilly areas, each of which has its own local name. One area, called the Hellam Hills, extends from north of the towns of Hallam and Wrightsville to the Susquehanna River. The Pigeon Hills are west of Spring Grove and north of Hanover, and South Mountain is in the northwestern corner of the county.

The Edgemont soils are the most extensive. They are well-drained, moderately deep to deep loams underlain by hard quartzite. They occur on gently to moderately sloping hilltops and moderately steep to very steep hillsides. The gently sloping Edgemont soils are generally channery or stony, and the steeper ones are stony. The Murrill soils, which formed in colluvium deposited over limestone, are deep, well drained, and gently or moderately sloping. The Highfield soils are well drained and moderately deep to deep.

Of minor extent in the association are the Catoctin soils, which are shallow, well drained, and gently sloping to moderately steep. They are underlain by aporhyolite and metabasalt. There are also small areas of the Glenville and Worsham soils.

More than half of this association is forested, and most of the forested acreage is stony. The cleared areas, most of which are gently or moderately sloping, are used to grow general crops, orchard crops, and pasture. The Murrill soils are the most productive in the association; they are excellent for crops.

Use and Management of Soils

This section has six main parts. The first groups the soils to show their relative suitability for agriculture and discusses the management of the soils of each group as cropland or pasture. The second gives estimates of the relative productivity of the soils for specified crops. The third groups the soils according to their suitability for use as woodland and gives information that is useful in the management of woodland. The fourth rates the soils according to their capacity to support specified game birds and animals and gives general suggestions for improvement of the soils as wildlife habitats. The fifth part of the section groups the soils to show their relative suitability as building sites and discusses some of the characteristics that have to be considered in selecting sites. The sixth part is concerned with the use of the soils in road construction and conservation engineering.

The soils of York County generally are highly productive and are easily worked. However, agriculture is widely diversified, and different management practices are needed for cropland, pasture, and orchard.

Cropland.—A large percentage of the cropland in the county consists of nearly level to moderately steep slopes that range from 300 to 500 feet in length. Periodic heavy rainfall, especially in summer, causes sheet and gully erosion unless soil conservation practices are followed. The loss of even part of the surface layer reduces the content of organic matter and the supply of plant nutrients and results in an increase in runoff and a decrease in the amount of rainfall absorbed. Erosion can be controlled by grassed waterways, diversion terraces, contour stripcropping, cover crops, good crop rotations, and other conservation measures.

Additional organic matter is needed by most of the soils in this county to improve structure and to increase the water-holding capacity. Organic matter can be supplied by a crop rotation of low intensity, by green-manure crops, and by heavy applications of barnyard manure.

A plowsole, or tillage pan, forms occasionally where soils are tilled continuously to the same depth. This pan is difficult for moisture or roots to penetrate. To prevent a pan from forming, soils should be tilled to various depths and deep-rooted legumes and grasses should be grown.

Artificial drainage is practical on most of the wetter soils, such as the Lindside and the Readington soils. If drainage is provided fields can be farmed uniformly, soils can be worked earlier in spring, and yields are better. Tile drains and open drains are suitable in most places. Diversion terraces will control water from adjacent higher areas. A drainage engineer should be consulted if drainage is planned.

The soils of York County are acid and require periodic applications of lime for most crops. Proper liming stimulates microbe activity, helps improve the physical condition of the soil, reduces the intake of toxic elements, and provides a more favorable medium for plant growth. Lime and fertilizer should be applied according to soil tests and crop needs.

Crop rotations of three intensities are suggested in the capability units. The three levels of intensity are illustrated by the following examples:

Intensive rotation (2-year rotation): Row crop, cover crop, small grain, and green-manure crop (or equivalent).

Rotation of moderate intensity (3-year rotation): Row crop, cover crop, small grain, and hay (or equivalent).

Rotation of low intensity (4- or 5-year rotation): Row crop, cover crop, small grain, and 2 or 3 years of hay (or equivalent).

Pastures.—There are two types of pasture in the county—permanent and temporary. The permanent upland pastures are well suited to a mixture of deep-rooted grasses and legumes, such as birdsfoot trefoil mixed with orchardgrass, timothy, or bromegrass. Bluegrass and white Dutch clover do well during the cooler months of the growing season. Upland pastures generally are dormant during July and August. On some farms, narrow flood plains provide good pasture and shade for livestock during these hot months.

Pasture plants that have proven successful on temporary pastures are ladino clover and orchardgrass or sudangrass and small grain, such as rye, wheat, and oats.

In reseeding pastures, slopes of 12 percent or less can be plowed. Slopes of more than 12 percent should be disked. The longer, steeper slopes should be seeded in contour strips.

Pastures generally should be mowed about the 15th of June and the 15th of August to control weeds and tall grass. Overgrazing is detrimental to all pasture plants, but especially to legumes. Fertilizer and lime should be applied according to soil tests and crop needs.

Orchards.—There are two types of orchards in the county—those that are kept in permanent bluegrass sod, such as apple and pear orchards, and those that are clean cultivated, such as peach and cherry orchards.

Orchards that are in permanent sod should be mowed two or three times each year, and the residues should be left to provide plant nutrients. Fertilizer should be applied in spring. Lime should be applied according to soil tests. If a good grass cover is maintained, erosion is not a serious problem. Trees should be planted on the contour.

Most of the orchards that are clean tilled are on slopes of 10 to 20 percent; consequently, erosion is a serious problem. A cover crop, such as ryegrass, will supply organic matter and help to control erosion. Fertilizer should be applied early in spring to provide nutrients for the fruit crop and to ensure a good cover crop. Trees should be planted on the contour. Diversion terraces are needed on the longer slopes.

Capability Groups of Soils

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

In this system all the kinds of soil are grouped at three levels—the capability class, the subclass, and the unit. The eight capability classes in the broadest grouping are designated by Roman numerals I through VIII. In class I are the soils that have few limitations, the widest range of use, and the least risk of damage when they are used.

The soils in the other classes have progressively greater natural limitations. In class VIII are soils and landforms so rough, shallow, or otherwise limited that they do not produce worthwhile yields of crops, grazing, or wood products.

The subclasses indicate major kinds of limitations within the classes. Within most of the classes there can be up to four subclasses. The subclass is indicated by adding a small letter, *e*, *w*, or *s*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* means that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony.

In class I there are no subclasses, because the soils of this class have few or no limitations. Class V can contain, at the most, only subclasses *w* and *s*, because the soils in it have little or no erosion hazard but have other limitations that limit their use largely to pasture, range, woodland, or wildlife.

Within the subclasses are the capability units—groups of soils enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. The capability units are convenient groupings of soils for many statements about their management. Capability units are generally identified by numbers assigned locally, for example, IIe–1 or IIIe–2.

Soils are classified in capability classes, subclasses, and units in accordance with the degree and kind of their permanent limitations. Not considered are the removal of stones; major and generally expensive land-forming that would change the slope, depth, or other characteristics of the soil; and possible but unlikely major reclamation projects.

The eight classes in the capability system, and the subclasses and units in this county, are described in the list that follows.

Class I. Soils that have few limitations that restrict their use.

- Unit I–1. Deep, well-drained, nearly level soils on flood plains, in depressions, and on stream terraces.
- Unit I–2. Deep, well-drained, nearly level soils that formed in calcareous material. They are on uplands, foot slopes, and stream terraces.
- Unit I–3. Deep, well-drained, nearly level soils that formed in material weathered from schist or phyllite. They are on uplands and stream terraces.

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

Subclass IIe. Soils subject to moderate erosion if they are not protected.

- Unit IIe–1. Deep, nearly level and gently sloping soils that formed in calcareous material. They are on uplands, foot slopes, and stream terraces.
- Unit IIe–2. Moderately deep to deep, nearly level and gently sloping soils that formed in material weathered from acid rock. They are on uplands and stream terraces.
- Unit IIe–3. Deep, gently sloping soils that formed in material weathered from quartzite or fanglomerate. They are on uplands.
- Unit IIe–4. Moderately deep to shallow, well-drained, gently sloping soils that formed in material weathered from sandstone, porcelanite, or shale. They are on uplands.
- Unit IIe–5. Moderately deep to shallow, gently sloping soils that formed in material weathered from calcareous schist.
- Unit IIe–6. Deep, moderately well drained and somewhat poorly drained, gently sloping soils that formed in material weathered from diabase, limestone, or calcareous schist. They are on uplands, at the base of slopes, and at the head of drainageways.
- Unit IIe–7. Deep, moderately well drained, gently sloping soils that formed in material weathered from acid rock. They are on uplands, on toe slopes, at the head of drainageways, and on stream terraces.

Subclass IIw. Soils that have moderate limitations because of excess water.

- Unit IIw–1. Deep, moderately well drained, nearly level soils on flood plains.
- Unit IIw–2. Deep, moderately well drained and somewhat poorly drained, nearly level soils that formed in material weathered from acid rock. These soils are on uplands, at the head of drainageways, and on stream terraces.
- Unit IIw–3. Deep, moderately well drained and somewhat poorly drained, nearly level soils that formed in material weathered from limestone, diabase, or calcareous schist. They are on uplands, in depressions, and at the head of drainageways.

Subclass IIs. Soils that have moderate limitations of moisture capacity or tilth.

- Unit IIs–1. Moderately deep to shallow, well-drained, nearly level soils that formed in material weathered from sandstone or shale.
- Unit IIs–2. Deep, well-drained, gently sloping soils that formed in material weathered from acid conglomerate. They are on uplands.

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

Subclass IIIe. Soils subject to severe erosion if they are cultivated and not protected.

- Unit IIIe–1. Well-drained, gently sloping and moderately sloping soils that formed in material weathered from limestone, diabase, or calcareous schist. They are on uplands and stream terraces.
- Unit IIIe–2. Well-drained, gently sloping and moderately sloping soils that formed in material weathered from acid rock. They are on uplands and stream terraces.
- Unit IIIe–3. Well-drained, gently sloping and moderately sloping soils that formed in material weathered from quartzite, fanglomerate, or sandstone. They are on uplands.
- Unit IIIe–4. Well-drained, gently sloping and moderately sloping soils that formed in mate-

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rial weathered from sandstone, shale, or schist. They are on uplands.

Unit IIIe–5. Well-drained, moderately sloping soils that formed in material weathered from calcareous schist. They are on uplands.

Unit IIIe–6. Somewhat poorly drained and moderately well drained, gently sloping and moderately sloping soils that formed in material weathered from porcelanite or in calcareous material.

Subclass IIIw. Soils that have severe limitations because of excess water.

Unit IIIw–1. Deep, somewhat poorly drained and poorly drained, nearly level soils on flood plains.

Unit IIIw–2. Deep and moderately deep, poorly drained to moderately well drained, nearly level and gently sloping soils on uplands and stream terraces.

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

Subclass IVe. Soils subject to very severe erosion if they are cultivated and not protected.

Unit IVe–1. Moderately sloping and moderately steep soils that formed in material weathered from limestone, diabase, or calcareous schist. They are on uplands.

Unit IVe–2. Moderately sloping and moderately steep soils that formed in material weathered from acid rock. They are on uplands.

Unit IVe–3. Moderately sloping and moderately steep soils that formed in material weathered from quartzite. They are on uplands.

Unit IVe–4. Gently sloping to moderately steep soils that formed in material weathered from sandstone, shale, or schist. They are on uplands.

Unit IVe–5. Moderately deep to shallow, gently sloping and moderately sloping soils that formed in material weathered from diabase or calcareous schist.

Unit IVe–6. Moderately deep to shallow, gently sloping to moderately steep soils that formed in material weathered from slate, aporhyolite, or porcelanite.

Unit IVe–7. Gently sloping to steep soils that formed in material weathered from porcelanite or in calcareous material.

Subclass IVw. Soils that have very severe limitations because of excess water.

Unit IVw–1. Deep, poorly drained soils that formed in material weathered from gray sandstone, limestone, or calcareous schist.

Class V. Soils that have little or no susceptibility to erosion but have other limitations that are impractical to remove without major reclamation and that limit their use largely to pasture, range, woodland, or wildlife food and cover.

Subclass Vw. Soils too wet for cultivation; drainage or protection not feasible.

Unit Vw–1. Poorly drained and very poorly drained soils that formed in material weathered mainly from diabase or schist.

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

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

Unit VIe–1. Moderately deep and deep, moderately steep and steep soils that formed in calcareous material.

Unit VIe–2. Deep, moderately steep and steep soils that formed in material weathered from fanglomerate, quartzite, or acid conglomerate.

Unit VIe–3. Shallow to moderately deep, moderately sloping and moderately steep soils that formed in material weathered from diabase or acid rock.

Unit VIe–4. Shallow, moderately well drained, moderately steep soils that formed in material weathered from porcelanite.

Subclass VIs. Soils generally unsuitable for cultivation and limited for other uses by low moisture capacity, stoniness, or other features.

Unit VIs–1. Well-drained, gently sloping to moderately steep, stony soils that formed in material weathered from diabase or acid rock.

Unit VIs–2. Moderately well drained and somewhat poorly drained, gently sloping to moderately steep, stony soils that formed in material weathered from diabase, shale, sandstone, or porcelanite.

Unit VIs–3. Very shallow to moderately deep, gently sloping to moderately steep, stony and shaly soils that formed in material weathered from schist, shale, sandstone, or porcelanite.

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

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

Unit VIIe–1. Moderately deep to shallow, moderately steep and steep soils that formed in material weathered from aporhyolite, diabase, porcelanite, quartz conglomerate, sandstone, or schist.

Unit VIIe–2. Shallow and very shallow, moderately steep to very steep soils that formed in material weathered from slate, diabase, schist, sandstone or shale.

Subclass VIIs. Soils very severely limited by low moisture capacity, stoniness, or other soil features.

Unit VIIs–1. Sloping to very steep, stony to extremely stony soils.

Unit VIIs–2. Somewhat poorly drained and poorly drained, nearly level to sloping, very stony soils.

Class VIII. Soils and landforms that have limitations that preclude their use for commercial production of plants and restrict their use to recreation, wildlife habitats, water supply, or esthetic purposes. (There are no class VIII soils in York County.)

In the following pages, each capability unit is described, the soils in each are listed, and some suggestions for use and management are given.

Capability unit I–1

This unit consists of deep, well-drained, nearly level soils on flood plains, in depressions, and on stream terraces. These soils formed in calcareous or acid material. The flood plains are overflowed occasionally for short periods, mostly in winter and in spring. There is little or no risk of erosion. The soils in this unit are—

Ashton loam, 0 to 3 percent slopes.
Bermudian silt loam, 0 to 3 percent slopes.
Bermudian silt loam, high bottom, 0 to 3 percent slopes.
Congaree silt loam.
Huntington silt loam.
Huntington silt loam, local alluvium, 0 to 3 percent slopes.

These soils are permeable and are high in available moisture capacity. They are fertile and have excellent tilth. The reaction ranges from strongly acid in the Congaree soil to nearly neutral in the Huntington soils.

These soils are among the most productive in the county. They are used mostly for general farm crops and pasture. They can be used for an intensive crop rotation if cover crops are grown to supply organic matter, tillage is kept to a minimum, and lime and fertilizer are applied. Winter cover crops will protect the soils in winter and in spring when flooding is most likely. Depressions and drainageways formed by flood scouring should be kept in grass or trees.

If well managed, all of these soils, and particularly the Huntington soils, are excellent for bluegrass pasture.

Capability unit I–2

This unit consists of deep, well-drained, nearly level soils on uplands, foot slopes, and stream terraces. These soils formed in material weathered from limestone, calcareous conglomerate, or calcareous schist. They are permeable and are high in available moisture capacity. Tilth is good, and fertility is high. The reaction ranges from medium acid to nearly neutral. There is little or no risk of erosion. The soils in this unit are—

Athol loam and silt loam, 0 to 3 percent slopes.
Conestoga silt loam, 0 to 3 percent slopes.
Duffield silt loam, 0 to 3 percent slopes.
Elk silt loam, 0 to 3 percent slopes.
Hagerstown silt loam, 0 to 3 percent slopes.
Murrill gravelly loam, 0 to 3 percent slopes.

These soils are excellent for corn, tobacco, tomatoes, small grain, hay, and pasture plants. They are not suited to potatoes and other root crops, because of the fine-textured subsoil.

An intensive crop rotation can be used if the content of organic matter is maintained, tillage is kept to a minimum, and crop residues are left or cover crops are grown to control erosion. Contour farming is needed in some fields. Natural drains should be kept in dense sod. Irrigation during droughts will increase crop yields.

Tall grasses and legumes are suitable pasture plants. Under good management, they will provide more forage than bluegrass.

Capability unit I–3

This unit consists of deep, well-drained, nearly level soils on uplands and stream terraces. These soils formed in material weathered primarily from schist or phyllite. They are permeable and are moderately high in available moisture capacity. Tilth is good, and fertility is high. The reaction is strongly acid or medium acid. There is little or no risk of erosion. The soils in this unit are—

Birdsboro silt loam, 0 to 3 percent slopes.
Chester silt loam, 0 to 3 percent slopes.
Elioak silt loam, 0 to 3 percent slopes.
Wickham silt loam, 0 to 3 percent slopes.

Much of the acreage is in woodland consisting of chestnut oak, red oak, black oak, white oak, and hickory. If cleared, these soils are excellent for truck crops, potatoes, and tree fruits. The Birdsboro and Wickham soils are less well suited to orchards than the other soils in this unit because of possible damage by frost.

An intensive crop rotation can be used if the organic-matter content is maintained, tillage is kept to a minimum, and crop residues are left or cover crops are grown to control erosion. Lime and fertilizer should be applied as indicated by crop needs and soil tests. On longer slopes, contour farming is needed to help control erosion. Irrigation will increase crop yields during dry periods.

Tall grasses and legumes are well suited for pastures and, under good management, will provide more forage than bluegrass.

Capability unit IIe–1

This unit consists of deep, well-drained, nearly level and gently sloping soils on uplands, foot slopes, and stream terraces. These soils formed in material weathered from limestone, calcareous conglomerate, diabase, or calcareous schist. They are permeable and are high in available moisture capacity. Tilth is good, and fertility is high. The reaction ranges from medium acid to nearly neutral. Some of the moderately eroded soils have lost as much as three-fourths of their original surface layer. The soils in this unit are—

Athol loam and silt loam, 3 to 8 percent slopes, moderately eroded.
Conestoga silt loam, 0 to 3 percent slopes, moderately eroded.
Conestoga silt loam, 3 to 8 percent slopes, moderately eroded.
Duffield silt loam, 0 to 3 percent slopes, moderately eroded.
Duffield silt loam, 3 to 8 percent slopes.
Duffield silt loam, 3 to 8 percent slopes, moderately eroded.
Elk silt loam, 3 to 8 percent slopes, moderately eroded.
Hagerstown silt loam, 0 to 3 percent slopes, moderately eroded.
Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded.
Huntington silt loam, local alluvium, 3 to 8 percent slopes.
Montalto channery silt loam, 3 to 8 percent slopes, moderately eroded.
Murrill gravelly loam, 3 to 8 percent slopes.
Murrill gravelly loam, 3 to 8 percent slopes, moderately eroded.

These soils are excellent for legume hays, such as alfalfa and red clover. They are well suited to corn, small grain, tobacco, hay, and pasture plants but are not suited to potatoes or other root crops.

A moderately intensive crop rotation can be used if the organic-matter content is maintained, tillage is kept to a minimum, and crop residues are left or cover crops are grown to help control erosion. Proper irrigation increases crop yields in dry years. In most areas erosion can be controlled and moisture conserved by contour farming, stripcropping, cropland terraces, diversion terraces, and grassed waterways. Some of these practices are not feasible in a few small areas of Murrill, Hagerstown, and Duffield soils that have karst topography.

Tall grasses and legumes do well in pastures.

Capability unit IIe–2

This unit consists of moderately deep to deep, nearly level and gently sloping soils on uplands and stream terraces. These soils formed in material weathered from acid rock. They are permeable and are moderately high in available moisture capacity. Tilth is good, and fertility is moderately high to high. The reaction ranges from very strongly acid to medium acid. Some of the moderately eroded soils have lost as much as three-fourths of their original surface layer. The soils in this unit are—

Ashton loam, 3 to 8 percent slopes.
Bermudian silt loam, high bottom, 3 to 8 percent slopes.
Birdsboro silt loam, 3 to 8 percent slopes, moderately eroded.
Chester silt loam, 0 to 3 percent slopes, moderately eroded.
Chester silt loam, 3 to 8 percent slopes.
Chester silt loam, 3 to 8 percent slopes, moderately eroded.
Edgemont silt loam, 3 to 8 percent slopes.
Edgemont silt loam, 3 to 8 percent slopes, moderately eroded.
Elioak silt loam, 3 to 8 percent slopes.
Elioak silt loam, 3 to 8 percent slopes, moderately eroded.
Glenelg channery silt loam, 3 to 8 percent slopes.
Glenelg channery silt loam, 3 to 8 percent slopes, moderately eroded.
Highfield channery silt loam, 3 to 8 percent slopes, moderately eroded.
Wheeling silt loam, 3 to 8 percent slopes, moderately eroded.
Whiteford silt loam, 3 to 8 percent slopes, moderately eroded.
Wickham silt loam, 3 to 8 percent slopes, moderately eroded.

These are the most extensive and most important agricultural soils in the county. They are well suited to corn, small grain, vegetables, tobacco, potatoes, tree fruits, hay, and pasture plants. Fruit trees on the Ashton and Bermudian soils may be damaged by frost. A moderately intensive crop rotation can be used if the organic-matter content is maintained, tillage is kept to a minimum, and residues from row crops are left or cover crops are grown. Erosion can be controlled by contour farming, stripcropping, cropland terraces, diversion terraces, and grassed waterways. Irrigation of high-priced cash crops has been successful.

In well-managed pastures, yields of tall grasses and legumes are excellent.

Capability unit IIe–3

This unit consists of deep, well-drained, gently sloping soils on uplands. These soils formed in material weathered primarily from quartzite or fanglomerate. They are very permeable, moderate to moderately low in available moisture capacity, and subject to drought. Tilth is good, and fertility is moderately low. The reaction is strongly acid or very strongly acid. In some places as much as three-fourths of the original surface layer has been lost through erosion. The soils in this unit are—

Arendtsville gravelly loam, 3 to 8 percent slopes, moderately eroded.
Edgemont channery loam, 3 to 8 percent slopes, moderately eroded.

During a season of normal rainfall, fairly good yields of crops such as corn, small grain, hay, potatoes, small fruits, and tree fruits can be obtained. In dry years, yields generally are less. Alfalfa can be grown if acidity is corrected and a fertilizer that includes boron is applied.

Quartzite and sandstone fragments occur throughout the profile but do not seriously interfere with tillage. A moderately intensive rotation can be used if the organic-matter content is maintained, tillage is kept to a minimum, and cover crops are grown or residues from row crops are left to help control erosion. Erosion can be controlled and moisture conserved by contour farming, stripcropping, diversion terraces, and grassed waterways.

In well-managed pastures, yields of tall grasses and legumes are fairly good.

Capability unit IIe–4

This unit consists of moderately deep to shallow, well-drained, gently sloping soils on uplands. These soils formed in material weathered from sandstone, porcelanite, or shale. They are permeable, moderate to moderately low in available moisture capacity, and subject to drought in dry periods. Tilth is good, and fertility is moderately low. The reaction is strongly acid or very strongly acid. Some of the moderately eroded soils have lost as much as three-fourths of their original surface layer. The soils in this unit are—

Brecknock channery silt loam, 3 to 8 percent slopes, moderately eroded.
Lansdale channery loam, 3 to 8 percent slopes, moderately eroded.
Lansdale loam, 3 to 8 percent slopes, moderately eroded.
Penn loam, 3 to 8 percent slopes, moderately eroded.
Penn silt loam, 3 to 8 percent slopes.
Penn silt loam, 3 to 8 percent slopes, moderately eroded.
Penn-Lansdale loams, 3 to 8 percent slopes, moderately eroded.

These soils are fairly well suited to corn, small grain, hay, and pasture plants, but yields generally are lower than those from soils in capability units IIe-1 and IIe-2. In dry years, yields are considerably less. In wet years, water may stand on the surface of Penn silt loam long enough to damage some crops.

A moderately intensive crop rotation can be used if the organic-matter content is maintained, tillage is kept to a minimum, and residues from row crops are left or cover crops are grown to help control erosion. Erosion can be controlled and moisture conserved by contour farming, contour stripcropping, diversion terraces, and grassed waterways.

In well-managed pastures, deep-rooted tall grasses and legumes do fairly well. Bluegrass is not suitable.

Capability unit IIe–5

The only soil in this unit, Pequea silt loam, 3 to 8 percent slopes, moderately eroded, is on uplands. This well-drained, moderately deep to shallow soil formed in material weathered from calcareous schist. It is permeable in the surface layer and in the upper part of the subsoil but becomes somewhat less permeable near bedrock. The available moisture capacity is moderate to moderately high, tilth is fair to good, and fertility is moderate to moderately high. The reaction is nearly neutral. In places as much as three-fourths of the original surface layer has been lost through erosion.

This soil is only fairly well suited to crops commonly grown in the county. It is best suited to drought-resistant grasses and legumes. A moderately intensive crop rotation can be used if the organic-matter content is maintained, tillage is kept to a minimum, and residues from row crops are left or cover crops are grown. Erosion can be controlled by contour farming, contour stripcropping, cropland terraces, diversion terraces, and grassed waterways.

Capability unit IIe–6

This unit consists of deep, moderately well drained and somewhat poorly drained, gently sloping soils on uplands, at the base of slopes, and at the head of drainageways. These soils formed in material weathered from diabase, limestone, or calcareous schist. They are slowly permeable in the lower part of the subsoil and are moderate to moderately high in available moisture capacity. Tilth is fair to good, and fertility is moderately high. The reaction is medium acid or slightly acid. In a few places as much as three-fourths of the original surface layer has been removed by erosion. The soils in this unit are—

Bedford silt loam, 3 to 8 percent slopes, moderately eroded.
Mount Lucas silt loam, 3 to 8 percent slopes.
Mount Lucas silt loam, 3 to 8 percent slopes, moderately. eroded.

These soils are suited to crops such as corn, spring-sown small grain, and birdsfoot trefoil. They are not suited to alfalfa and winter-sown small grain, because these crops generally are killed by winter heaving.

A moderately intensive crop rotation is suitable if the organic-matter content is maintained, tillage is kept to a minimum, and residues from row crops are left or cover crops are grown to control erosion. Diversion terraces are needed in places to intercept runoff from higher areas. In cultivated fields, erosion can be controlled by graded strips, diversion terraces, and grassed waterways. These soils will compact and become more difficult to work if grazed, worked, or driven over when wet.

Capability unit IIe–7

This unit consists of deep, moderately well drained, gently sloping soils on uplands, on toe slopes, on stream terraces, and at the head of drainageways. These soils formed in material weathered from acid rock. They are slowly permeable in the lower part of the subsoil and are moderate to moderately high in available moisture capacity. Tilth is fair to good, and fertility is moderate to moderately high. The reaction ranges from very strongly acid to medium acid. In a few areas as much as three-fourths of the original surface layer has been removed by erosion. The soils in this unit are—

Altavista silt loam, 3 to 8 percent slopes, moderately eroded.
Glenville silt loam, 3 to 8 percent slopes.
Glenville silt loam, 3 to 8 percent slopes, moderately eroded.
Raritan silt loam, 3 to 8 percent slopes, moderately eroded.
Readington silt loam, 3 to 8 percent slopes.
Readington silt loam, 3 to 8 percent slopes, moderately eroded.
Sciotoville silt loam, 3 to 8 percent slopes.

These soils are suited to crops such as corn, spring-sown small grain, and birdsfoot trefoil. A moderately intensive crop rotation can be used if the organic-matter content is maintained, tillage is kept to a minimum, and residues from row crops are left or cover crops are grown. In cultivated fields, drainage can be improved and erosion controlled by graded strips, drainage terraces, and grassed waterways. Wet spots respond to drainage. In some places diversion terraces to intercept surface runoff from higher areas would improve drainage.

Capability unit IIw–1

This unit consists of deep, moderately well drained, nearly level soils on flood plains. These soils formed in material weathered from calcareous or acid rock. They are permeable but have a seasonally high water table. The available moisture capacity is moderately high to high, tilth is good, and fertility is moderately high to high. The reaction ranges from slightly acid to very strongly acid. These soils are occasionally flooded. Flooding usually occurs in winter and early in spring but normally is of short duration. Scouring is the only erosion hazard. Drainage is the principal problem. The soils in this unit are—

Chewacla silt loam.
Lindside silt loam.
Rowland silt loam.

Because of overflow, these soils are best suited to hay and pasture. Where drained they are suited to crops such as corn, spring-sown grain, and birdsfoot trefoil.

A moderately intensive crop rotation can be used if the organic-matter content is maintained and winter cover crops are grown. The areas that are flooded most frequently should be kept in grass. Drainage can be improved in some places by tile, open drains, and drainage terraces. Fertilizer and lime should be applied according to soil tests.

These soils are well suited to bluegrass.

Capability unit IIw–2

This unit consists of deep, moderately well drained and somewhat poorly drained, nearly level soils on uplands, at the head of drainageways, and on stream terraces. These soils formed in material weathered from sandstone, shale, schist, or other acid rock. They are slowly permeable in the lower part of the subsoil and consequently have a seasonally high water table in winter and early in spring. The available moisture capacity is moderate to moderately high, tilth is fair to good, and fertility is moderately high. The reaction is medium acid or strongly acid. The soils in this unit are—

Altavista silt loam, 0 to 3 percent slopes.
Glenville silt loam, 0 to 3 percent slopes.
Raritan silt loam, 0 to 3 percent slopes.
Readington silt loam, 0 to 3 percent slopes.
Sciotoville silt loam, 0 to 3 percent slopes.

These soils are fairly well suited to crops such as corn, red clover, spring-sown small grain, birdsfoot trefoil, and bluegrass. A moderately intensive crop rotation can be used if the organic-matter content is maintained, tillage is kept to a minimum, and residues from row crops are left or cover crops are grown to help control erosion.

Capability unit IIw–3

This unit consists of deep, nearly level, moderately well drained and somewhat poorly drained soils on uplands, in depressions, and at the head of drainageways. These soils formed in material weathered from limestone, diabase, or calcareous schist. They are slowly permeable in the lower part of the subsoil and consequently have a seasonally high water table in winter and early in spring. The available moisture capacity is moderate to moderately high, tilth is fair to good, and fertility is moderately high to high. The reaction is medium acid or slightly acid. Drainage is the principal problem. The soils in this unit are—

Bedford silt loam, 0 to 3 percent slopes.
Mount Lucas silt loam, 0 to 3 percent slopes.

These soils are suited to crops such as corn, spring-sown small grain, birdsfoot trefoil, and red clover, but they are

better suited to pasture or hay crops. A moderately intensive crop rotation can be used if the organic-matter content is maintained and residues from row crops are left or cover crops are grown.

Drainage can be improved by means of graded rows, graded strips, drainage terraces, open drains, bedding, and grassed waterways. Tile drainage is feasible in some places.

Capability unit IIs–1

This unit consists of moderately deep to shallow, well-drained, nearly level soils on uplands. These soils formed in material weathered from sandstone or shale. Their root zone is limited by the depth to rock. Permeability is moderately rapid, and the available moisture capacity is moderately low. Tilth is good, but fertility is moderately low. In a few places the moderately eroded soils have lost as much as three-fourths of their original surface layer. The soils in this unit are—

Lansdale loam, 0 to 3 percent slopes, moderately eroded.
Penn silt loam, 0 to 3 percent slopes, moderately eroded.
Penn-Lansdale loams, 0 to 3 percent slopes.

These soils are fairly well suited to corn, small grain, alfalfa, and orchardgrass. The organic-matter content and soil structure can be maintained if a moderately intensive crop rotation is used and residues are left or cover crops are grown. Contour farming, stripcropping, and grassed waterways are needed to control erosion. Graded rows and strips are needed on some of the more nearly level areas to remove excess surface water.

Capability unit IIs–2

This unit consists of deep, well-drained, gently sloping soils on uplands. These soils formed in material weathered from acid conglomerate. They are moderately rapid in permeability and consequently are subject to droughtiness during the normal growing season. They have good tilth, however, and can be worked early in spring. The available moisture capacity is low to moderate, and fertility is low. In places the moderately eroded soil has lost as much as three-fourths of its original surface layer. The soils in this unit are—

Lewisberry sandy loam, 3 to 8 percent slopes.
Lewisberry sandy loam, 3 to 8 percent slopes, moderately eroded.

These soils are suited to most crops commonly grown in the county. The soil structure and organic-matter content can be maintained if a crop rotation of low intensity is used and cover crops are grown or residues from row crops are left.

In most fields erosion can be controlled by contour farming and contour stripcropping. In some places diversion terraces are needed.

Deep-rooted grasses and legumes or drought-tolerant pasture plants do best on these soils. Bluegrass does not provide much forage.

Capability unit IIIe–1

This unit consists of deep, well-drained, gently sloping and moderately sloping soils on uplands and stream terraces. These soils formed in material weathered from limestone, diabase, or calcareous schist. They are permeable and are moderate to high in available moisture capacity. Tilth is fair to good, and fertility is high. The reaction ranges from medium acid to nearly neutral. The moderately eroded soils have lost as much as three-fourths of their original surface layer. The severely eroded soil has lost more than three-fourths of its original surface layer, and in places the subsoil is exposed. The soils in this unit are—

Athol loam and silt loam, 8 to 15 percent slopes, moderately eroded.
Conestoga silt loam, 3 to 8 percent slopes, severely eroded.
Conestoga silt loam, 8 to 15 percent slopes, moderately eroded.
Duffield silt loam, 8 to 15 percent slopes, moderately eroded
Elk silt loam, 8 to 15 percent slopes, moderately eroded.
Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded.
Montalto channery silt loam, 8 to 15 percent slopes, moderately eroded.
Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded.

These soils are well suited to all crops commonly grown in the county. The organic-matter content and soil structure can be maintained if a crop rotation of low intensity is used, cover crops are grown, and residues from row crops are left. Tillage should be kept to a minimum. Lime and fertilizer should be applied according to soil tests. Erosion can be controlled by contour farming, contour stripcropping, and diversion terraces.

Capability unit IIIe–2

This unit consists of deep, well-drained, gently sloping and moderately sloping soils on uplands and stream terraces. These soils formed in material weathered from acid rock. They are permeable and are moderate to moderately high in available moisture capacity. Tilth is good, and fertility is high. The reaction ranges from medium acid to very strongly acid. The moderately eroded soils have lost as much as three-fourths of their original surface layer. The severely eroded soils have lost more than three-fourths of their original surface layer, and in places the subsoil is exposed. The soils in this unit are—

Birdsboro silt loam, 8 to 15 percent slopes, moderately eroded.
Chester silt loam, 3 to 8 percent slopes, severely eroded.
Chester silt loam, 8 to 15 percent slopes, moderately eroded.
Elioak silt loam, 8 to 15 percent slopes.
Elioak silt loam, 8 to 15 percent slopes, moderately eroded.
Glenelg channery silt loam, 3 to 8 percent slopes, severely eroded.
Glenelg channery silt loam, 8 to 15 percent slopes.
Glenelg channery silt loam, 8 to 15 percent slopes, moderately eroded.
Highfield channery silt loam, 8 to 15 percent slopes, moderately eroded.
Wheeling silt loam, 8 to 15 percent slopes, moderately eroded.
Whiteford silt loam, 8 to 15 percent slopes, moderately eroded.

These soils are well suited to all crops commonly grown in the county. The organic-matter content and soil structure can be maintained if a crop rotation of low intensity is used, cover crops are grown, and residues from row crops are left. Lime and fertilizer should be applied according to soil tests and crop needs. Erosion can be controlled by contour stripcropping, contour farming, and diversion terraces.

Capability unit IIIe–3

This unit consists of deep, well-drained, gently sloping and moderately sloping soils on uplands. These soils formed in material weathered primarily from quartzite, fanglomerate, or sandstone. They are permeable to very

permeable and are subject to drought. The available moisture capacity is moderate to moderately low, tilth is good, and fertility is moderately low. The reaction is strongly acid or very strongly acid. The moderately eroded soils have lost as much as three-fourths of their original surface layer. The severely eroded soil has lost more than three-fourths of its original surface layer, and in places the subsoil is exposed. The soils in this unit are—

Arendtsville gravelly loam, 8 to 15 percent slopes, moderately eroded.
Edgemont channery loam, 8 to 15 percent slopes, moderately eroded.
Edgemont silt loam, 3 to 8 percent slopes, severely eroded.
Edgemont silt loam, 8 to 15 percent slopes.
Edgemont silt loam, 8 to 15 percent slopes, moderately eroded.
Lewisberry sandy loam, 8 to 15 percent slopes.
Lewisberry sandy loam, 8 to 15 percent slopes, moderately eroded.

These soils are fairly well suited to the crops commonly grown in the county. The organic-matter content can be maintained and the soil structure preserved if a crop rotation of low intensity is used, residues from row crops are left, and cover crops are grown. Orchards should be planted on the contour, and each row of trees should be planted on a small terrace. To provide good air drainage, the trees should be alined up and down the slope.

Erosion can be controlled by contour stripcropping, diversion terraces, and grassed waterways. Fertilizer and lime requirements should be determined by soil tests.

Under good management, deep-rooted tall grasses and legumes will provide more forage than bluegrass. Bluegrass is short lived on these soils.

Capability unit IIIe–4

This unit consists of moderately deep to shallow, well-drained, gently sloping and moderately sloping soils on uplands. These soils formed in material weathered from sandstone, shale, or schist. They are permeable and are subject to drought during dry spells. The available moisture capacity is moderate to moderately low, tilth is good, and fertility is moderately low. The reaction is strongly acid or very strongly acid. The severely eroded soils have lost more than three-fourths of their original surface layer, and in places the subsoil is exposed. The moderately eroded soils have lost as much as three-fourths of their original surface layer. The slightly eroded or uneroded soils are mostly in woods. The soils in this unit are—

Brecknock channery silt loam, 8 to 15 percent slopes.
Brecknock channery silt loam, 8 to 15 percent slopes, moderately eroded.
Cardiff slaty silt loam, 3 to 8 percent slopes, moderately eroded.
Lansdale channery loam, 8 to 15 percent slopes, moderately eroded.
Lansdale loam, 3 to 8 percent slopes, severely eroded.
Legore silt loam, 3 to 8 percent slopes, moderately eroded.
Manor channery loam, 3 to 8 percent slopes.
Manor channery loam, 3 to 8 percent slopes, moderately eroded.
Penn loam, 3 to 8 percent slopes, severely eroded.
Penn loam, 8 to 15 percent slopes, moderately eroded.
Penn silt loam, 3 to 8 percent slopes, severely eroded.
Penn silt loam, 8 to 15 percent slopes.
Penn silt loam, 8 to 15 percent slopes, moderately eroded.
Penn-Lansdale loams, 3 to 8 percent slope, severely eroded.
Penn-Lansdale loams, 8 to 15 percent slopes, moderately eroded.
Penn and Readington shaly silt loams, 3 to 8 percent slopes, moderately eroded.

These soils are fairly well suited to the crops commonly grown in the county. The organic-matter content can be maintained and the soil structure preserved if a crop rotation of low intensity is used, cover crops are grown, and residues from row crops are left. Fertilizer and lime should be applied as indicated by soil tests and crop needs.

Pastures should not be overgrazed. Deep-rooted grasses and legumes will provide more forage than bluegrass.

Capability unit IIIe–5

The one soil in this unit, Pequea silt loam, 8 to 15 percent slopes, moderately eroded, is on uplands. This moderately deep to shallow, well-drained soil formed in material weathered from calcareous schist. It is permeable in the surface layer and in the upper part of the subsoil but somewhat less permeable in the lower part of the subsoil. The available moisture capacity is moderate, tilth is fair, and fertility is moderate. The reaction is nearly neutral. As much as three-fourths of the original surface layer has been lost through erosion,

This soil is fairly well suited to the crops commonly grown in the county. The soil structure can be preserved and the organic-matter content can be maintained if a crop rotation of low intensity is used, cover crops are grown, and residues of row crops are left. Contour farming, contour stripcropping, and diversion terraces will help to control erosion.

Capability unit IIIe–6

This unit consists of deep to moderately deep, somewhat poorly drained and moderately well drained soils on uplands. These gently sloping and moderately sloping soils formed in material weathered from porcelanite or in calcareous material. They are slowly permeable in the upper part of the subsoil and tend to remain wet until late in spring. The available moisture capacity is moderate, and tilth is fair. Fertility is low in the Lehigh soils and moderate in the Bedford soils. The reaction ranges from slightly acid to strongly acid. The soils in this unit are—

Bedford silt loam, 3 to 8 percent slopes, severely eroded.
Bedford silt loam, 8 to 15 percent slopes, moderately eroded.
Lehigh channery silt loam, 8 to 15 percent slopes.
Lehigh channery silt loam, 8 to 15 percent slopes, moderately eroded.

These soils are fairly well suited to crops such as corn, spring-sown small grain, birdsfoot trefoil, and timothy. The soil structure can be preserved and the organic-matter content maintained if a crop rotation of low intensity is used, cover crops are grown, and residues from row crops are left. Graded rows, graded strips, and drainage terraces will help to control erosion. Lime and fertilizer should be applied according to soil tests. Tile drains and shallow surface ditches are needed in some places on the Bedford soils.

Capability unit IIIw–1

This unit consists of deep, somewhat poorly drained and poorly drained, nearly level soils on flood plains. These soils formed in material weathered from calcareous or acid rock. The available moisture capacity is moderately high, tilth is fair to poor, and fertility is moderately high. The reaction ranges from slightly acid to very strongly acid. In winter and early in spring, these soils are flooded periodically. Many areas are also flooded during the cropping season, but usually only for short periods.

The water table is high for much of the year. Scouring is the only erosion hazard. Drainage is the principal problem. The soils in this group are—

Bowmansville silt loam.
Bowmansville silt loam, local alluvium.
Melvin silt loam.
Wehadkee silt loam.
Wehadkee silt loam, local alluvium, 3 to 8 percent slopes.

If drained, these soils can be used for moisture-tolerant hay and pasture. Some areas that are subject to prolonged or frequent flooding should be used only for temporary pasture during the summer months. Crops such as corn, spring-sown small grain, birdsfoot trefoil, timothy, and bluegrass are fairly well suited.

The soil structure can be preserved and the organic-matter content maintained if a crop rotation of low intensity is used and, following row crops, cover crops are grown to prevent scouring. Drainage can be improved by open drains and bedding. Tile drains are suitable where outlets are available. Cleaning streams and straightening channels will reduce flooding.

Capability unit IIIw–2

This unit consists of deep and moderately deep, poorly drained to moderately well drained, nearly level and gently sloping soils on uplands and stream terraces. These soils formed in acid or calcareous material. They have a slowly permeable subsoil and are moderately high in available moisture capacity. Tilth is fair to poor, and fertility is moderate to moderately high. The reaction is medium acid or strongly acid. These soils are not subject to flooding, but they have a seasonally high water table in winter and in spring. Water stands on the surface for short periods. The soils in this unit are—

Lamington silt loam.
Lawrence silt loam.
Lehigh channery silt loam, 0 to 3 percent slopes.
Lehigh channery silt loam, 3 to 8 percent slopes.
Lehigh channery silt loam, 3 to 8 percent slopes, moderately eroded.

These soils are best suited to crops such as birdsfoot trefoil, timothy, and bluegrass. They are only fairly well suited to crops such as corn and spring-sown small grain. Lime and fertilizer should be applied according to soil tests. The soil structure and organic-matter content can be maintained if a crop rotation of low intensity is used and a cover crop is grown.

Artificial drainage is needed if the best yields are to be obtained. Drainage can be improved by means of graded rows, graded strips, drainage-type terraces, and open ditches. Tile drains are not usually effective, because of the slow permeability of the subsoil.

Capability unit IVe–1

This unit consists mainly of deep and moderately deep, well-drained, moderately sloping and moderately steep soils on uplands. These soils formed in material weathered from limestone, diabase, or calcareous schist. Tilth is fair, and fertility is moderately high. The reaction ranges from medium acid to nearly neutral. The moderately eroded soils have lost as much as three-fourths of their original surface layer. The severely eroded soils have lost more than three-fourths of their original surface layer, and in many places the subsoil is exposed. They are somewhat less permeable than the moderately eroded soils. The soils in this unit are—

Athol loam and silt loam, 8 to 15 percent slopes, severely eroded.
Athol loam and silt loam, 15 to 25 percent slopes, moderately eroded.
Conestoga silt loam, 8 to 15 percent slopes, severely eroded.
Duffield silt loam, 15 to 25 percent slopes, moderately eroded.
Duffield silty clay, 8 to 15 percent slopes, severely eroded.
Hagerstown silt loam, 15 to 25 percent slopes, moderately eroded.
Hagerstown silty clay, 3 to 8 percent slopes, severely eroded.
Hagerstown silty clay, 8 to 15 percent slopes, severely eroded.
Montalto channery silt loam, 15 to 25 percent slopes, moderately eroded.
Montalto channery silty clay loam, 8 to 15 percent slopes, severely eroded.
Murrill gravelly loam, 8 to 15 percent slopes, severely eroded.

These soils are best suited to long-term hay and to pasture. An alfalfa-grass mixture does well. Where reseeding is needed, a suitable rotation is 1 year of a row crop, 1 year of small grain, then back to hay and pasture. Long slopes should be reseeded in alternate contour strips, so that only part of the field is cultivated each year. Diversion terraces are needed on long slopes, and all waterways should be sodded.

Deep-rooted tall grasses and legumes are suitable pasture plants and will provide more forage than bluegrass.

Capability unit IVe–2

This unit consists of deep or moderately deep, well-drained, moderately sloping and moderately steep soils on uplands. These soils formed in material weathered from acid rock. They are moderate in fertility and fair to good in rate of permeability. The severely eroded soils have lost more than three-fourths of their original surface layer, and in many places the subsoil is exposed. The moderately eroded soils have lost as much as three-fourths of their original surface layer. The soils in this unit are—

Elioak silt loam, 8 to 15 percent slopes, severely eroded.
Glenelg channery silt loam, 8 to 15 percent slopes, severely eroded.
Glenelg channery silt loam, 15 to 25 percent slopes.
Glenelg channery silt loam, 15 to 25 percent slopes, moderately eroded.
Lewisberry sandy loam, 15 to 25 percent slopes, moderately eroded.

Because of the severe erosion hazard, these soils are best suited to long-term hay or to pasture. A mixture of alfalfa and grass does well. Cultivated crops should be grown only if it is necessary to reestablish hay or pasture. All reseeding should be in strips on the contour. Apple and peach orchards can be established if the trees are set on the contour and protected with diversion terraces. Apple orchards should be well sodded. Diversion terraces are also needed on long slopes. All waterways should be sodded.

Capability unit IVe–3

This unit consists of deep, well-drained, moderately sloping and moderately steep soils on uplands. These soils formed mainly in material weathered from quartzite. They are permeable to very permeable and are subject to drought. The available moisture capacity is moderately low to low, fertility is moderately low to low, and tilth is good. The reaction is strongly acid or very strongly acid. The moderately eroded soils have lost as much as three-fourths of their original surface layer. The severely

eroded soils have lost more than three-fourths of their original surface layer, and in many places the subsoil is exposed. The soils in this unit are—

Edgemont channery loam, 8 to 15 percent slopes, severely eroded.
Edgemont channery loam, 15 to 25 percent slopes, moderately eroded.
Edgemont silt loam, 8 to 15 percent slopes, severely eroded.
Edgemont silt loam, 15 to 25 percent slopes, moderately eroded.

These soils should be used mostly for long-term hay crops or for pasture. They are best suited to deep-rooted grasses and legumes but can be used occasionally for a row crop. The reseeding of hay or pasture plants should be done in alternate contour strips, half the strips being planted the first year and the rest the following year. All farming operations should be on the contour to conserve moisture and control erosion. Erosion can be controlled by contour stripcropping, diversion terraces, and grassed waterways.

Capability unit IVe–4

This unit consists of moderately deep to shallow, well-drained, gently sloping to moderately steep soils on uplands. These soils formed in material weathered from sandstone, shale, or schist. They are permeable to very permeable and are subject to drought in dry periods. The available moisture capacity is moderate to moderately low, and fertility is moderately low. The reaction is strongly acid or very strongly acid. The moderately eroded soils have lost as much as three-fourths of their original surface layer. The severely eroded soils have lost more than three-fourths of their original surface layer, and in many places the subsoil is exposed. The soils in this unit are—

Lansdale channery loam, 8 to 15 percent slopes, severely eroded.
Lansdale channery loam, 15 to 25 percent slopes, moderately eroded.
Lansdale loam, 8 to 15 percent slopes, severely eroded.
Manor channery loam, 3 to 8 percent slopes, severely eroded.
Manor channery loam, 8 to 15 percent slopes.
Manor channery loam, 8 to 15 percent slopes, moderately eroded.
Penn loam, 8 to 15 percent slopes, severely eroded.
Penn silt loam, 8 to 15 percent slopes, severely eroded.
Penn silt loam, 15 to 25 percent slopes.
Penn silt loam, 15 to 25 percent slopes, moderately eroded.
Penn-Lansdale loams, 8 to 15 percent slopes, severely eroded.
Penn and Readington shaly silt loams, 3 to 8 percent slopes, severely eroded.

These soils should not be used intensively. They are best suited to long-term hay, but a row crop can be grown when hay is reseeded. Orchards should be planted on the contour, and the trees alined up and down the slope to provide good air drainage and reduce the danger of frost damage.

Erosion can be controlled by contour farming, contour strips, diversion terraces, and grassed waterways.

In well-managed pastures, deep-rooted grasses and legumes yield more forage than shallow-rooted plants.

Capability unit IVe–5

This unit consists of moderately deep to shallow, well-drained to excessively drained soils on uplands. These gently sloping and moderately sloping soils formed in material weathered from diabase or calcareous schist. They are permeable and are moderately fertile. Tilth is fair, and the reaction is nearly neutral. More than three-fourths of the original surface layer has been removed by erosion, and in many places the subsoil is exposed. The soils in this unit are—

Legore clay loam, 8 to 15 percent slopes, severely eroded.
Legore silt loam, 3 to 8 percent slopes, severely eroded.
Pequea silt loam, 8 to 15 percent slopes, severely eroded.

These soils are best suited to long-term hay and pasture. Reseeding should be done through a row crop or small grain and in contour strips. Diversion terraces and grassed waterways are needed in some fields.

Capability unit IVe–6

This unit consists of moderately deep to shallow, well-drained soils on uplands. These gently sloping to moderately steep soils formed in material weathered from slate, aporhyolite, or porcelanite. They are permeable in the surface layer and upper part of the subsoil but somewhat less permeable in the lower part of the subsoil. The available moisture capacity is moderately low, tilth is fair, and fertility is moderately low. The reaction is strongly acid or very strongly acid. The moderately eroded soils have lost as much as three-fourths of their original surface layer. In the severely eroded soils, the subsoil is exposed in many places. The soils in this unit are—

Brecknock channery silt loam, 8 to 15 percent slopes, severely eroded.
Brecknock channery silt loam, 15 to 25 percent slopes.
Brecknock channery silt loam, 15 to 25 percent slopes, moderately eroded.
Cardiff slaty silt loam, 8 to 15 percent slopes, moderately eroded.
Catoctin channery silt loam, 3 to 8 percent slopes, severely eroded.

These soils are best suited to long-term hay or pasture. Reseeding should be done through a row crop and in contour strips. Diversion terraces and grassed waterways are needed in some fields.

Capability unit IVe–7

This unit consists of moderately deep, moderately well drained and somewhat poorly drained soils on uplands. These gently sloping to steep soils formed in material weathered from porcelanite or in calcareous material. They are slowly permeable in the lower part of the subsoil and tend to remain wet until late in spring. The available moisture capacity is moderately low, and tilth is fair. Fertility is moderate to high in the Bedford soil and low in the Lehigh soils. The reaction is strongly acid or very strongly acid. The moderately eroded soil has lost as much as three-fourths of its original surface layer. The severely eroded soils have lost more than three-fourths of their original surface layer, and in many places the subsoil is exposed. The soils in this unit are—

Bedford silt loam, 8 to 15 percent slopes, severely eroded.
Lehigh channery silt loam, 3 to 8 percent slopes, severely eroded.
Lehigh channery silt loam, 8 to 15 percent slopes, severely eroded.
Lehigh channery silt loam, 15 to 25 percent slopes, moderately eroded.

These soils should be kept in vegetation such as hay, pasture plants, or trees. Only fair yields can be expected. In large fields reseeding should be done through a row crop and in graded strips. Only half the strips should be planted the first year, and the alternate strips the following year. All waterways should remain in sod. Diversion terraces are needed on the longer slopes.

Capability unit IVw–1

This unit consists of deep, poorly drained, nearly level and gently sloping soils that formed in material weathered primarily from gray sandstone, limestone, or calcareous schist. These soils are slowly permeable and have a high water table for most of the year. The available moisture capacity is moderately high, tilth is poor, and fertility is moderately low. The reaction is strongly acid or medium acid. The moderately eroded soils have lost as as much as three-fourths of their original surface layer. Drainage is the principal problem. The soils in this unit are—

Croton silt loam, 0 to 3 percent slopes.
Croton silt loam, 0 to 3 percent slopes, moderately eroded.
Croton silt loam, 3 to 8 percent slopes.
Croton silt loam, 3 to 8 percent slopes, moderately eroded.
Guthrie silt loam.

If drained, these soils are suited to moisture-tolerant grasses and legumes for hay and pasture. A row crop can be grown occasionally. Drainage can be improved by open drains, bedding, and drainage-type terraces at the base of slopes. Tile drains are not ordinarily recommended, because of the slow permeability of the subsoil. Fertilizer should be applied according to crop needs.

Capability unit Vw–1

This unit consists of poorly drained and very poorly drained soils in depressions and at the base of slopes. These nearly level and gently sloping soils formed in material weathered mainly from diabase or schist. They have a slowly permeable or very slowly permeable subsoil and remain wet for much of the year. The available moisture capacity is moderate, fertility is moderate, and tilth is poor. The reaction is medium acid. There is little or no risk of erosion. The soils in this unit are—

Watchung silt loam, 0 to 3 percent slopes.
Watchung silt loam, 3 to 5 percent slopes.
Worsham silt loam.

These soils are best suited to pasture, woodland, or wildlife food and cover. If they are used for pasture, moisture-tolerant plants should be grown. Lime and fertilizer should be applied according to soil tests. Drainage can be improved by diversion terraces and open drains. Bedding-type drains can be used on level and nearly level areas. Tile drains generally are not practical, because of the fine-textured, slowly permeable subsoil.

Capability unit VIe–1

This unit consists of moderately deep and deep, moderately steep and steep, well-drained to excessively drained soils on uplands. These soils formed in calcareous material. Tilth is fair to poor, fertility is moderate, and the reaction is slightly acid or neutral. The severely eroded soils have lost more than three-fourths of their original surface layer, and in many places the subsoil is exposed. The moderately eroded soils have lost as much as three-fourths of their original surface layer and are more permeable than the severely eroded soils. The soils in this unit are—

Athol loam and silt loam, 15 to 25 percent slopes, severely eroded.
Athol loam and silt loam, 25 to 35 percent slopes, moderately eroded.
Conestoga silt loam, 15 to 25 percent slopes, severely eroded.
Hagerstown and Duffield silty clay loams, 15 to 25 percent slopes, severely eroded.
Pequea silt loam, 15 to 25 percent slopes, severely eroded.
Pequea silt loam, 25 to 35 percent slopes, moderately eroded.

These soils can be used to a limited extent for pasture. Gullied areas and other severely eroded areas should be fenced off, then smoothed, limed and fertilized, and seeded to suitable grasses. Large fields should be reseeded in alternate strips, with only half the strips reseeded the first year and the rest the following year. When strips are disked for reseeding, all waterways should be left in grass. Diversion terraces are needed on long slopes, at the head of gullies, and in severely eroded areas. Pastures should not be overgrazed.

Capability unit VIe–2

This unit consists of deep, moderately steep and steep, well-drained to excessively drained soils on uplands. These soils formed in material weathered from fanglomerate, quartzite, or acid conglomerate. Permeability is moderate to moderately rapid, tilth is good, and fertility is moderately low. The reaction is strongly acid or very strongly acid. The moderately eroded soil has lost as much as three-fourths of its original surface layer. The severely eroded soils have lost more than three-fourths of their original surface layer, and in many places the subsoil is exposed. The soils in this unit are—

Arendtsville gravelly loam, 15 to 25 percent slopes, severely eroded.
Edgemont channery loam, 15 to 25 percent slopes, severely eroded.
Edgemont silt loam, 15 to 25 percent slopes, severely eroded.
Edgemont soils, 25 to 35 percent slopes, moderately eroded.

These soils need careful management. If used for pasture, they should be seeded to drought-resistant grasses and legumes. Lime and fertilizer should be applied according to soil tests. Yields are only fair.

Reseeding should be done in alternate contour strips. Only half the strips should be reseeded the first year, and the rest the following year. Diversion terraces are needed on some of the moderately steep soils, at the head of gullies, and in severely eroded areas.

Sodded orchards can be established in some places. The trees should be planted on the contour. Areas that are not used for pasture or orchards should be planted to conifers. Seedlings need to be protected from fire, grazing, and trampling by livestock.

Capability unit VIe–3

This unit consists of shallow to moderately deep, well-drained to excessively drained soils on uplands. These moderately sloping and moderately steep soils formed in material weathered from diabase or acid rock. Permeability is moderate to moderately rapid, tilth is fair to good, and fertility is moderately low. Except for the Legore soil, which is nearly neutral, these soils are strongly acid or very strongly acid. The moderately eroded soils have lost as much as three-fourths of their original surface layer. The severely eroded soils have lost more than three-fourths of their original surface layer, and in many places the subsoil is exposed. The soils in this unit are—

Brecknock channery silt loam, 15 to 25 percent slopes, severely eroded.
Brecknock channery silt loam, 25 to 35 percent slopes, moderately eroded.
Cardiff slaty silt loam, 8 to 15 percent slopes, severely eroded.

Cardiff slaty silt loam, 15 to 25 percent slopes, moderately eroded.
Catoctin channery silt loam, 8 to 15 percent slopes, severely eroded.
Glenelg channery silt loam, 15 to 25 percent slopes, severely eroded.
Legore silt loam, 15 to 25 percent slopes, moderately eroded.
Manor channery loam, 8 to 15 percent slopes, severely eroded.
Manor channery loam, 15 to 25 percent slopes.
Manor channery loam, 15 to 25 percent slopes, moderately eroded.
Penn soils, 15 to 25 percent slopes, severely eroded.
Penn-Lansdale loams, 15 to 25 percent slopes, severely eroded.
Steinsburg channery loam, 8 to 15 percent slopes, severely eroded.

The best use for these soils is pasture. Drought-resistant pasture plants should be selected for reseeding. Bluegrass does not provide much forage in summer. Lime and fertilizer should be applied according to soil tests. Pastures should not be overgrazed.

The larger fields should be reseeded in alternate contour strips. Only half the strips should be planted the first year, and the rest the following year. Diversion terraces can be used to control runoff on the moderately sloping soils and at the head of gullies, but suitable outlets should be provided before the terraces are constructed.

If these soils are not needed for pasture, they should be reforested to conifers. Seedlings need to be protected from fire and from grazing.

Capability unit VIe–4

The only soil in this unit, Lehigh channery silt loam, 15 to 25 percent slopes, severely eroded, is a shallow, moderately well drained soil on uplands. It formed in material weathered from porcelanite. It is slowly permeable in the lower part of the subsoil. Tilth is fair to poor, fertility is low, and the reaction is strongly acid or very strongly acid. More than three-fourths of the original surface layer has been removed by erosion, and in many places the subsoil is exposed.

This soil can be used for pasture but should not be overgrazed. Reseeding should be done in alternate contour strips. Only half the strips should be reseeded the first year, and the rest the following year. Diversion terraces are needed on long slopes and at the head of gullies to intercept runoff. Suitable outlets should be provided before the terraces are constructed.

If this soil is not needed for pasture, it should be reforested to suitable conifers. The young trees should be protected from fire and from grazing.

Capability unit VIs–1

This unit consists of deep and moderately deep, well-drained, stony soils on uplands. These gently sloping to moderately steep soils formed in material weathered from diabase or acid rock. Permeability is good, and fertility is moderately low to high. The reaction ranges from very strongly acid in the Arendtsville soils to nearly neutral in the Murrill soils. Because of stoniness, only very light machinery or hand tools can be used. Generally, there is little or no risk of erosion. The soils in this unit are—

Arendtsville very stony loam, 0 to 8 percent slopes.
Arendtsville very stony loam, 8 to 25 percent slopes.
Edgemont very stony loam, 0 to 8 percent slopes.
Edgemont very stony loam, 8 to 25 percent slopes.
Highfield very stony silt loam, 0 to 8 percent slopes.
Highfield and Catoctin very stony silt loams, 8 to 25 percent slopes.
Lewisberry and Lansdale very stony loams, 8 to 25 percent slopes.
Montalto very stony silt loam, 3 to 8 percent slopes.
Montalto very stony silt loam, 8 to 25 percent slopes.
Murrill very stony loam, 0 to 8 percent slopes.
Murrill very stony loam, 8 to 25 percent slopes.

Much of the acreage is in woods and should remain in woods. Cleared areas are used for pasture. Lime and fertilizer should be applied according to soil tests. Open areas not needed for pasture should be reforested with suitable conifers.

Capability unit VIs–2

This unit consists of deep, stony, moderately well drained and somewhat poorly drained soils on uplands. These gently sloping to moderately steep soils formed in material weathered from diabase, shale, sandstone, or porcelanite. They are moderately permeable in the upper part of the subsoil and slowly permeable in the lower part. Fertility is moderate, and the reaction ranges from medium acid to very strongly acid. Because of stoniness, only very light machinery and hand tools can be used. The soils in this unit are—

Lehigh very stony silt loam, 0 to 8 percent slopes.
Lehigh very stony silt loam, 8 to 25 percent slopes.
Mount Lucas very stony silt loam, 0 to 8 percent slopes.

Most of the acreage is in hardwood forest. White oak, red oak, and pin oak are the desirable species. These soils can be used to a very limited extent for pasture. The removal of some of the stones will permit the use of farm machinery. Spots can be fertilized and seeded to water-tolerant plants. Open areas not needed for pasture should be reforested with suitable conifers.

Capability unit VIs–3

This unit consists of very shallow to moderately deep, gently sloping to moderately steep soils on uplands. These stony and shaly soils formed in material weathered from schist, shale, sandstone, or porcelanite. Fertility is moderately low or low, and the reaction is strongly acid or very strongly acid. Erosion is not a serious problem except on the shaly soils. Stoniness and shaliness make the use of large equipment impractical. The soils in this unit are—

Brecknock very stony silt loam, 8 to 25 percent slopes.
Manor very stony loam, 0 to 8 percent slopes.
Manor very stony loam, 8 to 25 percent slopes, moderately eroded.
Penn shaly silt loam, 3 to 8 percent slopes, severely eroded.
Penn shaly silt loam, 8 to 15 percent slopes, severely eroded.
Penn very stony loam, 0 to 8 percent slopes.
Penn very stony loam, 8 to 25 percent slopes.
Penn and Readington shaly silt loams, 8 to 15 percent slopes, severely eroded.

Most of the acreage is in woods or is reverting to woods. These soils are either too stony or too shaly and shallow for most crops but can be used to a very limited extent for pasture. They are best suited to deep-rooted grasses and legumes. Bluegrass yields are very low. Lime and fertilizer should be applied according to soil tests.

If not needed for pasture, these soils can be used to produce timber for saw logs and pulpwood. They should be cleared of undesirable species and brush and should be reforested to suitable conifers. Trees would protect the watershed and provide wildlife refuge. A technical forester should be consulted when thinning or harvest cutting is planned.

Capability unit VIIe–1

This unit consists mostly of moderately deep to shallow, well-drained to excessively drained, moderately steep and steep soils on uplands. These soils formed in material weathered from aporhyolite, diabase, porcelanite, quartz conglomerate, sandstone, or schist. They are low in fertility and are strongly acid or very strongly acid. Erosion is a serious hazard. The severely eroded soils have lost much of their original surface layer, and in most places the subsoil is exposed. The soils in this unit are—

Catoctin channery silt loam, 15 to 25 percent slopes, severely eroded.
Legore clay loam, 15 to 25 percent slopes, severely eroded.
Lewisberry sandy loam, 25 to 45 percent slopes, moderately eroded.
Manor channery loam, 15 to 25 percent slopes, severely eroded.
Manor channery loam, 25 to 45 percent slopes.

Most of the acreage is in woods, is reverting to woods, or is idle. These soils are not suited to cultivation and are severely limited in their use for pasture. Areas that can be used for pasture should be planted to deep-rooted legumes and grasses.

These soils can be used to produce saw logs and pulpwood. Undesirable species and brush should be removed and replaced with suitable conifers. Management practices should include selective cutting for sustained yields and protection from fire and grazing. A technical forester should mark trees for thinning or harvest cutting. Small open areas can be planted to shrubs that provide food and cover for wildlife.

Capability unit VIIe–2

This unit consists mostly of shallow and very shallow, excessively drained soils on uplands. These moderately steep to very steep soils formed in material weathered from slate, diabase, schist, sandstone, or shale. They are low in fertility, and, except for the Legore soil, which is slightly acid, they are strongly acid or very strongly acid. Erosion is a serious hazard, and in most places the subsoil is exposed. Manor channery loam, 45 to 60 percent slopes, is mostly in woods and is only slightly eroded. The soils in this unit are—

Cardiff slaty silt loam, 15 to 25 percent slopes, severely eroded.
Cardiff slaty silt loam, 25 to 35 percent slopes, severely eroded.
Legore clay loam, 25 to 35 percent slopes, severely eroded.
Manor channery loam, 25 to 45 percent slopes, moderately eroded.
Manor channery loam, 25 to 45 percent slopes, severely eroded.
Manor channery loam, 45 to 60 percent slopes,
Penn shaly silt loam, 15 to 25 percent slopes, severely eroded.
Penn soils, 25 to 35 percent slopes, severely eroded.
Penn soils, 35 to 60 percent slopes, severely eroded.
Steinsburg channery loam, 15 to 25 percent slopes, severely eroded.
Steinsburg channery loam, 25 to 35 percent slopes, moderately eroded.
Steinsburg channery loam, 25 to 35 percent slopes, severely eroded.

Forest is the best use for the soils in this unit. Even under the best management, only very limited pasture yields could be expected.

These soils can be used to produce saw logs and pulpwood. Undesirable species and brush should be removed and replaced with suitable conifers. A technical forester should mark trees for thinning and harvest cutting. Small open areas can be planted to shrubs that provide food and cover for wildlife.

Capability unit VIIs–1

This unit consists of shallow to moderately deep, well-drained to excessively drained, sloping to very steep soils on uplands. These stony to extremely stony soils formed in material weathered from diabase or

TABLE 1.—*Estimated productivity ratings of soils for*

[The ratings in columns A indicate productivity under common management; those in columns B indicate productivity under improved base an estimate. Steep and very stony soils, steep and severely

Soil	Corn (100= 80 bushels per acre)		Wheat (100= 35 bushels per acre)		Winter barley (100= 50 bushels per acre)		Spring oats (100= 45 bushels per acre)	
	A	B	A	B	A	B	A	B
Altavista silt loam, 0 to 3 percent slopes	80	160	40	75	------	45	------	85
Altavista silt loam, 3 to 8 percent slopes, moderately eroded	70	150	65	95	50	75	70	100
Arendtsville gravelly loam, 3 to 8 percent slopes, moderately eroded	80	150	75	100	75	100	90	115
Arendtsville gravelly loam, 8 to 15 percent slopes, moderately eroded	70	140	65	95	65	90	75	105
Arendtsville gravelly loam, 15 to 25 percent slopes, severely eroded	------	------	35	65	30	60	60	85
Arendtsville very stony loam, 0 to 8 percent slopes	------	------	------	------	------	------	------	------
Arendtsville very stony loam, 8 to 25 percent slopes	------	------	------	------	------	------	------	------
Ashton loam, 0 to 3 percent slopes	100	180	100	130	100	120	95	120
Ashton loam, 3 to 8 percent slopes	95	175	95	125	100	120	95	120
Athol loam and silt loam, 0 to 3 percent slopes	95	160	100	130	100	120	100	120
Athol loam and silt loam, 3 to 8 percent slopes, moderately eroded	85	155	95	120	95	110	100	120
Athol loam and silt loam, 8 to 15 percent slopes, moderately eroded	75	140	90	110	85	100	90	110
Athol loam and silt loam, 8 to 15 percent slopes, severely eroded	60	110	75	95	75	90	75	90
Athol loam and silt loam, 15 to 25 percent slopes, moderately eroded	50	100	75	95	75	90	75	90
Athol loam and silt loam, 15 to 25 percent slopes, severely eroded	------	------	65	80	65	80	65	80
Athol loam and silt loam, 25 to 35 percent slopes, moderately eroded	------	------	------	------	------	------	------	------

See footnotes at end of table.

acid rock. There is little or no erosion hazard. The soils in this unit are—

Brecknock very stony silt loam, 25 to 65 percent slopes.
Edgemont very stony loam, 25 to 60 percent slopes.
Lewisberry and Lansdale very stony sandy loams, 26 to 60 percent slopes.
Manor very stony loam, 25 to 75 percent slopes, moderately eroded.
Montalto extremely stony silt loam, 8 to 25 percent slopes.
Montalto extremely stony silt loam, 25 to 60 percent slopes.
Montalto very stony silt loam, 25 to 60 percent slopes.
Penn very stony loam, 25 to 60 percent slopes.

These soils are not suited to cultivated crops and are difficult to manage as pasture. Their best use is forest. Most of the acreage is in hardwoods. Oak and poplar are the species that should be encouraged. Areas that are cleared should be planted to white pine and Virginia pine. Small areas that are thinly forested should be planted to shrubs that provide food and cover for wildlife.

Capability unit VIIs–2

This unit consists of deep, somewhat poorly drained and poorly drained, nearly level to sloping, very stony soils on uplands. These soils formed in material weathered from diabase or acid rock. Stones and boulders cover from 3 to 15 percent of the surface. The stones generally are more then 10 inches in length. The boulders generally are 3 feet in diameter or larger There is little or no risk of erosion. The soils in this unit are—

Croton very stony silt loam, 0 to 8 percent slopes.
Watchung very stony silt loam, 0 to 8 percent slopes.

These soils are not suited to cultivated crops and are difficult to manage as pasture. They are too stony to be mowed, and removing stones is not practical. Drainage is not feasible, because of stoniness and slow permeability in the subsoil.

Most of the acreage is in woods and should remain in woods. Pin oak, beech, and red maple are the desirable species. Trees that are removed should be replaced with white pine.

Productivity Ratings

Table 1 shows the estimated productivity of most soils in the county under two levels of management. Steep and very stony soils, steep and severely eroded soils, and the four types of Made land are not shown.

The ratings given in this table are estimated averages for a normal 5-year period. They are based on figures derived from agricultural census data, on observations made by farmers in the county, and on records of yields on specific soils.

The ratings in columns A indicate the estimated productivity of the soils under management that is common on many farms in the county. The ratings in columns B are those that could be obtained under the better management suggested in the individual capability units.

Each rating denotes the productivity of a soil for a particular crop as a percentage of a standard index. The standard index represents the average acre yield of the specified crop on the most productive soils in the county under the A level of management. The standard index is shown at the head of each column.

The use of this table is best explained by an example. For instance, to find the estimated yield of corn on Glenelg channery silt loam, 8 to 15 percent slopes, moderately eroded, under the A level of management, first look at the standard index under the heading "Corn." The standard index is 80 bushels. In column A, the productivity rating for corn on Glenelg channery silt loam, 8 to 15 percent slopes, moderately eroded, is 75. Therefore, 75 percent of 80 bushels, or 60 bushels, is the estimated yield of corn on this soil under common management.

specified crops under two levels of management

management. Where no rating is given, either the soil is considered unsuitable for that crop or no information is available on which to eroded soils, and the four units of Made land are not included]

Alfalfa-grass hay (100=3 tons per acre)		Clover-grass hay (100=2 tons per acre)		Potatoes (100=325 bushels per acre)		Tomatoes (100=12 tons per acre)		Peaches (bushels per tree: very good=6+, good=4 to 6, fair=2 to 4, poor=below 2) [2]		Apples (bushels per tree: very good=30+, good=20 to 30, fair=10 to 20, poor=below 10) [2]		Bluegrass-clover pasture (100=100 cow-acre-days) [3]		Tall grass-legume pasture (100=100 cow-acre-days) [3]	
A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
35	70	70	120	------	------	40	75	Poor----	Poor-------	Fair----	Good------	95	115	130	170
40	80	60	100	------	------	60	115	Poor----	Fair-------	Fair----	Good------	85	105	130	170
70	115	75	120	85	125	75	115	Good----	Very good--	Good----	Very good--	75	90	100	115
60	105	65	105	75	115	65	106	Good----	Very good--	Good----	Very good--	70	85	90	105
45	90	50	90	------	------	------	------	---------	Good------	Fair----	Good------	50	60	70	85
------	------	------	------	------	------	------	------	Fair----	Good------	Fair----	Good------	------	------	------	------
------	------	------	------	------	------	------	------	Fair----	Good------	Fair----	Good------	------	------	------	------
100	145	100	125	100	140	100	150	Fair----	Good------	Fair----	Good------	105	125	150	180
95	140	95	115	100	140	90	140	Fair----	Good------	Fair----	Good------	100	120	145	175
95	140	90	115	90	120	90	110	Fair----	Good------	Fair----	Good------	95	115	140	170
90	135	90	115	85	110	80	95	Fair----	Good------	Fair----	Good------	75	100	130	160
80	125	80	100	80	100	70	85	Fair----	Good------	Good----	Very good--	65	90	125	155
65	115	65	85	55	75	50	65	Poor----	Fair-------	Fair----	Good------	50	70	110	140
65	115	65	85	50	70	50	65	Fair----	Fair-------	Fair----	Good------	55	75	115	145
55	100	50	70	------	------	------	------	Poor----	Poor-------	Poor----	Fair-------	45	60	95	125
------	------	------	------	------	------	------	------	Poor----	Fair-------	Fair----	Fair-------	45	60	------	------

TABLE 1.—*Estimated productivity ratings of soils for*

Soil	Corn (100= 80 bushels [1] per acre)		Wheat (100= 35 bushels per acre)		Winter barley (100= 50 bushels per acre)		Spring oats (100= 45 bushels per acre)	
	A	B	A	B	A	B	A	B
Bedford silt loam, 0 to 3 percent slopes	85	165	65	95	60	90	60	85
Bedford silt loam, 3 to 8 percent slopes, moderately eroded	80	150	60	90	70	100	70	95
Bedford silt loam, 3 to 8 percent slopes, severely eroded	65	145	35	65	60	90	55	70
Bedford silt loam, 8 to 15 percent slopes, moderately eroded	70	150	60	85	65	95	65	85
Bedford silt loam, 8 to 15 percent slopes, severely eroded	50	95	30	60	45	75	50	65
Bermudian silt loam, 0 to 3 percent slopes	95	170	80	105	60	85	80	100
Bermudian silt loam, high bottom, 0 to 3 percent slopes	100	175	100	120	95	115	95	115
Bermudian silt loam, high bottom, 3 to 8 percent slopes	95	170	100	120	95	115	95	115
Birdsboro silt loam, 0 to 3 percent slopes	80	150	100	120	100	120	85	115
Birdsboro silt loam, 3 to 8 percent slopes, moderately eroded	75	145	80	100	95	115	80	110
Birdsboro silt loam, 8 to 15 percent slopes, moderately eroded	70	140	70	90	85	105	75	100
Bowmansville silt loam	------	90	------	------	------	------	------	80
Bowmansville silt loam, local alluvium	------	100	------	------	------	------	------	80
Brecknock channery silt loam, 3 to 8 percent slopes, moderately eroded	55	90	70	85	70	85	75	110
Brecknock channery silt loam, 8 to 15 percent slopes	55	85	70	85	70	85	75	105
Brecknock channery silt loam, 8 to 15 percent slopes, moderately eroded	45	75	60	80	65	75	70	100
Brecknock channery silt loam, 8 to 15 percent slopes, severely eroded	35	55	40	60	40	60	55	75
Brecknock channery silt loam, 15 to 25 percent slopes	40	65	45	65	45	65	70	95
Brecknock channery silt loam, 15 to 25 percent slopes, moderately eroded	35	60	40	55	40	60	60	90
Brecknock channery silt loam, 15 to 25 percent slopes, severely eroded	------	------	30	40	30	40	40	60
Brecknock channery silt loam, 25 to 35 percent slopes, moderately eroded	------	------	------	------	------	------	------	------
Brecknock very stony silt loam, 8 to 25 percent slopes	------	------	------	------	------	------	------	------
Cardiff slaty silt loam, 3 to 8 percent slopes, moderately eroded	70	110	75	105	75	105	75	100
Cardiff slaty silt loam, 8 to 15 percent slopes, moderately eroded	55	100	60	90	65	90	65	90
Cardiff slaty silt loam, 8 to 15 percent slopes, severely eroded	------	------	40	60	40	60	40	60
Cardiff slaty silt loam, 15 to 25 percent slopes, moderately eroded	------	------	45	70	45	65	45	65
Cardiff slaty silt loam, 15 to 25 percent slopes, severely eroded	------	------	------	------	------	------	------	------
Cardiff slaty silt loam, 25 to 35 percent slopes, severely eroded	------	------	------	------	------	------	------	------
Catoctin channery silt loam, 3 to 8 percent slopes, severely eroded	50	75	60	100	60	100	60	90
Catoctin channery silt loam, 8 to 15 percent slopes, severely eroded	40	65	50	70	50	70	50	65
Catoctin channery silt loam, 15 to 25 percent slopes, severely eroded	------	------	30	50	30	50	30	45
Chester silt loam, 0 to 3 percent slopes	100	170	100	130	100	120	100	120
Chester silt loam, 0 to 3 percent slopes, moderately eroded	95	170	100	130	100	120	100	120
Chester silt loam, 3 to 8 percent slopes	95	170	95	125	100	120	100	120
Chester silt loam, 3 to 8 percent slopes, moderately eroded	90	165	95	125	95	120	90	110
Chester silt loam, 3 to 8 percent slopes, severely eroded	80	155	85	120	85	110	80	100
Chester silt loam, 8 to 15 percent slopes, moderately eroded	80	160	85	120	85	110	80	100
Chewacla silt loam	75	150	50	85	------	60	55	100
Conestoga silt loam, 0 to 3 percent slopes	90	160	100	130	100	125	100	125
Conestoga silt loam, 0 to 3 percent slopes, moderately eroded	90	155	95	125	95	120	95	120
Conestoga silt loam, 3 to 8 percent slopes, moderately eroded	85	150	90	125	90	115	90	115
Conestoga silt loam, 3 to 8 percent slopes, severely eroded	75	125	85	120	85	110	80	100
Conestoga silt loam, 8 to 15 percent slopes, moderately eroded	80	145	85	120	85	110	80	100
Conestoga silt loam, 8 to 15 percent slopes, severely eroded	60	115	60	90	60	90	50	70
Conestoga silt loam, 15 to 25 percent slopes, severely eroded	------	------	30	45	30	45	30	40
Congaree silt loam	110	180	60	90	60	85	80	100
Croton silt loam, 0 to 3 percent slopes	------	55	------	70	------	------	------	------
Croton silt loam, 0 to 3 percent slopes, moderately eroded	------	50	------	70	------	------	------	------
Croton silt loam, 3 to 8 percent slopes	40	75	40	70	------	------	------	------
Croton silt loam, 3 to 8 percent slopes, moderately eroded	------	70	35	65	------	------	------	------
Croton very stony silt loam, 0 to 8 percent slopes	------	------	------	------	------	------	------	------
Duffield silt loam, 0 to 3 percent slopes	100	180	100	130	100	120	100	120
Duffield silt loam, 0 to 3 percent slopes, moderately eroded	95	175	95	130	95	120	95	120
Duffield silt loam, 3 to 8 percent slopes	95	175	95	130	95	120	100	120
Duffield silt loam, 3 to 8 percent slopes, moderately eroded	85	165	90	125	90	115	90	110
Duffield silt loam, 8 to 15 percent slopes, moderately eroded	75	150	85	120	85	110	80	100
Duffield silt loam, 15 to 25 percent slopes, moderately eroded	60	100	70	105	70	90	60	80
Duffield silty clay, 8 to 15 percent slopes, severely eroded	60	120	75	110	75	95	60	80
Edgemont channery loam, 3 to 8 percent slopes, moderately eroded	70	120	60	80	70	100	80	95
Edgemont channery loam, 8 to 15 percent slopes, moderately eroded	60	105	55	75	65	95	75	90
Edgemont channery loam, 8 to 15 percent slopes, severely eroded	45	85	45	65	55	85	65	80
Edgemont channery loam, 15 to 25 percent slopes, moderately eroded	50	100	50	70	60	90	65	80
Edgemont channery loam, 15 to 25 percent slopes, severely eroded	------	------	40	55	45	65	50	65
Edgemont silt loam, 3 to 8 percent slopes	80	130	70	90	80	110	90	110
Edgemont silt loam, 3 to 8 percent slopes, moderately eroded	75	125	65	85	75	105	85	100
Edgemont silt loam, 3 to 8 percent slopes, severely eroded	65	100	60	80	70	100	75	90

See footnotes at end of table.

specified crops under two levels of management—Continued

Alfalfa-grass hay (100=3 tons per acre)		Clover-grass hay (100=2 tons per acre)		Potatoes (100=325 bushels per acre)		Tomatoes (100=12 tons per acre)		Peaches (bushels per tree: very good=6+, good=4 to 6, fair=2 to 4, poor=below 2) [2]		Apples (bushels per tree: very good=30+, good=20 to 30, fair=10 to 20, poor=below 10) [2]		Bluegrass-clover pasture (100=100 cow-acre-days) [3]		Tall grass-legume pasture (100=100 cow-acre-days) [3]	
A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
75	105	90	125	------	------	50	105	------	------	------	------	80	140	125	185
75	105	90	125	55	65	60	115	------	------	------	------	70	120	110	160
60	95	80	110	50	60	50	105	------	------	------	------	65	110	100	150
80	105	85	120	55	65	60	115	------	------	------	------	70	120	110	160
60	95	80	105	50	60	45	100	------	------	------	------	60	100	95	140
80	120	100	125	70	110	100	140	------	------	------	------	100	120	130	170
95	135	100	125	80	120	100	120	------	------	------	------	95	115	130	170
95	135	100	125	90	130	90	135	Fair----	Good------	Fair----	Good------	85	105	130	165
80	120	80	120	85	125	100	150	------	------	------	------	95	115	130	160
75	120	75	120	80	120	95	120	Poor----	Fair-------	Poor----	Fair-------	85	105	125	155
70	115	70	110	85	125	85	140	Fair----	Good------	Fair----	Good------	75	95	120	150
------	------	40	100	------	------	------	------	------	------	------	------	------	75	------	100
------	------	------	120	------	------	------	------	------	------	------	------	------	80	70	120
80	100	80	95	50	60	40	50	Poor----	Fair-------	Poor----	Fair-------	50	65	105	130
75	95	75	90	50	60	40	50	Poor----	Fair-------	Poor----	Fair-------	45	60	105	130
70	85	75	90	45	55	40	50	Poor----	Fair-------	Poor----	Fair-------	40	50	95	120
55	70	60	75	35	45	20	30	------	------	------	------	35	40	79	95
70	90	65	80	40	50	30	40	Poor----	Fair-------	Poor----	Fair-------	40	50	85	115
65	85	50	65	35	45	20	30	Poor----	Fair-------	Poor----	Fair-------	35	45	80	110
50	65	35	45	------	------	------	------	------	------	------	------	25	35	50	65
------	------	------	------	------	------	------	------	------	------	------	------	25	35	50	65
------	------	------	------	------	------	------	------	------	------	------	------	30	40	------	------
75	100	85	105	65	80	60	70	Good----	Good------	Fair----	Good------	55	65	120	140
70	95	80	100	60	75	50	60	Fair----	Good------	Fair----	Fair-------	50	60	115	135
60	80	70	80	------	------	------	------	Fair----	Fair-------	Poor----	Fair-------	40	50	95	115
65	85	75	90	------	------	------	------	Fair----	Fair-------	Poor----	Fair-------	45	55	100	120
------	------	------	------	------	------	------	------	Poor----	Fair-------	Poor----	Poor-------	30	40	80	100
------	------	------	------	------	------	------	------	Poor----	Fair-------	Poor----	Poor-------	25	35	------	------
65	90	60	80	------	------	------	------	Poor----	Fair-------	Poor----	Fair-------	50	60	100	130
55	75	50	70	------	------	------	------	Poor----	Fair-------	Poor----	Fair-------	40	50	90	110
40	55	40	50	------	------	------	------	------	------	------	------	30	40	70	75
95	145	100	130	100	140	100	150	Good----	Very good--	Good----	Very good--	85	100	150	180
95	140	100	125	100	140	100	150	Good----	Very good--	Good----	Very good--	80	95	145	175
95	140	100	125	95	135	95	145	Good----	Very good--	Good----	Very good--	80	95	145	175
90	135	95	120	90	130	85	135	Good----	Very good--	Good----	Very good--	70	85	140	170
85	130	85	110	80	120	70	120	Fair----	Good------	Fair----	Good------	60	70	125	160
85	130	85	110	80	120	75	125	Good----	Very good--	Good----	Very good--	60	75	130	165
------	70	65	110	------	------	------	65	------	------	------	------	70	125	100	180
95	145	100	130	100	140	100	150	Fair----	Good------	Fair----	Good------	85	100	120	170
90	140	95	125	95	135	95	145	Fair----	Good------	Fair----	Good------	80	95	115	165
90	140	95	125	90	130	85	140	Fair----	Good------	Fair----	Good------	80	90	110	160
85	130	85	110	80	120	70	120	Poor----	Good------	Fair----	Good------	60	70	100	150
85	130	85	110	80	120	75	125	Poor----	Good------	Fair----	Good------	60	70	105	155
70	125	65	90	60	90	60	110	Poor----	Good------	Fair----	Good------	50	70	90	125
70	100	65	85	------	------	------	------	Poor----	Poor-------	Poor----	Fair-------	50	60	75	105
80	120	100	125	100	135	95	130	------	------	------	------	80	95	140	170
------	------	40	100	------	------	------	------	------	------	------	------	15	65	50	120
------	------	40	100	------	------	------	------	------	------	------	------	15	65	50	115
------	------	45	100	------	------	------	------	------	------	------	------	20	75	85	120
------	------	40	100	------	------	------	------	------	------	------	------	20	75	80	110
100	150	100	130	100	140	100	150	Good----	Very good--	Good----	Very good--	100	120	150	180
100	150	95	130	100	140	95	145	Good----	Very good--	Good----	Very good--	90	115	145	175
100	150	100	125	95	135	95	145	Good----	Very good--	Good----	Very good--	90	115	145	175
95	145	90	120	90	125	90	140	Good----	Very good--	Good----	Very good--	80	105	140	170
90	140	85	110	80	110	80	130	Good----	Very good--	Good----	Very good--	70	95	130	165
80	130	65	90	45	65	60	100	Fair----	Good------	Fair----	Good------	55	75	110	145
80	130	65	90	60	90	60	100	Fair----	Good------	Fair----	Good------	55	75	110	145
65	110	80	100	75	95	70	90	Fair----	Good------	Fair----	Good------	60	75	90	140
55	95	70	90	65	80	65	80	Fair----	Good------	Fair----	Good------	50	65	80	130
35	80	50	70	45	55	35	45	Poor----	Good------	Poor----	Fair-------	35	45	55	105
45	70	50	70	45	55	40	50	Fair----	Good------	Fair----	Good------	40	55	55	105
25	55	40	60	------	------	------	------	Poor----	Fair-------	Poor----	Fair-------	25	35	35	75
80	125	90	110	75	95	80	100	Fair----	Good------	Fair----	Good------	65	80	100	150
70	115	85	85	70	90	75	95	Fair----	Good------	Fair----	Good------	60	75	95	145
50	95	65	105	55	70	55	75	Fair----	Good------	Fair----	Good------	45	60	70	120

TABLE 1.—*Estimated productivity ratings of soils for*

Soil	Corn (100= 80 bushels [1] per acre)		Wheat (100= 35 bushels per acre)		Winter barley (100= 50 bushels per acre)		Spring oats (100= 45 bushels per acre)	
	A	B	A	B	A	B	A	B
Edgemont silt loam, 8 to 15 percent slopes	65	115	65	85	75	105	85	100
Edgemont silt loam, 8 to 15 percent slopes, moderately eroded	60	110	60	80	70	100	80	95
Edgemont silt loam, 8 to 15 percent slopes, severely eroded	50	90	50	70	60	90	70	85
Edgemont silt loam, 15 to 25 percent slopes, moderately eroded	55	105	55	75	65	95	70	85
Edgemont silt loam, 15 to 25 percent slopes, severely eroded	------	------	45	60	50	70	55	70
Edgemont soils, 25 to 35 percent slopes, moderately eroded	------	------	------	------	------	------	------	------
Edgemont very stony loam, 0 to 8 percent slopes	------	------	------	------	------	------	------	------
Edgemont very stony loam, 8 to 25 percent slopes	------	------	------	------	------	------	------	------
Elioak silt loam, 0 to 3 percent slopes	100	180	100	130	100	120	100	120
Elioak silt loam, 3 to 8 percent slopes	95	175	100	130	100	120	100	120
Elioak silt loam, 3 to 8 percent slopes, moderately eroded	90	165	95	125	95	120	90	110
Elioak silt loam, 8 to 15 percent slopes	90	165	95	125	95	120	90	110
Elioak silt loam, 8 to 15 percent slopes, moderately eroded	80	160	85	120	85	110	80	100
Elioak silt loam, 8 to 15 percent slopes, severely eroded	75	145	75	110	75	100	70	90
Elk silt loam, 0 to 3 percent slopes	100	180	100	130	100	120	100	120
Elk silt loam, 3 to 8 percent slopes, moderately eroded	95	175	95	125	100	120	100	120
Elk silt loam, 8 to 15 percent slopes, moderately eroded	80	160	85	120	85	110	80	100
Glenelg channery silt loam, 3 to 8 percent slopes	80	125	90	120	95	115	95	115
Glenelg channery silt loam, 3 to 8 percent slopes, moderately eroded	75	115	85	115	90	110	85	105
Glenelg channery silt loam, 3 to 8 percent slopes, severely eroded	70	100	75	105	80	105	75	95
Glenelg channery silt loam, 8 to 15 percent slopes	80	120	90	115	90	115	85	105
Glenelg channery silt loam, 8 to 15 percent slopes, moderately eroded	75	115	80	110	80	105	75	95
Glenelg channery silt loam, 8 to 15 percent slopes, severely eroded	60	90	60	90	60	85	60	80
Glenelg channery silt loam, 15 to 25 percent slopes	70	110	80	115	80	105	75	95
Glenelg channery silt loam, 15 to 25 percent slopes, moderately eroded	65	105	70	100	65	90	70	90
Glenelg channery silt loam, 15 to 25 percent slopes, severely eroded	------	------	45	70	40	65	55	70
Glenville silt loam, 0 to 3 percent slopes	85	150	55	70	40	60	55	85
Glenville silt loam, 3 to 8 percent slopes	90	145	65	80	45	65	70	105
Glenville silt loam, 3 to 8 percent slopes, moderately eroded	85	140	55	70	40	60	60	95
Guthrie silt loam	------	75	------	65	------	------	------	------
Hagerstown silt loam, 0 to 3 percent slopes	100	180	100	130	100	120	100	120
Hagerstown silt loam, 0 to 3 percent slopes, moderately eroded	95	175	95	130	95	120	95	115
Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded	90	165	90	125	90	115	90	110
Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded	80	150	75	105	75	105	75	95
Hagerstown silt loam, 15 to 25 percent slopes, moderately eroded	70	140	65	95	65	95	50	70
Hagerstown silty clay, 3 to 8 percent slopes, severely eroded	70	140	75	105	75	105	75	95
Hagerstown silty clay, 8 to 15 percent slopes, severely eroded	60	135	60	90	60	90	50	70
Hagerstown and Duffield silty clay loams, 15 to 25 percent slopes, severely eroded	40	90	50	85	60	80	45	65
Highfield channery silt loam, 3 to 8 percent slopes, moderately eroded	75	140	70	100	90	115	90	110
Highfield channery silt loam, 8 to 15 percent slopes, moderately eroded	70	130	65	95	80	105	85	105
Highfield very stony silt loam, 0 to 8 percent slopes	------	------	------	------	------	------	------	------
Highfield and Catoctin very stony silt loams, 8 to 25 percent slopes	------	------	------	------	------	------	------	------
Huntington silt loam	110	200	------	------	------	------	------	------
Huntington silt loam, local alluvium, 0 to 3 percent slopes	110	200	100	120	95	115	95	110
Huntington silt loam, local alluvium, 3 to 8 percent slopes	105	195	95	115	95	115	95	110
Lamington silt loam	------	70	------	70	------	------	------	------
Lansdale loam, 0 to 3 percent slopes, moderately eroded	75	115	90	110	90	110	85	105
Lansdale loam, 3 to 8 percent slopes, moderately eroded	65	105	75	105	85	105	80	100
Lansdale loam, 3 to 8 percent slopes, severely eroded	55	95	65	95	75	95	65	75
Lansdale loam, 8 to 15 percent slopes, severely eroded	50	85	60	80	60	80	45	65
Lansdale channery loam, 3 to 8 percent slopes, moderately eroded	65	105	70	100	80	100	80	100
Lansdale channery loam, 8 to 15 percent slopes, moderately eroded	60	95	65	95	75	95	65	75
Lansdale channery loam, 8 to 15 percent slopes, severely eroded	50	85	60	80	60	80	45	65
Lansdale channery loam, 15 to 25 percent slopes, moderately eroded	55	90	60	80	60	80	45	65
Lawrence silt loam	30	80	------	60	------	------	------	60
Legore silt loam, 3 to 8 percent slopes, moderately eroded	65	110	70	100	80	100	80	100
Legore silt loam, 3 to 8 percent slopes, severely eroded	45	95	60	90	70	90	65	85
Legore silt loam, 15 to 25 percent slopes, moderately eroded	------	------	60	80	60	80	50	70
Legore clay loam, 8 to 15 percent slopes, severely eroded	------	------	55	80	60	80	50	70
Legore clay loam, 15 to 25 percent slopes, severely eroded	------	------	------	------	------	------	------	------
Legore clay loam, 25 to 35 percent slopes, severely eroded	------	------	------	------	------	------	------	------
Lehigh channery silt loam, 0 to 3 percent slopes	50	85	65	90	30	40	60	90
Lehigh channery silt loam, 3 to 8 percent slopes	50	85	60	90	40	50	60	90
Lehigh channery silt loam, 3 to 8 percent slopes, moderately eroded	45	80	55	85	35	45	55	90
Lehigh channery silt loam, 3 to 8 percent slopes, severely eroded	35	70	45	80	25	40	40	70

See footnotes at end of table.

specified crops under two levels of management—Continued

Alfalfa-grass hay (100=3 tons per acre)		Clover-grass hay (100=2 tons per acre)		Potatoes (100=325 bushels per acre)		Tomatoes (100=12 tons per acre)		Peaches (bushels per tree: very good=6+, good=4 to 6, fair=2 to 4, poor=below 2) [2]		Apples (bushels per tree: very good=30+, good=20 to 30, fair=10 to 20, poor=below 10) [2]		Bluegrass-clover pasture (100=100 cow-acre-days) [3]		Tall grass-legume pasture (100=100 cow-acre-days) [3]	
A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
70	115	80	100	70	90	75	90	Fair	Good	Fair	Good	60	75	95	145
60	105	75	95	60	75	70	85	Fair	Good	Fair	Good	60	75	85	135
40	85	55	75	45	55	40	50	Poor	Good	Fair	Good	35	45	60	110
50	75	65	85	45	55	45	55	Fair	Good	Fair	Good	40	55	60	110
30	55	45	65	------	------	------	------	Poor	Fair	Poor	Fair	25	35	40	80
------	------	------	------	------	------	------	------	Poor	Fair	Poor	Fair	25	35	------	------
------	------	------	------	------	------	------	------	Poor	Fair	Poor	Fair	50	65	------	------
------	------	------	------	------	------	------	------	Poor	Fair	Poor	Fair	50	65	------	------
95	140	100	125	100	140	100	150	Good	Very good	Good	Very good	85	100	150	180
95	140	100	125	95	125	95	145	Good	Very good	Good	Very good	80	95	145	175
90	135	95	120	90	130	85	135	Good	Very good	Good	Very good	70	85	140	170
90	135	95	120	85	125	85	135	Good	Very good	Good	Very good	70	85	140	170
85	130	85	110	80	120	74	125	Good	Very good	Good	Very good	60	75	130	165
75	120	75	100	70	110	55	75	Fair	Good	Fair	Good	45	55	110	140
100	150	100	130	100	140	100	150	------	Good	------	Good	90	110	150	180
100	150	100	125	95	135	95	150	Poor	Fair	Poor	Fair	85	105	145	175
85	130	85	110	80	120	80	125	Fair	Good	Fair	Good	70	90	130	160
90	135	95	120	90	130	90	140	Fair	Good	Fair	Good	75	90	105	155
85	130	90	115	85	125	80	130	Fair	Good	Fair	Good	65	80	100	150
80	120	80	105	75	115	70	115	Poor	Good	Poor	Fair	50	65	90	140
85	130	90	115	80	120	75	125	Fair	Good	Fair	Good	65	80	100	150
80	125	80	105	75	115	70	115	Fair	Good	Fair	Good	55	70	95	145
65	110	65	110	55	95	50	70	Poor	Fair	Poor	Fair	40	50	85	135
70	115	80	105	75	115	70	115	Fair	Good	Fair	Good	55	70	90	140
65	110	65	110	65	95	60	90	Fair	Good	Poor	Fair	40	50	85	135
50	95	50	95	------	------	------	------	Poor	Poor	Poor	Poor	25	40	70	120
------	85	60	100	------	------	55	110	------	------	Poor	Poor	80	100	130	150
------	95	65	105	------	------	65	120	------	------	Poor	Poor	90	110	140	160
------	90	60	100	------	------	60	115	------	------	Poor	Poor	85	105	130	150
------	------	40	100	------	------	------	------	------	------	Poor	------	30	115	80	145
100	150	100	130	90	120	100	150	Good	Very good	Good	Very good	80	120	150	180
95	150	95	125	85	115	95	145	Good	Very good	Good	Very good	70	115	145	175
95	145	90	120	80	110	85	135	Fair	Good	Good	Very good	65	105	145	175
85	135	85	110	70	100	75	120	Fair	Good	Good	Very good	60	95	130	165
80	130	65	90	45	65	45	65	Poor	Fair	Poor	Fair	50	75	110	145
80	130	85	110	55	80	60	100	Poor	Fair	Fair	Good	50	90	125	155
70	125	65	90	40	60	40	60	Poor	Fair	Poor	Fair	40	75	110	145
70	120	55	80	40	70	45	80	Poor	Fair	Poor	Poor	45	65	95	130
85	115	90	120	85	115	90	140	Good	Very good	Good	Very good	70	85	110	145
80	110	80	110	75	105	80	125	Good	Very good	Good	Very good	60	75	105	140
------	------	------	------	------	------	------	------	Fair	Good	Fair	Good	75	100	------	------
------	------	------	------	------	------	------	------	Fair	Good	Fair	Good	75	100	------	------
------	------	100	125	------	------	100	140	------	------	------	------	120	140	150	180
100	150	100	130	75	115	100	140	------	------	------	------	120	140	150	180
100	150	100	130	75	115	100	140	Poor	Fair	Fair	Good	115	135	145	175
------	------	40	100	------	------	------	------	------	------	------	------	30	90	60	120
75	95	95	120	90	130	70	120	Poor	Fair	Poor	Fair	80	110	125	145
70	85	90	115	85	125	60	110	Poor	Fair	Poor	Fair	70	100	115	135
55	75	80	105	70	110	50	100	Poor	Fair	Poor	Fair	60	90	100	120
50	65	65	90	60	85	40	90	------	------	------	------	40	60	90	105
70	85	85	110	85	125	75	125	Poor	Fair	Poor	Fair	70	100	130	150
65	85	75	100	75	115	60	110	Poor	Fair	Poor	Fair	60	90	120	140
50	70	60	85	60	100	40	90	------	------	------	------	45	60	100	120
50	70	60	85	60	100	40	90	------	------	------	------	50	65	100	120
------	------	50	60	------	------	------	------	------	------	------	------	55	95	85	115
85	100	80	105	70	110	75	120	Poor	Fair	Poor	Fair	70	90	85	120
70	95	70	95	55	95	55	105	Poor	Fair	Poor	Fair	60	80	75	110
60	90	55	80	------	------	------	------	Poor	Fair	Poor	Fair	40	50	55	90
60	90	55	80	40	80	40	85	Poor	Poor	Poor	Fair	40	50	55	90
------	------	------	------	------	------	------	------	------	------	Poor	Fair	30	40	45	80
------	------	------	------	------	------	------	------	------	------	------	------	20	35	------	------
------	------	50	75	------	------	15	25	------	------	Poor	Fair	35	55	75	130
------	------	55	80	------	------	20	30	------	------	Poor	Fair	40	60	80	130
------	70	50	75	------	------	20	30	------	------	Poor	Fair	35	55	75	125
------	60	40	70	------	------	15	20	------	------	Poor	Fair	30	50	65	105

TABLE 1.—*Estimated productivity ratings of soils for*

Soil	Corn (100= 80 bushels [1] per acre)		Wheat (100= 35 bushels per acre)		Winter barley (100= 50 bushels per acre)		Spring oats (100= 45 bushels per acre)	
	A	B	A	B	A	B	A	B
Lehigh channery silt loam, 8 to 15 percent slopes	45	75	55	80	30	40	55	85
Lehigh channery silt loam, 8 to 15 percent slopes, moderately eroded	40	70	50	75	25	35	50	85
Lehigh channery silt loam, 8 to 15 percent slopes, severely eroded	25	60	35	60	15	35	35	65
Lehigh channery silt loam, 15 to 25 percent slopes, moderately eroded	------	------	35	60	15	35	45	80
Lehigh channery silt loam, 15 to 25 percent slopes, severely eroded	------	------	25	50	------	------	------	------
Lehigh very stony silt loam, 0 to 8 percent slopes	------	------	------	------	------	------	------	------
Lehigh very stony silt loam, 8 to 25 percent slopes	------	------	------	------	------	------	------	------
Lewisberry sandy loam, 3 to 8 percent slopes	80	120	90	120	90	110	90	110
Lewisberry sandy loam, 3 to 8 percent slopes, moderately eroded	70	110	80	110	80	100	80	100
Lewisberry sandy loam, 8 to 15 percent slopes	75	115	85	115	85	105	85	105
Lewisberry sandy loam, 8 to 15 percent slopes, moderately eroded	65	105	75	95	75	90	75	190
Lewisberry sandy loam, 15 to 25 percent slopes, moderately eroded	55	95	60	85	60	80	60	80
Lewisberry sandy loam, 25 to 45 percent slopes, moderately eroded	------	------	------	------	------	------	------	------
Lewisberry and Lansdale very stony loams, 8 to 25 percent slopes	------	------	------	------	------	------	------	------
Lindside silt loam	85	160	50	100	------	60	50	100
Manor channery loam, 3 to 8 percent slopes	65	110	85	115	90	110	90	110
Manor channery loam, 3 to 8 percent slopes, moderately eroded	60	100	80	110	85	105	85	105
Manor channery loam, 3 to 8 percent slopes, severely eroded	50	90	70	100	75	100	70	90
Manor channery loam, 8 to 15 percent slopes	60	100	85	110	85	110	80	100
Manor channery loam, 8 to 15 percent slopes, moderately eroded	50	90	75	105	75	100	70	85
Manor channery loam, 8 to 15 percent slopes, severely eroded	------	------	65	85	50	75	50	70
Manor channery loam, 15 to 25 percent slopes	------	------	70	100	70	95	65	85
Manor channery loam, 15 to 25 percent slopes, moderately eroded	------	------	60	90	55	80	60	80
Manor channery loam, 15 to 25 percent slopes, severely eroded	------	------	------	------	------	------	------	------
Manor channery loam, 25 to 45 percent slopes	------	------	------	------	------	------	------	------
Manor channery loam, 25 to 45 percent slopes, moderately eroded	------	------	------	------	------	------	------	------
Manor very stony loam, 0 to 8 percent slopes	------	------	------	------	------	------	------	------
Manor very stony loam, 8 to 25 percent slopes, moderately eroded	------	------	------	------	------	------	------	------
Melvin silt loam	------	90	------	60	------	50	------	100
Montalto channery silt loam, 3 to 8 percent slopes, moderately eroded	75	125	90	120	90	115	85	105
Montalto channery silt loam, 8 to 15 percent slopes, moderately eroded	70	115	80	115	85	110	75	95
Montalto channery silt loam, 15 to 25 percent slopes, moderately eroded	60	105	65	100	75	95	65	85
Montalto channery silty clay loam, 8 to 15 percent slopes, severely eroded	50	95	60	95	70	90	60	80
Montalto very stony silt loam, 3 to 8 percent slopes	------	------	------	------	------	------	------	------
Montalto very stony silt loam, 8 to 25 percent slopes	------	------	------	------	------	------	------	------
Mount Lucas silt loam, 0 to 3 percent slopes	65	140	60	90	40	70	65	100
Mount Lucas silt loam, 3 to 8 percent slopes	75	145	65	95	45	75	70	105
Mount Lucas silt loam, 3 to 8 percent slopes, moderately eroded	70	140	60	90	40	70	65	100
Mount Lucas very stony silt loam, 0 to 8 percent slopes	------	------	------	------	------	------	------	------
Murrill gravelly loam, 0 to 3 percent slopes	100	180	100	130	100	120	100	120
Murrill gravelly loam, 3 to 8 percent slopes	95	175	100	130	100	120	100	120
Murrill gravelly loam, 3 to 8 percent slopes, moderately eroded	90	170	95	130	90	115	90	100
Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded	85	150	85	120	85	110	80	100
Murrill gravelly loam, 8 to 15 percent slopes, severely eroded	65	135	75	110	75	95	65	80
Murrill very stony loam, 0 to 8 percent slopes	------	------	------	------	------	------	------	------
Murrill very stony loam, 8 to 25 percent slopes	------	------	------	------	------	------	------	------
Penn silt loam, 0 to 3 percent slopes, moderately eroded	85	125	85	120	75	100	75	105
Penn silt loam, 3 to 8 percent slopes	85	125	85	120	80	105	75	110
Penn silt loam, 3 to 8 percent slopes, moderately eroded	75	115	80	115	70	95	75	105
Penn silt loam, 3 to 8 percent slopes, severely eroded	50	90	65	100	60	85	60	80
Penn silt loam, 8 to 15 percent slopes	70	115	80	115	70	95	70	100
Penn silt loam, 8 to 15 percent slopes, moderately eroded	60	100	65	100	60	85	70	95
Penn silt loam, 8 to 15 percent slopes, severely eroded	45	85	55	90	45	70	55	75
Penn silt loam, 15 to 25 percent slopes	55	100	65	100	60	85	65	85
Penn silt loam, 15 to 25 percent slopes, moderately eroded	45	90	55	90	45	70	60	85
Penn loam, 3 to 8 percent slopes, moderately eroded	70	110	75	110	65	90	75	95
Penn loam, 3 to 8 percent slopes, severely eroded	45	90	60	95	55	80	65	75
Penn loam. 8 to 15 percent slopes, moderately eroded	50	100	60	95	55	80	60	70
Penn loam, 8 to 15 percent slopes, severely eroded	------	80	50	90	40	65	40	60

See footnotes at end of table.

specified crops under two levels of management—Continued

Alfalfa-grass hay (100=3 tons per acre)		Clover-grass hay (100=2 tons per acre)		Potatoes (100=325 bushels per acre)		Tomatoes (100=12 tons per acre)		Peaches (bushels per tree: very good=6+, good=4 to 6, fair=2 to 4, poor=below 2) [2]		Apples (bushels per tree: very good=30+, good=20 to 30, fair=10 to 20, poor=below 10) [2]		Bluegrass-clover pasture (100=100 cow-acre-days) [3]		Tall grass-legume pasture (100=100 cow-acre-days) [3]	
A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
------	70	50	75	------	------	20	30	----------	----------	Poor----	Fair------	35	55	75	120
------	65	45	75	------	------	15	20	----------	----------	Poor----	Fair------	30	50	65	115
------	50	35	70	------	------	------	------	----------	----------	Poor----	Poor------	25	40	45	90
------	60	35	75	------	------	------	------	----------	----------	Poor----	Poor------	25	40	45	80
------	------	------	60	------	------	------	------	----------	----------	----------	----------	20	35	40	70
------	------	------	------	------	------	------	------	----------	----------	Poor----	Fair------	35	60	------	------
------	------	------	------	------	------	------	------	----------	----------	----------	----------	35	60	------	------
75	120	85	115	75	120	70	120	Fair----	Good------	Fair----	Good------	65	85	130	160
60	105	70	100	65	110	60	110	Fair----	Good------	Fair----	Good------	55	70	115	130
70	110	75	105	70	115	65	115	Fair----	Good------	Fair----	Good------	60	80	120	135
55	90	60	90	60	105	55	100	Fair----	Good------	Fair----	Good------	45	65	100	120
45	80	45	75	55	100	50	90	Poor----	Fair------	Poor----	Fair------	40	60	90	110
------	------	------	------	------	------	------	------	----------	----------	----------	----------	------	------	------	------
------	------	------	------	------	------	------	------	Poor----	Fair------	Poor----	Fair------	45	70	------	------
------	85	70	130	------	------	40	75	----------	----------	----------	----------	120	140	120	185
85	130	90	115	85	125	85	135	Fair----	Good------	Fair----	Good------	70	85	105	135
80	100	85	110	80	120	75	125	Fair----	Good------	Fair----	Good------	60	75	100	130
70	95	70	95	70	105	60	105	Fair----	Good------	Fair----	Good------	45	60	95	110
80	105	85	110	75	115	70	120	Fair----	Good------	Fair----	Good------	60	75	100	130
75	100	75	100	65	105	55	95	Fair----	Good------	Fair----	Good------	50	65	95	120
55	90	55	100	------	------	------	------	Poor----	Fair------	Poor----	Fair------	35	45	80	105
60	105	70	110	------	------	------	------	Fair----	Good------	Fair----	Good------	50	65	90	120
55	100	55	100	------	------	------	------	Poor----	Fair------	Poor----	Fair------	35	45	80	105
------	------	------	------	------	------	------	------	----------	----------	----------	----------	20	35	70	90
------	------	------	------	------	------	------	------	----------	----------	----------	----------	35	45	------	------
------	------	------	------	------	------	------	------	----------	----------	----------	----------	20	35	------	------
------	------	------	------	------	------	------	------	Poor----	Fair------	Poor----	Fair------	60	75	------	------
------	------	------	------	------	------	------	------	Poor----	Fair------	Poor----	Fair------	60	75	------	------
------	------	50	120	------	------	------	------	----------	----------	----------	----------	35	75	70	130
85	115	90	120	60	75	75	125	Fair----	Good------	Fair----	Good------	75	100	120	150
80	110	80	110	40	55	65	115	Fair----	Good------	Fair----	Good------	65	90	110	145
70	110	65	95	30	40	45	85	Fair----	Good------	----------	Good------	55	75	100	135
70	100	65	95	25	35	45	85	Poor----	Fair------	Fair----	Good------	60	85	90	130
------	------	------	------	------	------	------	------	Fair----	Good------	----------	Good------	65	90	------	------
------	------	------	------	------	------	------	------	Fair----	Good------	Fair----	Good------	65	90	------	------
45	85	90	120	------	------	50	105	----------	----------	Poor----	Fair------	65	80	110	145
55	90	95	125	40	50	60	115	----------	----------	Poor----	Fair------	70	85	110	150
50	85	90	120	35	45	50	105	----------	----------	Poor----	Fair------	65	80	110	145
------	------	------	------	------	------	------	------	----------	----------	----------	----------	70	85	------	------
100	150	100	130	100	140	100	150	Fair----	Good------	Good---	Very good--	100	120	150	180
100	150	95	125	95	135	95	145	Fair----	Good------	Good---	Very good--	90	115	145	175
95	145	90	120	90	130	85	135	Fair----	Good------	Good---	Very good--	80	105	140	170
90	140	85	115	80	120	75	125	Fair----	Good------	Good---	Very good--	75	95	130	165
80	130	75	105	70	110	65	120	Fair----	Good------	Fair----	Good------	70	90	115	150
------	------	------	------	------	------	------	------	Fair----	Good------	Fair----	Good------	90	110	------	------
------	------	------	------	------	------	------	------	Fair----	Good------	Fair----	Good------	80	100	------	------
65	75	80	110	60	75	80	115	Poor----	Fair------	Poor----	Fair------	80	110	115	145
65	75	80	110	60	75	80	115	Poor----	Fair------	Poor----	Fair------	75	105	115	145
70	100	75	105	55	70	70	100	Poor----	Fair------	Poor----	Fair------	70	100	100	135
65	90	65	95	40	50	55	70	----------	----------	----------	----------	55	85	90	120
70	100	75	105	55	70	75	110	Poor----	Fair------	Poor----	Fair------	70	100	100	135
65	95	65	95	56	60	60	90	Poor----	Fair------	Poor----	Fair------	55	85	95	120
50	75	55	85	20	35	35	50	----------	----------	----------	----------	40	60	80	105
65	90	65	95	46	60	55	85	----------	----------	----------	----------	55	85	90	130
55	85	55	85	35	40	40	70	----------	----------	----------	----------	40	60	80	110
65	90	70	100	60	75	65	95	Poor----	Fair------	Poor----	Fair------	70	100	110	130
50	70	60	90	45	55	50	65	----------	----------	----------	----------	50	70	95	115
60	85	60	90	50	65	55	85	Poor----	Fair------	Poor----	Fair------	60	85	105	115
30	60	50	80	30	45	30	45	----------	----------	----------	----------	45	60	85	100

See footnotes at end of table.

TABLE 1.—*Estimated productivity ratings of soils for*

Soil	Corn (100= 80 bushels [1] per acre)		Wheat (100= 35 bushels per acre)		Winter barley (100= 50 bushels per acre)		Spring oats (100= 45 bushels per acre)	
	A	B	A	B	A	B	A	B
Penn shaly silt loam, 3 to 8 percent slopes, severely eroded	------	------	55	70	40	65	55	75
Penn shaly silt loam, 8 to 15 percent slopes, severely eroded	------	------	45	60	30	55	35	55
Penn shaly silt loam, 15 to 25 percent slopes, severely eroded	------	------	------	------	------	------	------	------
Penn soils, 15 to 25 percent slopes, severely eroded	------	------	45	80	30	55	20	50
Penn soils, 25 to 35 percent slopes, severely eroded	------	------	------	------	------	------	------	------
Penn very stony loam, 0 to 8 percent slopes	------	------	------	------	------	------	------	------
Penn very stony loam, 8 to 25 percent slopes	------	------	------	------	------	------	------	------
Penn-Lansdale loams, 0 to 3 percent slopes	90	160	90	125	80	105	85	105
Penn-Lansdale loams, 3 to 8 percent slopes, moderately eroded	75	110	80	115	70	95	75	95
Penn-Lansdale loams, 3 to 8 percent slopes, severely eroded	55	90	65	100	60	85	65	75
Penn-Lansdale loams, 8 to 15 percent slopes, moderately eroded	55	100	65	100	60	85	60	70
Penn-Lansdale loams, 8 to 15 percent slopes, severely eroded	40	80	55	90	45	70	40	60
Penn-Lansdale loams, 15 to 25 percent slopes, severely eroded	------	------	45	80	30	55	20	50
Penn and Readington shaly silt loams, 3 to 8 percent slopes, moderately eroded	------	45	20	50	------	------	20	45
Penn and Readington shaly silt loams, 3 to 8 percent slopes, severely eroded	------	40	15	35	------	------	15	35
Penn and Readington shaly silt loams, 8 to 15 percent slopes, severely eroded	------	------	------	------	------	------	------	------
Pequea silt loam, 3 to 8 percent slopes, moderately eroded	80	140	90	115	90	110	90	110
Pequea silt loam, 8 to 15 percent slopes, moderately eroded	70	130	85	105	80	100	80	100
Pequea silt loam, 8 to 15 percent slopes, severely eroded	55	100	75	95	70	90	65	85
Pequea silt loam, 15 to 25 percent slopes, severely eroded	------	------	50	70	45	60	40	55
Pequea silt loam, 25 to 35 percent slopes, moderately eroded	------	------	------	------	------	------	------	------
Raritan silt loam, 0 to 3 percent slopes	60	100	55	85	------	------	55	80
Raritan silt loam, 3 to 8 percent slopes, moderately eroded	55	100	55	100	------	80	55	80
Readington silt loam, 0 to 3 percent slopes	75	110	55	100	30	80	55	85
Readington silt loam, 3 to 8 percent slopes	75	100	60	100	40	80	65	90
Readington silt loam, 3 to 8 percent slopes, moderately eroded	70	95	50	90	30	70	55	85
Rowland silt loam	75	105	60	90	------	50	45	90
Sciotoville silt loam, 0 to 3 percent slopes	80	160	60	85	30	40	35	45
Sciotoville silt loam, 3 to 8 percent slopes	70	150	55	75	40	50	50	55
Steinsburg channery loam, 8 to 15 percent slopes, severely eroded	------	------	35	55	35	55	50	70
Steinsburg channery loam, 15 to 25 percent slopes, severely eroded	------	------	------	------	------	------	------	------
Steinsburg channery loam, 25 to 35 percent slopes, moderately eroded	------	------	------	------	------	------	------	------
Steinsburg channery loam, 25 to 35 percent slopes, severely eroded	------	------	------	------	------	------	------	------
Watchung silt loam, 0 to 3 percent slopes	------	50	------	80	------	------	------	------
Watchung silt loam, 3 to 5 percent slopes	------	55	------	100	------	------	------	------
Watchung very stony silt loam, 0 to 8 percent slopes	------	------	------	------	------	------	------	------
Wehadkee silt loam	------	90	------	60	------	50	------	------
Wehadkee silt loam, local alluvium, 3 to 8 percent slopes	------	90	------	60	------	50	------	100
Wheeling silt loam, 3 to 8 percent slopes, moderately eroded	95	170	92	125	95	120	95	120
Wheeling silt loam, 8 to 15 percent slopes, moderately eroded	85	155	85	120	85	110	80	100
Whiteford silt loam, 3 to 8 percent slopes, moderately eroded	90	140	80	120	90	115	85	105
Whiteford silt loam, 8 to 15 percent slopes, moderately eroded	80	130	70	110	80	105	75	95
Wickham silt loam, 0 to 3 percent slopes	100	180	100	130	100	120	100	120
Wickham silt loam, 3 to 8 percent slopes, moderately eroded	90	170	90	120	90	110	90	110
Worsham silt loam	------	55	------	------	------	------	------	------

[1] If corn is used for silage, the standard yield is 14 tons per acre.

[2] Based on trees that are 7 to 18 years old.

specified crops under two levels of management—Continued

Alfalfa-grass hay (100=3 tons per acre)		Clover-grass hay (100=2 tons per acre)		Potatoes (100=325 bushels per acre)		Tomatoes (100=12 tons per acre)		Peaches (bushels per tree: very good=6+, good=4 to 6, fair=2 to 4, poor=below 2) [2]		Apples (bushels per tree: very good=30+, good=20 to 30, fair=10 to 20, poor=below 10) [2]		Bluegrass-clover pasture (100=100 cow-acre-days) [3]		Tall grass-legume pasture (100=100 cow-acre-days) [3]	
A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
------	------	55	75	40	50	30	45	------	------	------	------	20	55	50	75
------	------	45	65	25	40	20	30	------	------	------	------	35	45	40	60
------	------	------	------	------	------	------	------	------	------	------	------	20	25	20	40
------	------	35	65	------	------	------	------	------	------	------	------	25	40	65	75
------	------	------	------	------	------	------	------	------	------	------	------	20	30	------	------
------	------	------	------	------	------	------	------	------	------	------	------	60	80	------	------
------	------	------	------	------	------	------	------	------	------	------	------	35	45	------	------
70	80	85	115	70	85	80	115	Poor----	Fair------	Poor----	Fair------	80	110	130	150
60	70	75	105	60	75	70	115	Poor----	Fair------	Poor----	Fair------	70	100	115	135
45	55	65	95	45	55	55	70	Poor----	Fair------	Poor----	Fair------	55	85	100	120
50	60	65	95	50	65	60	90	Poor----	Fair------	Poor----	Fair------	55	85	100	120
30	40	55	85	30	45	35	50	------	------	------	------	40	60	90	105
------	------	35	65	------	------	------	------	------	------	------	------	25	40	65	75
------	------	45	65	------	------	------	------	Poor----	Poor------	Poor----	Poor------	30	45	70	95
------	------	35	55	------	------	------	------	Poor----	Poor------	Poor----	Poor------	20	35	50	75
------	------	20	45	------	------	------	------	Poor----	Poor------	Poor----	Poor------	15	30	40	65
90	140	85	115	75	85	70	80	Fair----	Good------	Fair----	Good------	70	95	120	145
80	125	75	105	70	80	60	70	Fair----	Good------	Fair----	Good------	60	85	110	135
65	115	40	70	55	65	40	55	Poor----	Fair------	Poor----	Poor------	50	70	100	125
45	100	40	70	35	50	30	45	Poor----	Poor------	Poor----	Poor------	30	50	80	105
------	------	------	------	------	------	------	------	------	------	------	------	30	50	------	------
------	------	75	100	------	------	50	105	------	------	------	------	50	90	85	115
------	------	75	100	------	------	------	------	------	------	------	------	50	90	85	115
35	65	75	125	------	------	50	90	------	------	Poor----	Fair------	60	75	120	140
40	65	70	125	------	------	60	100	------	------	Poor----	Fair------	65	80	125	145
35	60	65	85	------	------	55	95	------	------	Poor----	Fair------	60	75	110	130
------	------	70	115	------	------	40	75	------	------	------	------	90	110	110	140
30	45	65	85	------	------	50	105	------	------	------	------	65	80	125	145
40	55	70	90	------	------	60	115	------	------	Poor----	Fair------	70	85	130	150
45	80	55	75	------	------	------	------	------	------	------	------	30	45	70	95
------	------	------	------	------	------	------	------	------	------	------	------	20	30	50	75
------	------	------	------	------	------	------	------	------	------	------	------	20	30	50	75
------	------	------	------	------	------	------	------	------	------	------	------	15	25	------	------
------	------	60	70	------	------	------	------	------	------	------	------	40	55	30	130
------	------	65	75	------	------	------	------	------	------	------	------	45	75	60	130
------	------	------	------	------	------	------	------	------	------	------	------	40	55	------	------
------	------	35	120	------	------	------	------	------	------	------	------	35	90	50	125
------	------	45	130	------	------	------	------	------	------	------	------	40	95	55	130
90	140	100	130	90	130	95	140	Fair----	Good------	Fair----	Good------	65	85	140	170
80	125	85	110	85	125	85	130	Fair----	Good------	Fair----	Good------	55	75	130	160
80	125	85	110	85	125	95	140	Fair----	Good------	Fair----	Good------	60	80	135	165
70	115	75	100	75	115	80	120	Fair----	Good------	Fair----	Good------	50	70	125	155
90	140	100	130	100	140	100	150	Fair----	Good------	Fair----	Good------	80	100	150	180
80	130	90	120	90	130	95	140	Fair----	Good------	Fair----	Good------	65	85	135	165
------	------	------	75	------	------	------	------	------	------	------	------	35	80	60	120

[3] The number of days 1 acre will graze 1 cow, steer, or horse, 5 hogs, or 7 sheep without injury to the pasture.

Woodland [1]

Dense forest covered all of the county at the time that settlement began. Clearing land for farming and cutting timber for commercial purposes have eliminated the virgin stands. At present, 25 percent of the county is woodland, all of it second and third growth. Much of the present woodland occurs as rather large tracts on the very stony phases of the Manor, Montalto, Penn, and Edgemont soils. In addition, most farms have woodlots, ordinarily on the steeper slopes. Approximately 46 percent of the existing commercial woodland consists of sawtimber. The rest consists of seedlings, saplings, and poletimber.

The six principal forest types (*10*) [2] in the existing woodland of York County and the approximate extent of each (*13*) in relation to the total area of woodland are as follows:

	Percentage of total woodland in the county
Northern red oak	57
Northern red oak predominates; associates are black oak, scarlet oak, chestnut oak, and yellow-poplar.	
Chestnut oak	19
Chestnut oak predominates; common associates are scarlet oak, white oak, black oak, pitch pine, blackgum, and red maple; occasional associates are white pine, red oak, and Virginia pine.	
Yellow-poplar	10
Yellow-poplar predominates; associates are black locust, red maple, sweet birch, northern red oak, cucumbertree, sweetgum, and other moist-site species.	
Pitch pine and Virginia pine	8
In the pitch pine type, the chief associates are chestnut oak and scarlet oak. In the Virginia pine type, the chief associates are chestnut oak, black oak, white oak, red maple, and blackgum; pitch pine may also be present.	
White oak	6
White oak predominates; associates are black oak, northern red oak, bur oak, shagbark hickory, bitternut hickory, white ash, bigtooth aspen, and yellow-poplar.	

At present, there are in the county extensive stands of chestnut oak and pitch pine on soils that would support red oak and yellow-poplar, which have greater commercial value. Good woodland management can change the composition of a stand so that the more desirable species will predominate. The soils and the climate are favorable, and technical assistance is available. How much effort landowners are willing to make toward improving their woodland depends largely on general economic conditions and the extent of urban development. Good markets for pulpwood at Spring Grove and at York encourage the improvement of existing woodland and the development of new areas.

Table 2 gives data obtained in studies of rates of tree growth on 28 plots representing 5 extensive soils of York County. Of primary interest is the Schnur oak site index for each of the plots. This index (*9*) is based on the average height of a normal 50-year-old stand. By using this index, a forester can calculate the volume of timber that a normal stand will yield at a given age.

As an aid in planning woodland management, the soils of the county have been grouped according to similarity in the characteristics that affect the production of timber.

Table 3 gives, for each of the 29 woodland groups, a rating of potential productivity, a list of the species best suited to the soils of the group, and ratings for the principal hazards that affect the production of timber.

The ratings in table 3 are estimates based on data presented in table 2 and also on similar data obtained in recent studies in Chester County, Pa., where some of the soils are the same as in York County and climate and topography are similar.

Potential productivity is based on the site index for oak (excluding pin oak, for which the site-growth relationship is different). A rating of F1 indicates that the soils are excellent for production of timber; the site index for oak is 75 or better, and the expected yield is 13,750 board feet per acre (*9*) when a stand is 50 years old. A rating of F2 indicates that the soils are good for production of timber; the site index for oak is 65 to 74, and the expected yield is 9,750 board feet per acre when a stand is 50 years of age. A rating of F3 indicates that the soils are fairly good for production of timber; the site index for oak is 55 to 64, and the expected yield is 6,300 board feet per acre when a stand is 50 years of age. A rating of F4 indicates that the soils are poor for production of timber; the site index for oak is 54 or less, and the expected yield is less than 3,250 board feet per acre when a stand is 50 years of age.

Species priority shows which of the native species should be encouraged and what species should be selected for planting.

Seedling mortality refers to loss of planted stock resulting from unfavorable characteristics of the soil.

Plant competition refers to the rate at which brush, grass, and undesirable trees are likely to invade a given site.

Equipment limitation indicates the degree to which soil characteristics and topography restrict or prohibit the operation of equipment commonly used in planting, tending, or harvesting trees. In this county the limitations result chiefly from steep slopes, stones and boulders on the surface, and poor drainage.

Erosion hazard refers to potential erosion when the soils are managed according to currently acceptable standards.

Windthrow hazard represents an evaluation of the factors that control the development of tree roots and, consequently, the likelihood that trees will be uprooted by wind.

Each of the last five of these factors is rated as slight, moderate, or severe, to indicate the degree to which each affects the production of timber. As an example, a rating of *slight* for seedling mortality indicates that no more than 25 percent of planted seedlings are likely to die; that satisfactory restocking from the initial planting can be expected; and that adequate restocking would ordinarily result from natural regeneration. A rating of *moderate* indicates that between 25 and 50 percent of planted seedlings are likely to die; that some replanting is ordinarily needed; and that natural regeneration cannot always be relied upon for adequate and immediate restocking. A rating of *severe* indicates that more than 50 percent of planted seedlings are likely to die; that considerable replanting, special preparation of seedbeds, and superior planting techniques are necessary for adequate and immediate restocking; and that restocking cannot be expected to result from natural regeneration.

The ratings in table 3 are generalized for the groups. Exceptions to the generalized ratings are explained in the

[1] Prepared by VERNAL C. MILES, woodland specialist, in consultation with technicians of the Pennsylvania Department of Forests and Waters.

[2] Italic numbers in parentheses refer to Literature Cited, p. 153.

TABLE 2.—*Plot data and site indexes for mixed oak*

Soil type and plot number	Slope	Position on slope	Aspect	Average age of trees	Average height of trees	Schnur site index (*9*)	Average site index	Woodland site class
	Pct.			*Yr.*	*Ft.*			
Lewisberry sandy loam							65	F2
Plot no. 1	12	Middle	NE.	60	72	64		
Plot no. 2	6	Not significant	NW.	51	66	65		
Plot no. 3	10	Upper	SE.	46	68	73		
Plot no. 4	25	Lower	W.	55	66	63		
Plot no. 5	9–18	Lower	NW.	64	69	60		
Brecknock very stony silt loam							60	F3
Plot no. 6	20	Upper	NW.	106	66	48		
Plot no. 7	55	Upper	SW.	51	63	62		
Plot no. 8	20	Upper	SW.	46	75	80		
Plot no. 9	10	Middle	NE.	49	64	64		
Plot no. 10	15	Upper	SE.	60	62	55		
Plot no. 11	15	Upper	NW.	58	60	55		
Edgemont very stony loam							73	F2
Plot no. 12	9	Upper	S.	53	92	87		
Plot no. 13	12	Upper	NW.	48	64	66		
Plot no. 14	9	Lower	NE.	55	70	67		
Plot no. 15	12	Upper	SE.	56	73	69		
Plot no. 16	55	Middle	SW.	50	88	88		
Plot no. 17	10	Not significant	SE.	60	67	62		
Penn very stony loam							64	F3
Plot no. 18	22	Middle	N.	70	77	65		
Plot no. 19	8	Upper	W.	64	80	60		
Plot no. 20	8	Upper	SW.	65	71	61		
Plot no. 21	25	Middle	SW.	58	76	70		
Plot no. 22	40	Upper	NW.	68	75	64		
Plot no. 23	26	Upper	NE.	68	64	54		
Montalto very stony silt loam							72	F2
Plot no. 24	8	Not significant	NW.	53	86	83		
Plot no. 25	10	Middle	SW.	55	73	69		
Plot no. 26	5	Not significant	SE.	43	73	77		
Plot no. 27	8	Lower	NE.	53	66	64		
Plot no. 28	10	Upper	NW.	47	70	71		

narrative descriptions of the individual groups, which follow the table.

Woodland group 1

This group consists of deep and moderately deep, well-drained, medium-textured soils that have slopes of 0 to 8 percent. These soils are on uplands, terraces, and flood plains. They formed from material derived from schist, sandstone, shale, slate, and conglomerate. Also included in the group is some Made land derived from similar materials.

The soils in this group are—

Arendtsville gravelly loam, 3 to 8 percent slopes, moderately eroded.
Arendtsville very stony loam, 0 to 8 percent slopes.
Bermudian silt loam, 0 to 3 percent slopes.
Bermudian silt loam, high bottom, 0 to 3 percent slopes.
Bermudian silt loam, high bottom, 3 to 8 percent slopes.
Birdsboro silt loam, 0 to 3 percent slopes.
Birdsboro silt loam, 3 to 8 percent slopes, moderately eroded.
Chester silt loam, 0 to 3 percent slopes.
Chester silt loam, 0 to 3 percent slopes, moderately eroded.
Chester silt loam, 3 to 8 percent slopes.
Chester silt loam, 3 to 8 percent slopes, moderately eroded.
Congaree silt loam.
Edgemont channery loam, 3 to 8 percent slopes, moderately eroded.
Edgemont silt loam, 3 to 8 percent slopes.
Edgemont silt loam, 3 to 8 percent slopes, moderately eroded.
Edgemont very stony loam, 0 to 8 percent slopes.
Elioak silt loam, 0 to 3 percent slopes.
Elioak silt loam, 3 to 8 percent slopes.
Elioak silt loam, 3 to 8 percent slopes, moderately eroded.
Glenelg channery silt loam, 3 to 8 percent slopes.
Glenelg channery silt loam, 3 to 8 percent slopes, moderately eroded.
Highfield channery silt loam, 3 to 8 percent slopes, moderately eroded.
Highfield very stony silt loam, 0 to 8 percent slopes.
Lansdale channery loam, 3 to 8 percent slopes, moderately eroded.
Lansdale loam, 0 to 3 percent slopes, moderately eroded.
Lansdale loam, 3 to 8 percent slopes, moderately eroded.
Lewisberry sandy loam, 3 to 8 percent slopes.
Made land, Penn and Lansdale materials, gently sloping.
Made land, Wheeling and Sciotoville materials.
Wheeling silt loam, 3 to 8 percent slopes, moderately eroded.
Whiteford silt loam, 3 to 8 percent slopes, moderately eroded.
Wickham silt loam, 0 to 3 percent slopes.
Wickham silt loam, 3 to 8 percent slopes, moderately eroded.

The nonstony soils in this group are excellent for timber production, and the very stony ones are good. Seedling mortality is no special problem. Competition from brush, grass, and undesirable tree species is moderate on the very stony soils and severe on all others in this group. Equipment limitations are moderate on the very stony soils and slight on all others. The erosion hazard is slight, except for those soils designated as moderately eroded. The windthrow hazard is slight.

Bermudian silt loam, 0 to 3 percent slopes, and Chester silt loam, 3 to 8 percent slopes, moderately eroded, are subject to overflow, usually 12 hours or less in duration. The two high-bottom Bermudian soils are subject to very infrequent overflow.

TABLE 3.—*Interpretations for woodland management*

[See text, p. 28, for explanation of ratings]

Woodland group: description [1] and map symbols	Potential productivity	Species priority		Seedling mortality	Plant competition	Equipment limitation	Erosion hazard	Windthrow hazard
		Native trees	Planted trees					
Group 1.—Deep and moderately deep, well-drained, acid soils; 0 to 8 percent slopes. AgB2, ArB, BeA, BhA, BhB, BmA, BmB2, ChA, ChA2, ChB, ChB2, Cp, EcB2, EdB, EdB2, EhB, EkA, EkB, EkB2, GcB, GcB2, HfB2, HgB, LcB2, LdA2, LdB2, LmB, MdB, Me, WgB2, WhB2, WkA, WkB2.	F1	Yellow-poplar, red oak, white oak.	White pine, Norway spruce, larch.	Slight	Severe	Slight	Slight	Slight.
Group 2.—Deep and moderately deep, well-drained, slightly acid to neutral soils; 0 to 8 percent slopes. AbA, AbB, AtA, AtB2, CoA, CoA2, CoB2, DuA, DuA2, DuB, DuB2, EIA, EIB2, HaA, HaA2, HaB2, Hn, HuA, HuB, Ma, MnB2, MtB, MwA, MwB, MwB2, MxB.	F1	Yellow-poplar, red oak, white oak.	White pine, Austrian pine.	Slight	Severe	Slight	Slight	Slight.
Group 3.—Moderately deep and deep, well-drained, severely eroded, acid soils; 3 to 8 percent slopes. ChB3, EdB3, GcB3, LdB3, LmB2.	F2	Yellow-poplar, red oak, white oak.	White pine, Norway spruce, larch.	Moderate	Moderate	Moderate	Moderate	Moderate.
Group 4.—Moderately deep and deep, well-drained, severely eroded, slightly acid to neutral soils; 3 to 8 percent slopes. CoB3, HcB3.	F2	Yellow-poplar, red oak, white oak.	White oak, Austrian pine.	Moderate	Moderate	Moderate	Severe	Slight.
Group 5.—Deep and moderately deep, well-drained, acid soils; 8 to 25 percent slopes. AgC2, ArD, BmC2, ChC2, EcC2, EcD2, EdC, EdC2, EdD2, EhD, EkC, EkC2, GcC, GcC2, GcD, GcD2, HfC2, HhD, LcC2, LcD2, LmC, LmD2, LnD, MdD, WgC2, WhC2.	F1	Yellow-poplar, red oak, white oak.	Larch, white pine, Norway spruce, Austrian pine.	Slight	Moderate	Moderate	Moderate	Slight.
Group 6.—Deep and moderately deep, well-drained, slightly acid to neutral soils; 8 to 25 percent slopes. AtC2, AtD2, CoC2, DuC2, DuD2, EIC2, HaC2, HaD2, MnC2, MnD2, MsD, MtD, MwC2, MxD.	F1	Yellow-poplar, red oak, white oak.	White pine, Austrian pine.	Slight	Severe	Slight	Moderate	Slight.
Group 7.—Moderately deep and deep, well-drained, severely eroded, acid soils; 8 to 25 percent slopes. AgD3, EcC3, EcD3, EdC3, EdD3, EkC3, GcC3, GcD3, LcC3, LdC3, LmC2.	F2	Yellow-poplar, white oak, red oak.	White pine, larch, Norway spruce, Austrian pine.	Moderate	Slight	Severe	Severe	Slight.
Group 8.—Moderately deep and deep, well-drained, medium-textured to moderately fine textured, slightly acid to neutral, severely eroded soils; 8 to 25 percent slopes. AtC3, AtD3, CoC3, CoD3, DyC3, HcC3, HdD3 MoC3, MwC3.	F2	Red oak, white oak, yellow-poplar.	Austrian pine, white pine.	Moderate	Moderate	Moderate	Severe	Slight.

Group 9.—Deep and moderately deep, well-drained, acid soils; 25+ percent slopes. EgE2, EhF, LrF.	F2	Yellow-poplar, red oak, white oak.	White pine, larch, Austrian pine, Norway spruce.	Moderate	Moderate	Severe	Moderate	Slight.
Group 10.—Deep and moderately deep, well-drained, slightly acid to neutral soils; 25+ percent slopes. AtE2, MsF, MtF.	F2	Red oak, white oak, yellow-poplar.	White pine, Austrian pine.	Moderate	Moderate	Severe	Moderate	Slight.
Group 11.—Deep, moderately well drained, acid soils; 0 to 8 percent slopes. AaA, AaB2, Ck, GnA, GnB, GnB2, LhB, LhB2, LhB3, LlB, RaA, RaB2, RdA, RdB, RdB2, Ro, ScA, ScB.	F2	Yellow-poplar, red oak, white oak.	Larch, white pine, Norway spruce, Austrian pine.	Slight	Severe	Moderate	Slight	Slight.
Group 12.—Deep, moderately well drained, slightly acid to neutral soils; 0 to 8 percent slopes. BdA, BdB2, BdB3, Ls, MuB, MuB2, MvB.	F2	Red oak, white oak, yellow-poplar.	Austrian pine, white pine.	Slight	Severe	Moderate	Slight	Slight.
Group 13.—Shallow to moderately deep, moderately well drained soils; 8 to 25 percent slopes. BdC2, BdC3, LhC, LhC2, LhD2, LlD.	F4	White pine, white ash, red oak, pin oak.	White pine, larch, Norway spruce, Austrian pine.	Moderate	Moderate	Moderate	Moderate	Moderate.
Group 14.—Shallow, moderately well drained, severely eroded soils; 8 to 25 percent slopes. LhC3, LhE3, PrC3.	F4	White pine, white oak, red oak, pin oak.	White pine, Norway spruce, larch, Austrian pine.	Severe	Slight	Moderate	Severe	Moderate.
Group 15.—Shallow to very shallow, somewhat poorly drained, acid soils; 0 to 8 percent slopes. LhA, PrB2, PrB3.	F3	Pin oak, red maple.	White spruce, white pine.	Moderate	Moderate	Moderate	Moderate	Severe.
Group 16.—Shallow to very shallow, somewhat poorly drained, slightly acid to neutral soils; 0 to 8 percent slopes. Le, MuA.	F4	Pin oak, red maple.	White pine	Moderate	Moderate	Moderate	Slight	Severe.
Group 17.—Deep, poorly drained, acid soils; 0 to 8 percent slopes. Bn, Bo, CrA, CrA2, CrB, CrB2, CvB, La, Wd, We, Wo.	F4	Pin oak, red maple.	White pine, white spruce.	Severe	Moderate	Severe	Slight	Severe.
Group 18.—Deep, poorly drained, slightly acid to neutral soils; 0 to 8 percent slopes. Gu, Mm, WaA, WaB, WcB.	F4	Pin oak, red maple.	White pine	Severe	Severe	Severe	Slight	Severe.
Group 19.—Shallow, well-drained, acid soils; 0 to 8 percent slopes. CaB2, MfB, MfB2, MgB, PeB2, PgA2, PgB, PgB2, PmB, PnA, PnB2.	F2	White pine, red oak.	White pine, Virginia pine.	Moderate	Moderate	Slight	Moderate	Slight.
Group 20.—Shallow, well-drained, slightly acid to neutral soils; 0 to 8 percent slopes. BrB2, LgB2, LgB3, PsB2.	F2	White pine, red oak.	White pine, Virginia pine.	Moderate	Moderate	Slight	Moderate	Moderate.
Group 21.—Shallow to very shallow, severely eroded, well-drained soils; 3 to 8 percent slopes. CcB3, MfB3, PeB3, PfB3, PgB3, PnB3.	F3	White pine, red oak.	White pine, Virginia pine.	Severe	Slight	Slight	Severe	Moderate.

See footnote at end of table.

TABLE 3.—*Interpretations for woodland management*—Continued

[See text, p. 28, for explanation of ratings]

Woodland group: description [1] and map symbols	Potential productivity	Species priority		Seedling mortality	Plant competition	Equipment limitation	Erosion hazard	Windthrow hazard
		Native trees	Planted trees					
Group 22.—Shallow, well-drained, acid soils; 8 to 25 percent slopes. CaC2, CaD2, MfC, MfC2, MfD, MfD2, MgD2, PeC2, PgC, PgC2, PgD, PgD2, PmD, PnC2.	F2	White pine, red oak.	White pine, Virginia pine.	Moderate	Moderate	Moderate	Moderate	Moderate.
Group 23.—Shallow, well-drained, slightly acid to neutral soils; 8 to 25 percent slopes. BrC, BrC2, BrD, BrD2, BvD, LgD2, PsC2.	F3	White pine, red oak.	White pine, Virginia pine.	Slight	Moderate	Moderate	Moderate	Slight.
Group 24.—Shallow and very shallow, severely eroded, acid soils; 8 to 25 percent slopes. CaC3, CaD3, CcC3, CcD3, MfC3, MfD3, PeC3, PfC3, PfD3, PhD3, PgC3, PnC3, PnD3, SsC3, SsD3.	F3	Virginia pine	Virginia pine, white pine.	Severe	Slight	Moderate	Severe	Moderate.
Group 25.—Shallow and very shallow, severely eroded, slightly acid to neutral soils; 8 to 25 percent slopes. BrC3, BrD3, LfC3, LfD3, PsC3, PsD3.	F4	Virginia pine	White pine, Virginia pine.	Severe	Slight	Moderate	Severe	Moderate.
Group 26.—Shallow, well-drained, acid soils; 25 to 75 percent slopes. LmE2, MfE, MfE2, MfF, MgF2, PmF, SsE2.	F3	Red oak, black oak, Virginia pine, pitch pine.	White pine, Virginia pine, Austrian pine.	Severe	Slight	Severe	Severe	Moderate.
Group 27.—Shallow, well-drained, slightly acid to neutral soils; 25 to 65 percent slopes. BrE2, BvF, PsE2.	F3	White pine, red oak.	White pine, Virginia pine.	Moderate	Moderate	Severe	Severe	Moderate.
Group 28.—Shallow, severely eroded, well-drained, acid soils; 25 to 75 percent slopes. CaE3, MfE3, PhE3, PhF3, SsE3.	F4	Virginia pine	White pine, Virginia pine.	Severe	Slight	Severe	Severe	Severe.
Group 29.—Shallow, severely eroded, well-drained soils over diabase; 25 to 35 percent slopes. LfE3.	F4	Virginia pine	White pine, Virginia pine.	Severe	Slight	Severe	Severe	Severe.

[1] Soils are medium textured unless otherwise described.

Woodland group 2

This group consists of deep and moderately deep, well-drained, medium-textured soils that have slopes of 0 to 8 percent. These soils are on uplands, terraces, and flood plains. They formed from material derived from limestone, diabase, and calcareous schist.

The soils in this group are—

Ashton loam, 0 to 3 percent slopes.
Ashton loam, 3 to 8 percent slopes.
Athol loam and silt loam, 0 to 3 percent slopes.
Athol loam and silt loam, 3 to 8 percent slopes, moderately eroded.
Conestoga silt loam, 0 to 3 percent slopes.
Conestoga silt loam, 0 to 3 percent slopes, moderately eroded.
Conestoga silt loam, 3 to 8 percent slopes, moderately eroded.
Duffield silt loam, 0 to 3 percent slopes.
Duffield silt loam, 0 to 3 percent slopes, moderately eroded.
Duffield silt loam, 3 to 8 percent slopes.
Duffield silt loam, 3 to 8 percent slopes, moderately eroded.
Elk silt loam, 0 to 3 percent slopes.
Elk silt loam, 3 to 8 percent slopes, moderately eroded.
Hagerstown silt loam, 0 to 3 percent slopes.
Hagerstown silt loam, 0 to 3 percent slopes, moderately eroded.
Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded.
Huntington silt loam.
Huntington silt loam, local alluvium, 0 to 3 percent slopes.
Huntington silt loam, local alluvium, 3 to 8 percent slopes.
Made land, Duffield and Conestoga materials.
Montalto channery silt loam, 3 to 8 percent slopes, moderately eroded.
Montalto very stony silt loam, 3 to 8 percent slopes.
Murrill gravelly loam, 0 to 3 percent slopes.
Murrill gravelly loam, 3 to 8 percent slopes.
Murrill gravelly loam, 3 to 8 percent slopes, moderately eroded.
Murrill very stony loam, 0 to 8 percent slopes.

In general, these soils are excellent for timber production. The very stony Montalto soil and the very stony Murrill soil, however, are exceptions to the ratings given in table 3. These two soils are rated F2 for potential productivity and moderate for both seedling mortality and plant competition. For the moderately eroded soils in the group, the erosion hazard is moderate rather than slight.

Huntington silt loam is subject to overflow, usually 12 hours or less in duration. The Huntington silt loams, local alluvium, and the Ashton loams are subject to very infrequent overflow.

Woodland group 3

This group consists of moderately deep and deep, severely eroded. well-drained, medium-textured soils that have slopes of 3 to 8 percent. These soils are on uplands. They formed from material derived from sandstone and schist.

The soils in this group are—

Chester silt loam, 3 to 8 percent slopes, severely eroded.
Edgemont silt loam, 3 to 8 percent slopes, severely eroded.
Glenelg channery silt loam, 3 to 8 percent slopes, severely eroded.
Lansdale loam, 3 to 8 percent slopes, severely eroded.
Lewisberry sandy loam, 3 to 8 percent slopes, moderately eroded.

These soils are rated good for timber production. The only exception to the ratings given in table 3 is that for the Edgemont and Lewisberry soils the windthrow hazard is only slight instead of moderate.

Woodland group 4

This group consists of moderately deep and deep, severely eroded, well-drained, medium-textured soils that have slopes of 3 to 8 percent. These soils are on uplands. They formed from material derived from calcareous schist and limestone.

The soils in this group are—

Conestoga silt loam, 3 to 8 percent slopes, severely eroded.
Hagerstown silty clay, 3 to 8 percent slopes, severely eroded.

These are good soils for timber production, although the erosion hazard is severe. The ratings in table 3 apply to both soils.

Woodland group 5

This group consists of deep and moderately deep, well-drained, medium-textured soils that have slopes of 8 to 25 percent. These soils are on uplands and terraces. They formed from material derived from schist, sandstone, shale, slate, and conglomerate. Also included in this group is Made land derived from similar materials.

The soils in this group are—

Arendtsville gravelly loam, 8 to 15 percent slopes, moderately eroded.
Arendtsville very stony loam, 8 to 25 percent slopes.
Birdsboro silt loam, 8 to 15 percent slopes, moderately eroded.
Chester silt loam, 8 to 15 percent slopes, moderately eroded.
Edgemont channery loam, 8 to 15 percent slopes, moderately eroded.
Edgemont channery loam, 15 to 25 percent slopes, moderately eroded.
Edgemont silt loam, 8 to 15 percent slopes.
Edgemont silt loam, 8 to 15 percent slopes, moderately eroded.
Edgemont silt loam, 15 to 25 percent slopes, moderately eroded.
Edgemont very stony loam, 8 to 25 percent slopes.
Elioak silt loam, 8 to 15 percent slopes.
Elioak silt loam, 8 to 15 percent slopes, moderately eroded.
Glenelg channery silt loam, 8 to 15 percent slopes.
Glenelg channery silt loam, 8 to 15 percent slopes, moderately eroded.
Glenelg channery silt loam, 15 to 25 percent slopes.
Glenelg channery silt loam, 15 to 25 percent slopes, moderately eroded.
Highfield channery silt loam, 8 to 15 percent slopes, moderately eroded.
Highfield and Catoctin very stony silt loams, 8 to 25 percent slopes.
Lansdale channery loam, 8 to 15 percent slopes, moderately eroded.
Lansdale channery loam, 15 to 25 percent slopes, moderately eroded.
Lewisberry sandy loam, 8 to 15 percent slopes.
Lewisberry sandy loam, 15 to 25 percent slopes, moderately eroded.
Lewisberry and Lansdale very stony loams, 8 to 25 percent slopes.
Made land, Penn and Lansdale materials, strongly sloping.
Wheeling silt loam, 8 to 15 percent slopes, moderately eroded.
Whiteford silt loam, 8 to 15 percent slopes, moderately eroded.

In general, these soils are excellent for timber production. The rating is good instead of excellent, however, for the very stony Edgemont, Lewisberry, and Lansdale soils; the nonstony Lansdale and Lewisberry soils that have slopes of 15 percent or more; and the Whiteford soil. Seedling mortality is moderate on the very stony Arendtsville, Edgemont, Lewisberry, and Lansdale soils and on the moderately eroded soils that have slopes of 15 percent or more. Plant competition is slight on the moderately eroded Glenelg, Lansdale, and Lewisberry soils that have slopes of 15 percent or more. The equipment limitation is severe instead of moderate on all the very stony soils. For the very stony soils, the erosion hazard is slight, and for the moderately eroded soils that have slopes of more than 15 percent, it is severe. The windthrow hazard is moderate instead of slight for the moderately eroded

Glenelg and Lansdale soils that have slopes of 15 percent or more.

Woodland group 6

This group consists of deep and moderately deep, well-drained, medium-textured soils that have slopes of 8 to 25 percent. These soils are on uplands and terraces. They formed from material derived from limestone, diabase, and calcareous schist.

The soils in this group are—

- Athol loam and silt loam, 8 to 15 percent slopes, moderately eroded.
- Athol loam and silt loam, 15 to 25 percent slopes, moderately eroded.
- Conestoga silt loam, 8 to 15 percent slopes, moderately eroded.
- Duffield silt loam, 8 to 15 percent slopes, moderately eroded.
- Duffield silt loam, 15 to 25 percent slopes, moderately eroded.
- Elk silt loam, 8 to 15 percent slopes, moderately eroded.
- Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded.
- Hagerstown silt loam, 15 to 25 percent slopes, moderately eroded.
- Montalto channery silt loam, 8 to 15 percent slopes, moderately eroded.
- Montalto channery silt loam, 15 to 25 percent slopes, moderately eroded.
- Montalto extremely stony silt loam, 8 to 25 percent slopes.
- Montalto very stony silt loam, 8 to 25 percent slopes.
- Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded.
- Murrill very stony loam, 8 to 25 percent slopes.

Most of these soils are excellent for timber production. The ratings in table 3 apply to most of the soils in this group, but there are some exceptions. Potential productivity is rated F2 for the extremely stony and very stony soils. Both seedling mortality and plant competition are moderate on the moderately eroded soils where the slope is 15 percent or more, and also on the extremely stony and very stony soils. The equipment limitation is moderate on the Athol, Conestoga, and Duffield soils and severe on the extremely stony and very stony Montalto soils. For the extremely stony and very stony soils, the erosion hazard is slight.

Woodland group 7

This group consists of moderately deep and deep, severely eroded, well-drained, medium-textured soils that have slopes of 8 to 25 percent. These soils are on uplands. They formed from material derived from sandstone, slate, and schist.

The soils in this group are—

- Arendtsville gravelly loam, 15 to 25 percent slopes, severely eroded.
- Edgemont channery loam, 8 to 15 percent slopes, severely eroded.
- Edgemont channery loam, 15 to 25 percent slopes, severely eroded.
- Edgemont silt loam, 8 to 15 percent slopes, severely eroded.
- Edgemont silt loam, 15 to 25 percent slopes, severely eroded.
- Elioak silt loam, 8 to 15 percent slopes, severely eroded.
- Glenelg channery silt loam, 8 to 15 percent slopes, severely eroded.
- Glenelg channery silt loam, 15 to 25 percent slopes, severely eroded.
- Lansdale channery loam, 8 to 15 percent slopes, severely eroded.
- Lansdale loam, 8 to 15 percent slopes, severely eroded.
- Lewisberry sandy loam, 8 to 15 percent slopes, moderately eroded.

These soils are fairly good for timber production. The ratings in table 3 apply, with the following exceptions. Potential productivity is rated F3 for Lansdale channery loam, 8 to 15 percent slopes, severely eroded. Seedling mortality is severe on all slopes of more than 15 percent. Both plant competition and equipment limitation are moderate on slopes of less than 15 percent. The windthrow hazard is moderate on Glenelg and Lansdale soils, and also on Edgemont soils where the slope is 15 percent or more.

Woodland group 8

This group consists of moderately deep and deep, severely eroded, well-drained, medium-textured to moderately fine textured soils that have slopes of 8 to 25 percent. These soils are on uplands. They formed from material derived from limestone, diabase, and calcareous schist.

The soils in this group are—

- Athol loam and silt loam, 8 to 15 percent slopes, severely eroded.
- Athol loam and silt loam, 15 to 25 percent slopes, severely eroded.
- Conestoga silt loam, 8 to 15 percent slopes, severely eroded.
- Conestoga silt loam, 15 to 25 percent slopes, severely eroded.
- Duffield silty clay, 8 to 15 percent slopes, severely eroded.
- Hagerstown and Duffield silty clay loams, 15 to 25 percent slopes, severely eroded.
- Hagerstown silty clay, 8 to 15 percent slopes, severely eroded.
- Montalto channery silty clay loam, 8 to 15 percent slopes, severely eroded.
- Murrill gravelly loam, 8 to 15 percent slopes, severely eroded.

In general, these soils are good for timber production. The ratings in table 3 apply, with the following exceptions. Potential productivity is rated F3 and seedling mortality is rated severe for Hagerstown and Duffield silty clay loams, 15 to 25 percent slopes, severely eroded, and for Hagerstown silty clay, 8 to 15 percent slopes, severely eroded. The equipment limitation is severe on all slopes of more than 15 percent. The windthrow hazard is moderate on the Athol, Conestoga, Hagerstown, and Duffield soils where the slope is 15 percent or more and on Hagerstown silty clay, 8 to 15 percent slopes, severely eroded.

Woodland group 9

This group consists of deep and moderately deep, well-drained, medium-textured soils that have slopes of more than 25 percent. These soils are on uplands. They formed from material derived from slate, sandstone, schist, and conglomerate.

The soils in this group are—

- Edgemont soils, 25 to 35 percent slopes, moderately eroded.
- Edgemont very stony loam, 25 to 60 percent slopes.
- Lewisberry and Lansdale very stony sandy loams, 25 to 60 percent slopes.

These soils are good for timber production. The ratings in table 3 apply, except that for Edgemont soils, 25 to 35 percent slopes, moderately eroded, seedling mortality is slight and the erosion hazard is severe.

Woodland group 10

This group consists of deep and moderately deep, well-drained, medium-textured soils on slopes of more than 25 percent. These soils are on uplands. They formed from material derived from diabase and calcareous conglomerate.

The soils in this group are—

- Athol loam and silt loam, 25 to 35 percent slopes, moderately eroded.
- Montalto extremely stony silt loam, 25 to 60 percent slopes.
- Montalto very stony silt loam, 25 to 60 percent slopes.

These soils are good for timber production. The only exception to the ratings in table 3 is that for the Athol loam and silt loam the erosion hazard is severe.

Woodland group 11

This group consists of deep, moderately well drained, medium-textured soils that have slopes of 0 to 8 percent. These soils are on uplands, terraces, and flood plains. They formed from material derived from schist, sandstone, and shale.

The soils in this group are—

Altavista silt loam, 0 to 3 percent slopes.
Altavista silt loam, 3 to 8 percent slopes, moderately eroded.
Chewacla silt loam.
Glenville silt loam, 0 to 3 percent slopes.
Glenville silt loam, 3 to 8 percent slopes.
Glenville silt loam, 3 to 8 percent slopes, moderately eroded.
Lehigh channery silt loam, 3 to 8 percent slopes.
Lehigh channery silt loam, 3 to 8 percent slopes, moderately eroded.
Lehigh channery silt loam, 3 to 8 percent slopes, severely eroded.
Lehigh very stony silt loam, 0 to 8 percent slopes.
Raritan silt loam, 0 to 3 percent slopes.
Raritan silt loam, 3 to 8 percent slopes, moderately eroded.
Readington silt loam, 0 to 3 percent slopes.
Readington silt loam, 3 to 8 percent slopes.
Readington silt loam, 3 to 8 percent slopes, moderately eroded.
Rowland silt loam.
Sciotoville silt loam, 0 to 3 percent slopes.
Sciotoville silt loam, 3 to 8 percent slopes.

In general, these soils are good for timber production. However, the Lehigh soils are only fairly good. Seedling mortality and plant competition are moderate on the Lehigh soils. For the soils that have slopes of 3 to 8 percent, the erosion hazard is moderate, and for the severely eroded soils it is severe.

Chewacla silt loam and Rowland silt loam are on flood plains. They are subject to overflow, usually 12 hours or less in duration.

Woodland group 12

This group consists of deep, moderately well drained, medium-textured soils that have slopes of 0 to 8 percent. These soils are on uplands, terraces, and flood plains. They formed from material derived from diabase, limestone, and calcareous schist.

The soils in this group are—

Bedford silt loam, 0 to 3 percent slopes.
Bedford silt loam, 3 to 8 percent slopes, moderately eroded.
Bedford silt loam, 3 to 8 percent slopes, severely eroded.
Lindside silt loam.
Mount Lucas silt loam, 3 to 8 percent slopes.
Mount Lucas silt loam, 3 to 8 percent slopes, moderately eroded.
Mount Lucas very stony silt loam, 0 to 8 percent slopes.

The ratings in table 3 apply, with the following exceptions. Plant competition is moderate on the Mount Lucas soils and on the moderately eroded Bedford soil. The equipment limitation is severe on the very stony Mount Lucas soil. The erosion hazard is moderate on all the moderately eroded soils and severe on the severely eroded Bedford soil.

Lindside silt loam is on flood plains and is subject to overflow, usually 12 hours or less in duration.

Woodland group 13

This group consists of shallow to moderately deep, moderately well drained, medium-textured soils that have slopes of 8 to 25 percent. These soils formed from material derived from shale, slate, limestone, and calcareous schist.

The soils in this group are—

Bedford silt loam, 8 to 15 percent slopes, moderately eroded.
Bedford silt loam, 8 to 15 percent slopes, severely eroded.
Lehigh channery silt loam, 8 to 15 percent slopes.
Lehigh channery silt loam, 8 to 15 percent slopes, moderately eroded.
Lehigh channery silt loam, 15 to 25 percent slopes, moderately eroded.
Lehigh very stony silt loam, 8 to 25 percent slopes.

The soils in this group are poor for timber production. The ratings in table 3 apply, with the following exceptions. The equipment limitation is severe on the very stony Lehigh soil. For the severely eroded Bedford soil and for all slopes of more than 15 percent, the erosion hazard is rated severe. For the very stony Lehigh soil, the erosion hazard is rated slight.

Woodland group 14

This group consists of shallow, moderately well drained, medium-textured, severely eroded soils that have slopes of 8 to 25 percent. These soils formed from material derived from shale and slate.

The soils in this group are—

Lehigh channery silt loam, 8 to 15 percent slopes, severely eroded.
Lehigh channery silt loam, 15 to 25 percent slopes, severely eroded.
Penn and Readington shaly silt loams, 8 to 15 percent slopes, severely eroded.

These soils are poor for timber production. The limiting factors are given in table 3.

Woodland group 15

This group consists of shallow to very shallow, somewhat poorly drained, medium-textured soils that have slopes of 0 to 8 percent. These soils are on uplands. They formed from material derived from slate and shale.

The soils in this group are—

Lehigh channery silt loam, 0 to 3 percent slopes.
Penn and Readington shaly silt loams, 3 to 8 percent slopes, moderately eroded.
Penn and Readington shaly silt loams, 3 to 8 percent slopes, severely eroded.

These soils, in general, are fair for timber production. An exception to the generalized ratings given in table 3 concerns the severely eroded Penn and Readington soils. These are rated poor for timber production. Seedling mortality is severe, plant competition is slight, and the erosion hazard is severe.

Woodland group 16

This group consists of shallow to very shallow, somewhat poorly drained, medium-textured soils that have slopes of 0 to 8 percent. These soils are on uplands. They developed from material derived from limestone and diabase.

The soils in this group are—

Lawrence silt loam.
Mount Lucas silt loam, 0 to 3 percent slopes.

These soils are poor for timber production because of the unfavorable characteristics described above and the limiting factors given in table 3.

Woodland group 17

This group consists of deep, poorly drained, medium-textured soils that have slopes of 0 to 8 percent. These

soils are on uplands, terraces, and flood plains. They developed from material derived from schist, shale, and slate.

The soils in this group are—

Bowmansville silt loam.
Bowmansville silt loam, local alluvium.
Croton silt loam, 0 to 3 percent slopes.
Croton silt loam, 0 to 3 percent slopes, moderately eroded.
Croton silt loam, 3 to 8 percent slopes.
Croton silt loam, 3 to 8 percent slopes, moderately eroded.
Croton very stony silt loam, 0 to 8 percent slopes.
Lamington silt loam.
Wehadkee silt loam.
Wehadkee silt loam, local alluvium, 3 to 8 percent slopes.
Worsham silt loam.

These soils are poor for timber production. The ratings in table 3 are generalizations for the group. Some specific exceptions to these ratings follow. Seedling mortality is moderate on the Croton and Wehadkee soils. Plant competition is severe on Bowmansville silt loam and on Wehadkee silt loam. The equipment limitation is moderate on the Croton, Wehadkee, Lamington, and Worsham soils. The erosion hazard is moderate on all the moderately eroded soils and on those that have slopes of 3 to 8 percent.

Bowmansville silt loam and Wehadkee silt loam are subject to overflow of short duration, usually 12 hours or less. Wehadkee silt loam, local alluvium, 3 to 8 percent slopes, is subject to very infrequent overflow.

Woodland group 18

This group consists of deep, poorly drained, medium-textured soils that have slopes of 0 to 8 percent. These are on uplands, terraces, and flood plains. They developed from material derived from limestone and diabase.

The soils in this group are—

Guthrie silt loam.
Melvin silt loam.
Watchung silt loam, 0 to 3 percent slopes.
Watchung silt loam, 3 to 5 percent slopes.
Watchung very stony silt loam, 0 to 8 percent slopes.

These soils are rated poor for timber production. The only exception to the ratings in table 3 concerns plant competition, which is moderate on Guthrie silt loam and on Watchung silt loam , 3 to 5 percent slopes.

Woodland group 19

This group consists of shallow, well-drained, medium-textured soils that have slopes of 0 to 8 percent. These soils are on uplands. They developed from material derived from schist, shale, and sandstone.

The soils in this group are—

Cardiff slaty silt loam, 3 to 8 percent slopes, moderately eroded.
Manor channery loam, 3 to 8 percent slopes.
Manor channery loam, 3 to 8 percent slopes, moderately eroded.
Manor very stony loam, 0 to 8 percent slopes.
Penn loam, 3 to 8 percent slopes, moderately eroded.
Penn silt loam, 0 to 3 percent slopes, moderately eroded.
Penn silt loam, 3 to 8 percent slopes.
Penn silt loam, 3 to 8 percent slopes, moderately eroded.
Penn very stony loam, 0 to 8 percent slopes.
Penn-Lansdale loams, 0 to 3 percent slopes.
Penn-Lansdale loams, 3 to 8 percent slopes, moderately eroded.

These soils are good for timber production. Seedling mortality is slight on the soils that are not moderately eroded. On the very stony soils, the equipment limitation is moderate and the erosion hazard is slight.

Woodland group 20

This group consists of shallow, well-drained, medium-textured soils that have slopes of 0 to 8 percent. These soils are on uplands. They developed from material derived from diabase, calcareous schist, and porcelanite.

The soils in this group are—

Brecknock channery silt loam, 3 to 8 percent slopes, moderately eroded.
Legore silt loam, 3 to 8 percent slopes, moderately eroded.
Legore silt loam, 3 to 8 percent slopes, severely eroded.
Pequea silt loam, 3 to 8 percent slopes, moderately eroded.

These soils are good to fairly good for timber production. Although table 3 rates the group good in potential productivity, the two Legore soils are only fairly good. For the severely eroded Legore soil, seedling mortality is rated severe, plant competition slight, and the erosion hazard severe.

Woodland group 21

This group consists of shallow to very shallow, well-drained, medium-textured, severely eroded soils that have slopes of 3 to 8 percent. These soils are on uplands. They developed from material derived from schist, shale, and sandstone.

The soils in this group are—

Catoctin channery silt loam, 3 to 8 percent slopes, severely eroded.
Manor channery loam, 3 to 8 percent slopes, severely eroded.
Penn loam, 3 to 8 percent slopes, severely eroded.
Penn shaly silt loam, 3 to 8 percent slopes, severely eroded.
Penn silt loam, 3 to 8 percent slopes, severely eroded.
Penn-Lansdale loams, 3 to 8 percent slopes, severely eroded.

In general these soils are fairly good for timber production. Exceptions are the Catoctin and Manor soils, which are rated good.

Woodland group 22

This group consists of shallow, well-drained, medium-textured soils that have slopes of 8 to 25 percent. These soils are on uplands. They formed in material derived from schist, sandstone, and shale.

The soils in this group are—

Cardiff slaty silt loam, 8 to 15 percent slopes, moderately eroded.
Cardiff slaty silt loam, 15 to 25 percent slopes, moderately eroded.
Manor channery loam, 8 to 15 percent slopes.
Manor channery loam, 8 to 15 percent slopes, moderately eroded.
Manor channery loam, 15 to 25 percent slopes.
Manor channery loam, 15 to 25 percent slopes, moderately eroded.
Manor very stony loam, 8 to 25 percent slopes, moderately eroded.
Penn loam, 8 to 15 percent slopes, moderately eroded.
Penn silt loam, 8 to 15 percent slopes.
Penn silt loam, 8 to 15 percent slopes, moderately eroded.
Penn silt loam, 15 to 25 percent slopes.
Penn silt loam, 15 to 25 percent slopes, moderately eroded.
Penn very stony loam, 8 to 25 percent slopes.
Penn-Lansdale loams, 8 to 15 percent slopes, moderately eroded.

In general, these soils are good for timber production, but Penn very stony loam, 8 to 25 percent slopes, and all the Penn and Cardiff soils that have slopes of more than 15 percent and are moderately eroded are only fairly good. On the soils not moderately eroded, seedling mortality is slight. The equipment limitation is severe on

the very stony soils. The erosion hazard is severe on Cardiff slaty silt loam, 15 to 25 percent slopes, moderately eroded, and on the Penn soils that have slopes of 15 to 25 percent. On the very stony soils, the erosion hazard is slight.

Woodland group 23

This group consists mostly of shallow, well-drained, medium-textured soils that have slopes of 8 to 25 percent. These soils are on uplands. They developed from material derived from limestone, diabase, calcareous schist, and porcelanite.

The soils in this group are—

Brecknock channery silt loam, 8 to 15 percent slopes.
Brecknock channery silt loam, 8 to 15 percent slopes, moderately eroded.
Brecknock channery silt loam, 15 to 25 percent slopes.
Brecknock channery silt loam, 15 to 25 percent slopes, moderately eroded.
Brecknock very stony silt loam, 8 to 25 percent slopes.
Legore silt loam, 15 to 25 percent slopes, moderately eroded.
Pequea silt loam, 8 to 15 percent slopes, moderately eroded.

The Brecknock soils are shallow to moderately deep. These soils are fairly good for timber production, with one exception—Pequea silt loam, 8 to 15 percent slopes, moderately eroded—which is rated good. The ratings in table 3 apply, with the following exceptions. Seedling mortality is moderate on the moderately eroded soils and the very stony soils, and it is severe on the Legore soil. Plant competition is slight and the windthrow hazard is moderate on the Pequea soil and also on the Brecknock and Legore soils that have slopes of 15 to 25 percent and are moderately eroded. The equipment limitation is severe on the very stony soil. The erosion hazard is severe on the Legore soil.

Woodland group 24

This group consists of shallow and very shallow, severely eroded, medium-textured soils that have slopes of 8 to 25 percent. These soils are on uplands. They formed from material derived from schist, sandstone, and shale.

The soils in this group are—

Cardiff slaty silt loam, 8 to 15 percent slopes, severely eroded.
Cardiff slaty silt loam, 15 to 25 percent slopes, severely eroded.
Catoctin channery silt loam, 8 to 15 percent slopes, severely eroded.
Catoctin channery silt loam, 15 to 25 percent slopes, severely eroded.
Manor channery loam, 8 to 15 percent slopes, severely eroded.
Manor channery loam, 15 to 25 percent slopes, severely eroded.
Penn loam, 8 to 15 percent slopes, severely eroded.
Penn shaly silt loam, 8 to 15 percent slopes, severely eroded.
Penn shaly silt loam, 15 to 25 percent slopes, severely eroded.
Penn soils, 15 to 25 percent slopes, severely eroded.
Penn silt loam, 8 to 15 percent slopes, severely eroded.
Penn-Lansdale loams, 8 to 15 percent slopes, severely eroded.
Penn-Lansdale loams, 15 to 25 percent slopes, severely eroded.
Steinsburg channery loam, 8 to 15 percent slopes, severely eroded.
Steinsburg channery loam, 15 to 25 percent slopes, severely eroded.

Generally, these soils are fairly good for timber, but the two Cardiff soils, the Penn soils that have slopes of 15 to 25 percent, and the Steinsburg soil that has slopes of 15 to 25 percent slopes are poor. On all the soils that have slopes of 15 to 25 percent, the equipment limitation and the windthrow hazard are severe.

Woodland group 25

This group consists of shallow and very shallow, severely eroded, medium-textured soils that have slopes of 8 to 25 percent. These soils are on uplands. They formed from material derived from limestone, diabase, calcareous schist, and porcelanite.

The soils in this group are—

Brecknock channery silt loam, 8 to 15 percent slopes, severely eroded.
Brecknock channery silt loam, 15 to 25 percent slopes, severely eroded.
Legore clay loam, 8 to 15 percent slopes, severely eroded.
Legore clay loam, 15 to 25 percent slopes, severely eroded.
Pequea silt loam, 8 to 15 percent slopes, severely eroded.
Pequea silt loam, 15 to 25 percent slopes, severely eroded.

These soils are poor for timber production. The ratings in table 3 apply, except that, for all soils on slopes of 15 to 25 percent, the equipment limitation and windthrow hazard are severe rather than moderate.

Woodland group 26

This group consists of shallow, well-drained, medium-textured soils that have slopes of 25 to 75 percent. These soils are on uplands. They formed from material derived from schist, shale, slate, and sandstone.

The soils in this group are—

Lewisberry sandy loam, 25 to 45 percent slopes, moderately eroded.
Manor channery loam, 25 to 45 percent slopes.
Manor channery loam, 25 to 45 percent slopes, moderately eroded.
Manor channery loam, 45 to 60 percent slopes.
Manor very stony loam, 25 to 75 percent slopes, moderately eroded.
Penn very stony loam, 25 to 60 percent slopes.
Steinsburg channery loam, 25 to 35 percent slopes, moderately eroded.

Although a rating of F3 (fairly good) is given in table 3 for this group, the range in potential productivity is from good to poor. The Manor soils that have slopes of 25 to 45 percent are good. The Steinsburg soil is poor. Although the soils differ in potential productivity, they all have severe limitations that present serious difficulties in timber production. Seedling mortality is moderate instead of severe on the soils that are not moderately eroded.

Woodland group 27

This group consists of shallow, well-drained, medium-textured soils that have slopes of 25 to 65 percent. These soils are on uplands. They formed from material derived from calcareous schist and porcelanite.

The soils in this group are—

Brecknock channery silt loam, 25 to 35 percent slopes, moderately eroded.
Brecknock very stony silt loam, 25 to 65 percent slopes.
Pequea silt loam, 25 to 35 percent slopes, moderately eroded.

These soils are fairly good for timber production, but they have a severe equipment limitation and a severe erosion hazard. The generalized ratings in table 3 are more nearly accurate for the Brecknock soils than for the Pequea soil. Seedling mortality and the windthrow hazard are severe and plant competition is slight on the Pequea soil. For Brecknock very stony silt loam, 25 to 65 percent slopes, the erosion hazard is moderate rather than severe

Woodland group 28

This group consists of shallow, well-drained, medium-textured, severely eroded soils that have slopes of 25 to 75 percent. These soils are on uplands. They formed from material derived from schist, shale, slate, and sandstone.

The soils in this group are—

Cardiff slaty silt loam, 25 to 35 percent slopes, severely eroded.
Manor channery loam, 25 to 45 percent slopes, severely eroded.
Penn soils, 25 to 35 percent slopes, severely eroded.
Penn soils, 35 to 60 percent slopes, severely eroded.
Steinsburg channery loam, 25 to 35 percent slopes, severely eroded.

In general, these soils are poor for timber production. The Manor soil is fairly good.

Woodland group 29

There is only one soil in this group. It is well drained and medium textured but is shallow and has been severely eroded. This soil is on uplands. It formed from material derived from diabase.

The soil in this group is—

Legore clay loam, 25 to 35 percent slopes, severely eroded.

This soil has severe limitations and is poor for timber production.

Wildlife

The kinds of wildlife that will live in a given area and the number of each kind depend on the kind and amount of food and cover, which in turn are controlled by the use and management of the soils. Both agricultural and non-agricultural areas can be so managed as to preserve and improve the wildlife habitat.

Wild plants provide most of the food and cover for wildlife in York County. The seeds of herbaceous plants, such as bristlegrass, smartweed, ragweed, and pigweed, furnish food for pheasants, quail, mourning doves, and many kinds of songbirds. Dogwood, viburnum, sumac, and wild cherry trees, wild grapevines, hawthorn bushes, and other shrubs, vines, and small trees furnish food and shelter for both birds and animals. Oak, hickory, and walnut trees provide food for squirrels. Cottontail rabbits and deer feed on the sprouts of maple trees, tuliptrees, flowering dogwood trees, raspberry bushes, and many other trees and shrubs.

Cutting back strips along the borders of woodlands permits the growth of shrubs, grasses, and herbs that provide food and cover. Borders of shrubs can be planted around reforested areas. Unplanted strips through large reforested areas provide diversity of cover and also furnish access to the woodlands and serve as firebreaks. Preserving all den trees in the outermost 50 feet of woodlands and along roads and streams will, as a rule, assure the maintenance of the squirrel population.

Soils used for crops provide more food and better cover for wildlife than soils used for pasture. Stripcropping creates travel lanes for wildlife in cultivated areas and also provides a diversity of food and cover. Diversion terraces serve as travel lanes and provide nesting cover. Planting hedgerows and grass-legume field borders are other ways of furnishing food and cover. In regulated shooting grounds, grain is planted specifically for the purpose of feeding game.

Pastures are likely to be lacking in food and cover, but suitable mixtures of grasses and legumes can be planted to furnish food for deer and rabbits. Streambanks and areas around ponds in pastures can be planted to conifers and food-producing shrubs. Grass borders protect the banks, dams, and spillways from erosion as well as furnishing food and cover for game.

Rural and suburban areas not suitable for agriculture or no longer used for agriculture can be improved as wildlife habitats by constructing ponds or marshes and by planting hedges, living fences, and food and cover plants. Some areas may be suitable for development as regulated shooting grounds. This kind of land use calls for special methods of strip farming, the use of crops not commonly grown for agricultural purposes, and the efficient utilization of released game birds. Wet bottom lands can be managed so as to attract waterfowl by constructing impoundments that have facilities for drawing down water, digging level ditches to provide more areas of open water, and planting wet fields to waterfowl foods and flooding the fields during the hunting season. These practices also create suitable habitats for muskrats and other fur bearers.

Pheasants, bobwhite, mourning doves, cottontail rabbits, gray squirrels, and deer are the common game birds and animals in York County. Table 4 shows the relative suitability of the different soils as habitats for each of these species. The ratings given are based on soil characteristics, topography, present use, productivity, kinds of vegetation, and the habitat preferences of each species. No rating is given if a soil is unsuitable for wildlife habitats or if the degree of suitability is not known.

Pheasants prefer large areas of fertile farmland, especially fields of corn or small grain. Apparently they do best on soils that are high in lime; consequently, they may be attracted to areas where the soils have been limed in preparation for growing crops. Pheasants like grassy areas for nesting, but generally they decrease in number where grassland farming is practiced.

Bobwhite are most abundant in areas where there are small fields of corn or small grain adjoining meadows and brushy areas. They are less numerous in extensive areas of open farmland, in areas where grassland farming is practiced, and in mature forests. Mourning doves, on the other hand, thrive where there are large fields of corn and small grain.

Cottontail rabbits thrive in most habitats but are most abundant in brushy areas interspersed with patches of grass. They are least abundant in large cultivated areas and in dense woodland.

Gray squirrels generally prefer woods where there are many oaks, hickories, and other nut trees. They are most abundant in woodlands that have a heavy undergrowth but normally live near the edges of or near openings in the woods.

Deer generally like second- and third-growth hardwood forests, brushy areas, and the edges of open fields.

TABLE 4.—*Suitability of soils as habitats for game*

Soil series and map symbols	Pheasant	Bobwhite	Mourning dove	Cottontail rabbit	Gray squirrel	Deer
Altavista:						
AaA, AaB2	Moderate	Moderate	Moderate	High	Low	Low.
Arendtsville:						
AgB2, AgC2, AgD3	Moderate	High	Moderate	High	High	High.
ArB, ArD	Low	Low	Low	Low	High	High.
Ashton:						
AbA, AbB	High	High	Moderate	High	Low	Low.
Athol:						
AtA, AtB2, AtC2, AtC3, AtD2, AtD3, AtE2	High	High	Moderate	High	Moderate	Moderate.
Bedford:						
BdA, BdB2, BdB3, BdC2, BdC3	High	High	High	High	Moderate	Moderate.
Bermudian:						
BeA, BhA, BhB	High	Moderate	High	Moderate	Low	Low.
Birdsboro:						
BmA, BmB2, BmC2	High	Moderate	High	High	Low	Low.
Bowmansville:						
Bn, Bo				Moderate	Moderate	Moderate.
Brecknock:						
BrB2, BrC, BrC2, BrC3, BrD, BrD2, BrD3, BrE2	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate.
BvD, BvF	Low	Low	Low	Low	High	High.
Cardiff:						
CaB2, CaC2, CaC3, CaD2, CaD3, CaE3	Low	Moderate	Low	Moderate	Moderate	Moderate.
Catoctin:						
CcB3, CcC3, CcD3	Low	Low	Low	Low	High	High.
Chester:						
ChA, ChA2, ChB, ChB2, ChB3, ChC2	High	Moderate	Moderate	Moderate	Moderate	Moderate.
Chewacla:						
Ck	Moderate	Moderate	Low	Moderate	Moderate	Moderate.
Conestoga:						
CoA, CoA2, CoB2, CoB3, CoC2, CoC3, CoD3	High	Moderate	High	High	Moderate	Moderate.
Congaree:						
Cp	High	Moderate	Moderate	Moderate	Moderate	Moderate.
Croton:						
CrA, CrA2, CrB, CrB2, CvB		Low	Low	Moderate	Moderate	Moderate.
Duffield:						
DuA, DuA2, DuB, DuB2, DuC2, DuD2, DyC3	High	High	High	High	Moderate	Moderate.
Edgemont:						
EcB2, EcC2, EcC3, EcD2, EcD3, EdB, EdB2, EdB3, EdC, EdC2, EdC3, EdD2, EdD3, EgE2	Moderate	High	Moderate	Moderate	Moderate	Moderate.
EhB, EhD, EhF	Low	Low	Low	Low	High	High.
Elioak:						
EkA, EkB, EkB2, EkC, EkC2, EkC3	High	Moderate	High	Moderate	Moderate	Moderate.
Elk:						
ElA, ElB2, ElC2	High	Moderate	High	Moderate	Low	Low.
Glenelg:						
GcB, GcB2, GcB3, GcC, GcC2, GcC3, GcD, GcD2, GcD3	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate.
Glenville:						
GnA, GnB, GnB2	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate.
Guthrie:						
Gu	Low	Low	Low	Moderate	Moderate	Moderate.
Hagerstown:						
HaA, HaA2, HaB2, HaC2, HaD2, HcB3, HcC3	High	High	High	High	Moderate	Moderate.
Hagerstown and Duffield:						
HdD3	High	High	High	High	Moderate	Moderate.
Highfield:						
HfB2, HfC2, HgB	Moderate	High	Moderate	Moderate	Moderate	High.
Highfield and Catoctin:						
HhD	Moderate	High	Moderate	Moderate	Moderate	High.
Huntington:						
Hn, HuA, HuB	High	Moderate	Moderate	Moderate	Moderate	Moderate.
Lamington:						
La		Low	Low	Moderate	Moderate	Moderate.
Lansdale:						
LcB2, LcC2, LcC3, LcD2, LdA2, LdB2, LdB3, LdC3	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate.
Lawrence:						
Le	Low	Moderate	Low	Moderate	Moderate	Moderate.

TABLE 4.—*Suitability of soils as habitats for game*—Continued

Soil series and map symbols	Pheasant	Bobwhite	Mourning dove	Cottontail rabbit	Gray squirrel	Deer
Legore:						
LfC3, LfD3, LfE3, LgB2, LgB3, LgD2	Moderate	High	Low	Low	High	Moderate.
Lehigh:						
LhA, LhB, LhB2, LhB3, LhC, LhC2, LhC3, LhD2, LhE3, LIB, LID	Low	Low	Low	Moderate	Moderate	Moderate.
Lewisberry:						
LmB, LmB2, LmC, LmC2, LmD2, LmE2	Moderate	High	Moderate	High	Moderate	Moderate.
Lewisberry and Lansdale:						
LnD, LrF	Low	Low	Low	Low	Moderate	Moderate.
Lindside:						
Ls	Moderate	Moderate	Low	Moderate	Moderate	Moderate.
Manor:						
MfB, MfB2, MfB3, MfC, MfC2, MfC3, MfD, MfD2, MfD3, MfE, MfE2, MfE3, MfF	Moderate	Moderate	Low	Moderate	Moderate	Moderate.
MgB, MgD2, MgF2	Low	Low	Low	Low	High	High.
Melvin:						
Mm				Low	Low	Moderate.
Montalto:						
MnB2, MnC2, MnD2, MoC3	Moderate	High	Moderate	High	Moderate	Moderate.
MsD, MsF, MtB, MtD, MtF	Low	Low	Low	Low	High	High.
Mount Lucas:						
MuA, MuB, MuB2	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate.
MvB	Low	Low	Low	Low	High	High.
Murrill:						
MwA, MwB, MwB2, MwC2, MwC3	High	High	Moderate	High	Moderate	High.
MxB, MxD	Low	Low	Low	Low	Moderate	High.
Penn:						
PeB2, PeB3, PeC2, PeC3, PhD3, PhE3, PhF3, PgA2, PgB, PgB2, PgB3, PgC, PgC2, PgC3, PgD, PgD2, PfB3, PfC3, PfD3	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate.
PmB, PmD, PmF	Low	Low	Moderate	Low	High	High.
Penn-Lansdale:						
PnA, PnB2, PnB3, PnC2, PnC3, PnD3	Moderate	Moderate	Moderate	Moderate	Low	Low.
Penn and Readington:						
PrB2, PrB3, PrC3	Low	Low	Low	Low	Low	Moderate.
Pequea:						
PsB2, PsC2, PsC3, PsD3, PsE2	Moderate	Moderate	Low	Moderate	Moderate	Moderate.
Raritan:						
RaA, RaB2	Moderate	Moderate	Low	High	Moderate	Moderate.
Readington:						
RdA, RdB, RdB2	Moderate	Moderate	Low	Moderate	Moderate	Moderate.
Rowland:						
Ro	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate.
Sciotoville:						
ScA, ScB	Moderate	Moderate	Moderate	High	Low	Low.
Steinsburg:						
SsC3, SsD3, SsE2, SsE3	Low	Moderate	Low	Moderate	Moderate	Moderate.
Watchung:						
WaA, WaB, WcB	Low	Low	Low	Moderate	Moderate	High.
Wehadkee:						
Wd, We				Low	Low	Low.
Wheeling:						
WgB2, WgC2	High	Moderate	High	High	Low	Low.
Whiteford:						
WhB2, WhC2	Moderate	Moderate	Moderate	High	Moderate	Moderate.
Wickham:						
WkA, WkB2	High	Moderate	High	High	Low	Low.
Worsham:						
Wo	Low	Low	Moderate	Moderate	Moderate	High.

Suburban Uses of Soils

At the time of the 1960 census, York County had a population of 238,336, which represented a gain of 35,599 in 10 years. As the population increases, people move from the larger towns and cities into residential developments in what were formerly agricultural areas. A mixed pattern of farmland and houses is the result. Suburban developments are most extensive in the northern part of the county, near Harrisburg, but are also present around York and Hanover. As the suburbs of Baltimore, Md., expand, development of homes will probably extend into the southern part of York County.

Soil survey reports are of great use to officials responsible for planning suburban development and for resolving the many problems that arise from changes in land use. In addition, the reports are sources of information for real estate agents, engineers, architects, school board members, councilmen or supervisors, individual homeowners, and others. Information can be obtained from

the maps as well as from the descriptions and tables. Table 6 in the section "Engineering Uses of Soils" gives information on the suitability of each soil in the county for infiltration of sewage and industrial waste, for the construction of ponds, for the construction of pipelines, for the construction of roads and streets, as foundations of structures, and as sources of topsoil.

The maps and the tables are guides on the basis of which some sites can be eliminated from consideration for some purposes. They do not supplant direct, detailed, on-site investigation of areas for which development is being planned. Only soil features are recognized in this report. Many other factors influence use, such as location in relation to towns and cities, transportation facilities, and other economic factors.

Depth, slope, internal drainage, nature of the parent material, and stoniness are the characteristics that affect the suitability of soils for building sites and other suburban uses. On the basis of these characteristics, the soils in York County are placed in 11 groups. Brief descriptions of these groups follow.

Group 1 for building sites

This group consists of deep, well-drained, permeable soils that have slopes of 0 to 8 percent. These soils are—

Arendtsville gravelly loam, 3 to 8 percent slopes, moderately eroded.
Ashton loam, 0 to 3 percent slopes.
Ashton loam, 3 to 8 percent slopes.
Athol loam and silt loam, 0 to 3 percent slopes.
Athol loam and silt loam, 3 to 8 percent slopes, moderately eroded.
Bermudian silt loam, high bottom, 0 to 3 percent slopes.
Bermudian silt loam, high bottom, 3 to 8 percent slopes.
Birdsboro silt loam, 0 to 3 percent slopes.
Birdsboro silt loam, 3 to 8 percent slopes, moderately eroded.
Chester silt loam, 0 to 3 percent slopes.
Chester silt loam, 0 to 3 percent slopes, moderately eroded.
Chester silt loam, 3 to 8 percent slopes.
Chester silt loam, 3 to 8 percent slopes, moderately eroded.
Chester silt loam, 3 to 8 percent slopes, severely eroded.
Conestoga silt loam, 0 to 3 percent slopes.
Conestoga silt loam, 0 to 3 percent slopes, moderately eroded.
Conestoga silt loam, 3 to 8 percent slopes, moderately eroded.
Conestoga silt loam, 3 to 8 percent slopes, severely eroded.
Duffield silt loam, 0 to 3 percent slopes.
Duffield silt loam, 0 to 3 percent slopes, moderately eroded.
Duffield silt loam, 3 to 8 percent slopes.
Duffield silt loam, 3 to 8 percent slopes, moderately eroded.
Edgemont channery loam, 3 to 8 percent slopes, moderately eroded.
Edgemont silt loam, 3 to 8 percent slopes.
Edgemont silt loam, 3 to 8 percent slopes, moderately eroded.
Edgemont silt loam, 3 to 8 percent slopes, severely eroded.
Elioak silt loam, 0 to 3 percent slopes.
Elioak silt loam, 3 to 8 percent slopes.
Elioak silt loam, 3 to 8 percent slopes, moderately eroded.
Elk silt loam, 0 to 3 percent slopes.
Elk silt loam, 3 to 8 percent slopes, moderately eroded.
Hagerstown silt loam, 0 to 3 percent slopes.
Hagerstown silt loam, 0 to 3 percent slopes, moderately eroded.
Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded.
Hagerstown silty clay, 3 to 8 percent slopes, severely eroded.
Highfield channery silt loam, 3 to 8 percent slopes, moderately eroded.
Lewisberry sandy loam, 3 to 8 percent slopes.
Lewisberry sandy loam, 3 to 8 percent slopes, moderately eroded.
Made land, Duffield and Conestoga materials.
Made land, Wheeling and Sciotoville materials.
Montalto channery silt loam, 3 to 8 percent slopes, moderately eroded.
Murrill gravelly loam, 0 to 3 percent slopes.
Murrill gravelly loam, 3 to 8 percent slopes.
Murrill gravelly loam, 3 to 8 percent slopes, moderately eroded.
Wheeling silt loam, 3 to 8 percent slopes, moderately eroded.
Whiteford silt loam, 3 to 8 percent slopes, moderately eroded.
Wickham silt loam, 0 to 3 percent slopes.
Wickham silt loam, 3 to 8 percent slopes, moderately eroded.

As sites for large commercial, industrial, institutional, and residential developments, these soils have fewer limitations than any other soils in the county. Bedrock is ordinarily at a depth of 4 to 6 feet. Excavations for residential developments do not usually require bedrock quarrying. The slopes are favorable, and grading can be done without difficulty.

For foundations, all the soils in this group are good, except the Hagerstown soils, which in some places have solution caverns in the underlying rock and consequently require careful investigation. In the Chester, Conestoga, and Elioak soils, the lower part of the subsoil is micaceous and slightly elastic.

Normal loads of sewage and industrial waste can be disposed of satisfactorily in most of these soils. The Hagerstown and Conestoga soils, however, require special on-site investigation. Because of the presence of large channels in the bedrock, contamination of the ground water is possible if soils of these two series are used for disposal of waste.

Grasses, shrubs, and trees will grow well where the subsoil has been exposed as a result of construction work, especially in the soils derived from limestone. Mulching, adding topsoil, applying lime and fertilizer, and constructing temporary diversions will help to get vegetation established. The loams and the severely eroded soils are somewhat droughty.

Some of the best agricultural soils in York County are in this group. So far as possible, the Chester, Duffield, Elioak, Elk, Hagerstown, and Murrill soils should be kept in agricultural production.

Group 2 for building sites

This group consists of deep, well-drained, permeable soils that have slopes of 8 to 25 percent. These soils are—

Arendtsville gravelly loam, 8 to 15 percent slopes, moderately eroded.
Arendtsville gravelly loam, 15 to 25 percent slopes, severely eroded.
Arendtsville very stony loam, 8 to 25 percent slopes.
Athol loam and silt loam, 8 to 15 percent slopes, moderately eroded.
Athol loam and silt loam, 8 to 15 percent slopes, severely eroded.
Athol loam and silt loam, 15 to 25 percent slopes, moderately eroded.
Athol loam and silt loam, 15 to 25 percent slopes, severely eroded.
Birdsboro silt loam, 8 to 15 percent slopes, moderately eroded.
Chester silt loam, 8 to 15 percent slopes, moderately eroded.
Conestoga silt loam, 8 to 15 percent slopes, moderately eroded.
Conestoga silt loam, 8 to 15 percent slopes, severely eroded.
Conestoga silt loam, 15 to 25 percent slopes, severely eroded.
Duffield silt loam, 8 to 15 percent slopes, moderately eroded.
Duffield silt loam, 15 to 25 percent slopes, moderately eroded.
Duffield silty clay, 8 to 15 percent slopes, severely eroded.
Edgemont channery loam, 8 to 15 percent slopes, moderately eroded.
Edgemont channery loam, 8 to 15 percent slopes, severely eroded.
Edgemont channery loam, 15 to 25 percent slopes, moderately eroded.
Edgemont channery loam, 15 to 25 percent slopes, severely eroded.
Edgemont silt loam, 8 to 15 percent slopes.
Edgemont silt loam, 8 to 15 percent slopes, moderately eroded.
Edgemont silt loam, 8 to 15 percent slopes, severely eroded.

Edgemont silt loam, 15 to 25 percent slopes, moderately eroded.
Edgemont silt loam, 15 to 25 percent slopes, severely eroded.
Edgemont very stony loam, 8 to 25 percent slopes.
Elioak silt loam, 8 to 15 percent slopes.
Elioak silt loam, 8 to 15 percent slopes, moderately eroded.
Elioak silt loam, 8 to 15 percent slopes, severely eroded.
Elk silt loam, 8 to 15 percent slopes, moderately eroded.
Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded.
Hagerstown silt loam, 15 to 25 percent slopes, moderately eroded.
Hagerstown silty clay, 8 to 15 percent slopes, severely eroded.
Hagerstown and Duffield silty clay loams, 15 to 25 percent slopes, severely eroded.
Highfield channery silt loam, 8 to 15 percent slopes, moderately eroded.
Highfield and Catoctin very stony silt loams, 8 to 25 percent slopes.
Huntington silt loam, local alluvium, 3 to 8 percent slopes.
Lewisberry sandy loam, 8 to 15 percent slopes.
Lewisberry sandy loam, 8 to 15 percent slopes, moderately eroded.
Lewisberry sandy loam, 15 to 25 percent slopes, moderately eroded.
Lewisberry and Lansdale very stony loams, 8 to 25 percent slopes.
Montalto channery silt loam, 8 to 15 percent slopes, moderately eroded.
Montalto channery silt loam, 15 to 25 percent slopes, moderately eroded.
Montalto channery silty clay loam, 8 to 15 percent slopes, severely eroded.
Montalto very stony silt loam, 8 to 25 percent slopes.
Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded.
Murrill gravelly loam, 8 to 15 percent slopes, severely eroded.
Murrill very stony loam, 8 to 25 percent slopes.
Wheeling silt loam, 8 to 15 percent slopes, moderately eroded.
Whiteford silt loam, 8 to 15 percent slopes, moderately eroded.

Because of their slopes these soils are generally not suitable for large commercial, industrial, or institutional developments. They are, however, suitable for residential developments. Bedrock is ordinarily at a depth of 3 tc 6 feet. Excavations do not usually require bedrock quarrying, except in some of the stony soils and possibly in the Hagerstown soils. Grading the stony soils is expensive. In the Chester, Conestoga, and Elioak soils, the lower part of the subsoil is micaceous and slightly elastic.

Normal loads of septic tank effluent can be disposed of satisfactorily in most of these soils. The soils on the stronger slopes are not suitable for disposal of industrial waste, and even those on the milder slopes may become saturated and subject to slippage.

The exposed subsoil, especially that of the soils derived from limestone, is a good medium for the growth of grasses, trees, and shrubs. The loams, gravelly loams, and silty clays are somewhat droughty. Mulching, adding topsoil, applying lime and fertilizer as needed, and constructing temporary diversions will help to get vegetation established. Slow downhill creep is likely in some areas. Surface drainage is good, but runoff may result in an erosion problem.

Group 3 for building sites

This group consists of moderately deep, well-drained, permeable soils and deep, very stony soils on slopes of 0 to 8 percent. These soils are—

Arendtsville very stony loam, 0 to 8 percent slopes.
Brecknock channery silt loam, 3 to 8 percent slopes, moderately eroded.
Edgemont very stony loam, 0 to 8 percent slopes.
Glenelg channery silt loam, 3 to 8 percent slopes,
Glenelg channery silt loam, 3 to 8 percent slopes, moderately eroded.
Glenelg channery silt loam, 3 to 8 percent slopes, severely eroded.
Highfield very stony silt loam, 0 to 8 percent slopes.
Lansdale channery loam, 3 to 8 percent slopes, moderately eroded.
Lansdale loam, 0 to 3 percent slopes, moderately eroded.
Lansdale loam, 3 to 8 percent slopes, moderately eroded.
Lansdale loam, 3 to 8 percent slopes, severely eroded.
Legore silt loam, 3 to 8 percent slopes, moderately eroded.
Legore silt loam, 3 to 8 percent slopes, severely eroded.
Montalto very stony silt loam, 3 to 8 percent slopes.
Murrill very stony loam, 0 to 8 percent slopes.
Pequea silt loam, 3 to 8 percent slopes, moderately eroded.

Most of the soils in this group are suitable for large commercial, industrial, institutional, and residential developments. Bedrock is ordinarily at a depth of 2½ to 4 feet. Bedrock quarrying may be necessary for excavations. The slopes are favorable, and all except the very stony soils can be graded without difficulty. For foundations, most of these soils are good. In the Glenelg soils, the lower part of the subsoil is micaceous and slightly elastic and the upper part of the bedrock may be weathered and soft.

These soils are satisfactory for disposal of septic tank effluent but, because of their limited depth, are only fair for disposal of industrial waste . The exposed subsoil is a fairly good medium for the growth of grasses, shrubs, and trees. Grasses are likely to need fertilizer and lime. The very stony soils are deeper than the others in the group but are more expensive to grade and excavate.

Except for the very stony soils, these are moderately productive agricultural soils.

Group 4 for building sites

This group consists of moderately deep to shallow, well-drained soils that have slopes of 8 to 25 percent. These soils are—

Brecknock channery silt loam, 8 to 15 percent slopes.
Brecknock channery silt loam, 8 to 15 percent slopes, moderately eroded.
Brecknock channery silt loam, 8 to 15 percent slopes, severely eroded.
Brecknock channery silt loam, 15 to 25 percent slopes.
Brecknock channery silt loam, 15 to 25 percent slopes, moderately eroded.
Brecknock channery silt loam, 15 to 25 percent slopes, severely eroded.
Brecknock very stony silt loam, 8 to 25 percent slopes.
Glenelg channery silt loam, 8 to 15 percent slopes.
Glenelg channery silt loam, 8 to 15 percent slopes, moderately eroded.
Glenelg channery silt loam, 8 to 15 percent slopes, severely eroded.
Glenelg channery silt loam, 15 to 25 percent slopes.
Glenelg channery silt loam, 15 to 25 percent slopes, moderately eroded.
Glenelg channery silt loam, 15 to 25 percent slopes, severely eroded.
Lansdale channery loam, 8 to 15 percent slopes, moderately eroded.
Lansdale channery loam, 8 to 15 percent slopes, severely eroded.
Lansdale channery loam, 15 to 25 percent slopes, moderately eroded.
Lansdale loam, 8 to 15 percent slopes, severely eroded.

Because of their slopes, these soils are not generally suitable for large commercial, industrial, or institutional developments. They are, however, fairly satisfactory for residential developments. For foundations, they are fair to good. Bedrock is ordinarily at a depth of 2 to 3 feet in the Brecknock soils, and some excavations may require bedrock quarrying. The Glenelg soils are underlain in many places by weathered, slightly elastic, micaceous schist.

Normal loads of septic tank effluent can be disposed of satisfactorily, but because of strong slopes and limited

depth, these soils should not be used for disposal of industrial waste.

The exposed subsoil is a fairly good medium for the growth of grasses, shrubs, and trees. The steeper soils and the severely eroded soils are somewhat droughty. Mulching, adding topsoil, applying fertilizer and lime, and constructing temporary diversions will help to get vegetation established. Slow downhill creep may occur. Runoff is rapid enough to cause gullying. The very stony soils are expensive to grade and excavate.

All of the soils in this group except the very stony ones are moderately productive if used for agriculture.

Group 5 for building sites

This group consists of shallow to moderately deep, well-drained soils that have slopes of 0 to 8 percent. These soils are—

Cardiff slaty silt loam, 3 to 8 percent slopes, moderately eroded.
Catoctin channery silt loam, 3 to 8 percent slopes, severely eroded.
Made land, Penn and Lansdale materials, gently sloping.
Manor channery loam, 3 to 8 percent slopes.
Manor channery loam, 3 to 8 percent slopes, moderately eroded.
Manor channery loam, 3 to 8 percent slopes, severely eroded.
Manor very stony loam, 0 to 8 percent slopes.
Penn loam, 3 to 8 percent slopes, moderately eroded.
Penn loam, 3 to 8 percent slopes, severely eroded.
Penn shaly silt loam, 3 to 8 percent slopes, severely eroded.
Penn silt loam, 0 to 3 percent slopes, moderately eroded.
Penn silt loam, 3 to 8 percent slopes.
Penn silt loam, 3 to 8 percent slopes, moderately eroded.
Penn silt loam, 3 to 8 percent slopes, severely eroded.
Penn very stony loam, 0 to 8 percent slopes.
Penn-Lansdale loams, 0 to 3 percent slopes.
Penn-Lansdale loams, 3 to 8 percent slopes, moderately eroded.
Penn-Lansdale loams, 3 to 8 percent slopes, severely eroded.
Penn and Readington shaly silt loams, 3 to 8 percent slopes, severely eroded.

These soils are generally suitable for large commercial, industrial, institutional, and residential developments. For foundations, they are generally good. The slopes are favorable, and all except the very stony soils can be graded without difficulty. Bedrock is ordinarily at a depth of 1½ to 2½ feet. Bedrock quarrying is necessary for most excavations.

These soils are not suitable for disposal of industrial waste, and, because of their limited depth to bedrock, they are poorly suited to disposal of septic tank effluent. Waste may seep to the surface, or it may sink into cracks in the bedrock and contaminate the ground water. The Penn and Readington shaly silt loams, which are only moderately well drained, are even less suitable for disposal of waste than the other soils in the group.

When the subsoil is exposed, these soils are a poor medium for the growth of grasses, shrubs, and trees. They are droughty. Mulching, adding topsoil, and applying lime and fertilizer will help to get vegetation established. All of the soils in this group are moderate to moderately low in productivity if used for agriculture.

Group 6 for building sites

This group consists of shallow, well-drained soils on slopes of 8 to 25 percent. These soils are—

Cardiff slaty silt loam, 8 to 15 percent slopes, moderately eroded.
Cardiff slaty silt loam, 8 to 15 percent slopes, severely eroded.
Cardiff slaty silt loam, 15 to 25 percent slopes, moderately eroded.
Cardiff slaty silt loam, 15 to 25 percent slopes, severely eroded.
Catoctin channery silt loam, 8 to 15 percent slopes, severely eroded.
Catoctin channery silt loam, 15 to 25 percent slopes, severely eroded.
Legore clay loam, 8 to 15 percent slopes, severely eroded.
Legore clay loam, 15 to 25 percent slopes, severely eroded.
Legore silt loam, 15 to 25 percent slopes, moderately eroded.
Made land, Penn and Lansdale materials, strongly sloping.
Manor channery loam, 8 to 15 percent slopes.
Manor channery loam, 8 to 15 percent slopes, moderately eroded.
Manor channery loam, 8 to 15 percent slopes, severely eroded.
Manor channery loam, 15 to 25 percent slopes.
Manor channery loam, 15 to 25 percent slopes, moderately eroded.
Manor channery loam, 15 to 25 percent slopes, severely eroded.
Manor very stony loam, 8 to 25 percent slopes, moderately eroded.
Penn loam, 8 to 15 percent slopes, moderately eroded.
Penn loam, 8 to 15 percent slopes, severely eroded.
Penn shaly silt loam, 8 to 15 percent slopes, severely eroded.
Penn shaly silt loam, 15 to 25 percent slopes, severely eroded.
Penn silt loam, 8 to 15 percent slopes.
Penn silt loam, 8 to 15 percent slopes, moderately eroded.
Penn silt loam, 8 to 15 percent slopes, severely eroded.
Penn silt loam, 15 to 25 percent slopes.
Penn silt loam, 15 to 25 percent slopes, moderately eroded.
Penn soils, 15 to 25 percent slopes, severely eroded.
Penn very stony loam, 8 to 25 percent slopes.
Penn-Lansdale loams, 8 to 15 percent slopes, moderately eroded.
Penn-Lansdale loams, 8 to 15 percent slopes, severely eroded.
Penn-Lansdale loams, 15 to 25 percent slopes, severely eroded.
Pequea silt loam, 8 to 15 percent slopes, moderately eroded.
Pequea silt loam, 8 to 15 percent slopes, severely eroded.
Pequea silt loam, 15 to 25 percent slopes, severely eroded.
Steinsburg channery loam, 8 to 15 percent slopes, severely eroded.
Steinsburg channery loam, 15 to 25 percent slopes, severely eroded.

Because of their slopes, these soils are not suitable for large commercial, industrial, or institutional developments, but they are satisfactory for residential developments. Bedrock is generally at a depth of 1 to 2 feet. Excavations usually require some bedrock quarrying, except possibly in the Manor or Pequea soils, which are underlain in places by soft, weathered, somewhat elastic schist, and in the Legore soils, which are underlain in places by gritty sandy clay loam. The very stony soils are expensive to grade and to excavate.

These are shallow soils, and when disturbed they are a poor medium for the growth of grasses, shrubs, and trees. They are droughty, especially the severely eroded soils. Mulching, adding topsoil, applying lime and fertilizer, and constructing temporary diversions will help to get vegetation established. Runoff and erosion are problems, and slow downhill creep may occur.

These soils are not suitable for disposal of industrial waste, and, although well drained, they have limited capacity for disposal of septic tank effluent. Excess water in the infiltration field is likely to cause seepage on the lower hillsides.

Group 7 for building sites

This group consists of deep, moderately well drained soils that have slopes of 0 to 8 percent. These soils are—

Altavista silt loam, 0 to 3 percent slopes.
Altavista silt loam, 3 to 8 percent slopes, moderately eroded.
Bedford silt loam, 0 to 3 percent slopes.
Bedford silt loam, 3 to 8 percent slopes, moderately eroded.
Bedford silt loam, 3 to 8 percent slopes, severely eroded.
Glenville silt loam, 0 to 3 percent slopes.

Glenville silt loam, 3 to 8 percent slopes.
Glenville silt loam, 3 to 8 percent slopes, moderately eroded.
Lehigh channery silt loam, 0 to 3 percent slopes.
Lehigh channery silt loam, 3 to 8 percent slopes.
Lehigh channery silt loam, 3 to 8 percent slopes, moderately eroded.
Lehigh channery silt loam, 3 to 8 percent slopes, severely eroded.
Lehigh very stony silt loam, 0 to 8 percent slopes.
Mount Lucas silt loam, 0 to 3 percent slopes.
Mount Lucas silt loam, 3 to 8 percent slopes.
Mount Lucas silt loam, 3 to 8 percent slopes, moderately eroded.
Mount Lucas very stony silt loam, 0 to 8 percent slopes.
Penn and Readington shaly silt loams, 3 to 8 percent slopes, moderately eroded.
Raritan silt loam, 0 to 3 percent slopes.
Raritan silt loam, 3 to 8 percent slopes, moderately eroded.
Readington silt loam, 0 to 3 percent slopes.
Readington silt loam, 3 to 8 percent slopes.
Readington silt loam, 3 to 8 percent slopes, moderately eroded.
Sciotoville silt loam, 0 to 3 percent slopes.
Sciotoville silt loam, 3 to 8 percent slopes.

These soils are fair for large commercial, industrial, institutional, and residential developments. Bedrock is ordinarily at a depth of 4 feet or more. Foundations are usually satisfactory. The principal limitation is slow permeability in the lower part of the subsoil. This results in a seasonal high water table that lasts through winter and the early part of spring and may persist into summer if rainfall is above normal. Sealing and drainage of basements are difficult because of the high water table.

None of the soils in this group are suitable for disposal of industrial waste. Buildings should be connected to established sewerage and water systems. The high water table may prevent, for weeks at a time, the normal operation of septic tank infiltration fields. In the Bedford and Glenville soils, which are more readily permeable than the others in the group, septic tanks may work if an independent tile system with adequate outlets is installed to drain the infiltration field. For seasonal use, as for summer camps, septic tanks may work satisfactorily if the infiltration fields are large. The Lehigh soils, which are very slowly permeable in the substratum, present the most serious problem in the disposal of waste.

Grasses, shrubs, and trees for planting on these soils must be carefully selected.

Group 8 for building sites

This group consists of deep to moderately deep, moderately well drained soils that have slopes of 8 to 25 percent. These soils are—

Bedford silt loam, 8 to 15 percent slopes, moderately eroded.
Bedford silt loam, 8 to 15 percent slopes, severely eroded.
Lehigh channery silt loam, 8 to 15 percent slopes.
Lehigh channery silt loam, 8 to 15 percent slopes, moderately eroded.
Lehigh channery silt loam, 8 to 15 percent slopes, severely eroded.
Lehigh channery silt loam, 15 to 25 percent slopes, moderately eroded.
Lehigh channery silt loam, 15 to 25 percent slopes, severely eroded.
Lehigh very stony silt loam, 8 to 25 percent slopes.
Penn and Readington shaly silt loams, 8 to 15 percent slopes, severely eroded.

These soils are not suitable for large commercial, industrial, institutional, or residential developments. They are slowly permeable in the lower part of the subsoil and are subject to seepage on the lower hillsides in winter and early in spring, when the water table is high. They provide satisfactory foundations for residences, but excavation of the hard porcelanite bedrock may be necessary on the Lehigh soils. Basements usually have seepage and drainage problems. The very stony Lehigh soil is exget pensive to excavate and grade.

These soils are not suitable for disposal of industrial waste. The high water table interferes to some extent with the infiltration of septic tank effluent and may result in seepage on the lower slopes.

When the subsoil is exposed, these soils are a poor medium for the growth of grasses, trees, and shrubs. Mulching, adding topsoil, applying lime and fertilizer liberally, and constructing temporary diversions will help to get a cover of carefully selected plants established.

All of the soils in this group are moderately low or low in productivity if used for agriculture.

Group 9 for building sites

This group consists of somewhat poorly drained and poorly drained soils that occur on uplands and have slopes of 0 to 8 percent. These soils are—

Croton silt loam, 0 to 3 percent slopes.
Croton silt loam, 0 to 3 percent slopes, moderately eroded.
Croton silt loam, 3 to 8 percent slopes.
Croton silt loam, 3 to 8 percent slopes, moderately eroded.
Croton very stony silt loam, 0 to 8 percent slopes.
Guthrie silt loam.
Lamington silt loam.
Lawrence silt loam.
Watchung silt loam, 0 to 3 percent slopes.
Watchung silt loam, 3 to 5 percent slopes.
Watchung very stony silt loam, 0 to 8 percent slopes.
Worsham silt loam.

Although the slopes are favorable and the depth to bedrock is ordinarily more than 4 feet, these soils are generally unsuitable for commercial, industrial, institutional, or residential developments. The principal limitation is the slowly permeable subsoil, which causes the water table to be high in winter and spring. In some of the nearly level soils, the water table is high for most of the year. These soils do not provide satisfactory foundations for heavy structures. For lighter structures, fill can be used to raise foundations above the water table. Basements are not feasible.

These soils are completely unsuitable for disposal of industrial waste, and disposal of septic tank effluent is impractical because the lines would be below the water table for long periods.

Woodland, natural parks, and game preserves are the best uses for these soils. Some sites would be excellent for ponds or lakes.

Group 10 for building sites

This group consists of soils that occur on flood plains and colluvial slopes and have slopes of 0 to 8 percent. These soils are—

Bermudian silt loam, 0 to 3 percent slopes.
Bowmansville silt loam.
Bowmansville silt loam, local alluvium.
Chewacla silt loam.
Congaree silt loam.
Huntington silt loam.
Huntington silt loam, local alluvium, 0 to 3 percent slopes.
Lindside silt loam.
Melvin silt loam.
Rowland silt loam.
Wehadkee silt loam.
Wehadkee silt loam, local alluvium, 3 to 8 percent slopes.

These soils are unsuitable for buildings. All except the local alluvium soils are flooded frequently or occasionally. The Bowmansville and Wehadkee local alluvium soils are affected by seepage from adjacent slopes for much of the year. Huntington silt loam, local alluvium, 0 to 3 percent slopes, is flooded only occasionally but is affected by runoff and hillside creep from adjoining slopes.

The well drained and moderately well drained soils in this group have considerable value as cropland and pasture. The Bowmansville soils on the wider flood plains are well suited to development as habitats for wildlife that requires a wet environment.

Group 11 for building sites

This group consists of well-drained soils, most of which have slopes of more than 25 percent. These soils are—

Athol loam and silt loam, 25 to 35 percent slopes, moderately eroded.
Brecknock channery silt loam, 25 to 35 percent slopes, moderately eroded.
Brecknock very stony silt loam, 25 to 65 percent slopes.
Cardiff slaty silt loam, 25 to 35 percent slopes, severely eroded.
Edgemont soils, 25 to 35 percent slopes, moderately eroded.
Edgemont very stony loam, 25 to 60 percent slopes.
Legore clay loam, 25 to 35 percent slopes, severely eroded.
Lewisberry sandy loam, 25 to 45 percent slopes, moderately eroded.
Lewisberry and Landsdale very stony sandy loams, 26 to 60 percent slopes.
Manor channery loam, 25 to 45 percent slopes.
Manor channery loam, 25 to 45 percent slopes, moderately eroded.
Manor channery loam, 25 to 45 percent slopes, severely eroded.
Manor channery loam, 45 to 60 percent slopes.
Manor very stony loam, 25 to 75 percent slopes, moderately eroded.
Montalto extremely stony silt loam, 8 to 25 percent slopes.
Montalto extremely stony silt loam, 25 to 60 percent slopes.
Montalto very stony silt loam, 25 to 60 percent slopes.
Penn soils, 25 to 35 percent slopes, severely eroded.
Penn soils, 35 to 60 percent slopes, severely eroded.
Penn very stony loam, 25 to 60 percent slopes.
Pequea silt loam, 25 to 35 percent slopes, moderately eroded.
Steinsburg channery loam, 25 to 35 percent slopes, moderately eroded.
Steinsburg channery loam, 25 to 35 percent slopes, severely eroded.

These soils are much too steep for commercial, industrial, or institutional developments and ordinarily too steep for residential building. Their best uses in suburban areas are woodland, parks, game preserves, and open spaces. A few of the nonstony areas can be used as pasture. Some areas that command scenic views can be used for high-cost luxury housing. Special investigation and special design are required for each site.

Montalto extremely stony silt loam, 8 to 25 percent slopes, while not so steep as the other soils in this group, is similar in suitability for use because of its extreme stoniness.

Engineering Uses of Soils

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. Permeability, compaction characteristics, drainage, grain size, plasticity, reaction, and shrink-swell characteristics are among the properties most important to engineers. Depth to the water table, depth to bedrock, and topography are also important.

This soil survey report contains information that can be used by engineers to—

1. Make soil and land-use studies that will aid in selecting and developing industrial, commercial, residential, and recreational sites.
2. Make preliminary estimates of the soil properties that are important in planning agricultural drainage systems, farm ponds, irrigation systems, and diversion terraces.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting locations for highways, airports, pipelines, and cables and in planning detailed investigations at the selected locations.
4. Locate probable sources of gravel and other construction material.
5. Correlate performance of engineering structures with soil mapping units to develop information for overall planning that will be useful in designing structures and planning certain engineering practices.
6. Determine the suitability of soils for cross-country movement of vehicles and construction equipment.
7. Supplement the information obtained from other published maps and reports and aerial photographs to make maps and reports that can be used readily by engineers.
8. Develop other preliminary estimates for construction purposes, pertinent to the particular area.

It is not intended that this report will eliminate the need for on-site sampling and testing of soils when the design and construction of specific engineering works are being considered. The report should be used primarily for planning detailed field investigations to determine the condition of the soil material in place at the proposed site. The information in the report will enable soils engineers to concentrate on the most suitable soils, to take fewer soil samples, and to make an adequate investigation at minimum cost.

Some of the terms used by soil scientists may not be familiar to engineers, and some words—for example, *soil, clay, silt,* and *sand*—may have special meanings in soil science. These terms are defined in the Glossary at the back of this report.

Engineering classification systems

Two systems of classifying soils are in general use among engineers. Both are used in this report.

Most highway engineers classify soil materials in accordance with the system approved by the American Association of State Highway Officials (AASHO)(*1*). In this system, classification is based on field performance of highways. All soil materials are classified in seven principal groups. The groups range from A-1 (gravelly soils of high bearing capacity, the best soils for subgrades) to A-7 (clay soils having low strength when wet, the poorest soils for subgrade). Within each group, the relative engineering value of the soil material is indicated by a group index number. Group indexes range from 0 for the best materials to 20 for the poorest. The group index number, when used, is shown in parentheses after the soil group symbol.

Some engineers prefer to use the Unified soil classification system established by the Waterways Experiment Station, Corps of Engineers (*14*). This system is based on identification of soils according to their texture and plasticity and their performance as engineering construction materials. Soil materials are identified as coarse grained (8 classes), fine grained (6 classes), or highly organic. Estimated classifications of the soils in York County, under both systems, are given in table 5.

Soil properties and engineering interpretations

The information and interpretations of most significance to engineers are presented in tables 5, 6, and 7. Additional information can be found in these sections of the report: "Descriptions of the Soils," "General Soil Map," and "Physiography, Bedrock, and Drainage." Brief explanations of how the information in the tables was obtained and explanations of the significance of some of the items follow. A useful reference book that gives further information on testing soils and determining their suitability for engineering purposes is the PCA Soil Primer (*7*).

ESTIMATED PROPERTIES OF THE SOILS.—Table 5 gives brief descriptions of the pertinent characteristics of the soils of each series and estimates of some of the physical properties that affect engineering work. For the Cardiff, Chester, Croton, Elioak, Lehigh, Lewisberry, Manor, Penn, and Readington soils, test data were available on which to base the estimates of soil properties (see table 7). For some of the other soils, the properties were estimated on the basis of tests of soils in nearby counties, and for some by comparison of soils not tested with similar soils for which test data were available. Estimated engineering classifications and some of the soil properties are given only for the soil beneath the surface layer, since it is the lower part of the profile that is significant in engineering.

The rates of permeability given in table 5 are based on the movement of water through the soil in its undisturbed state. The rates depend largely on the texture and structure of the soils.

Available moisture, measured in inches per inch of soil depth, is the approximate amount of capillary water in the soil at field capacity. 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.

The shrink-swell potential is an indication of the volume change to be expected with a change in moisture content. In general, soils classified as CH and A–7 have a high shrink-swell potential. Clean sand and gravel (single-grain material) and most other nonplastic or slightly plastic soils have a low shrink-swell potential.

The estimates in table 5 are based largely on modal soils; consequently, considerable variation from these values should be anticipated. More information on the range of properties of the soils is given in other sections of this report.

ENGINEERING INTERPRETATIONS.—Table 6 gives estimates of the suitability of the soils of the county for specified engineering uses and lists the soil properties that present hazards or difficulties in specified engineering uses. The statements in this table are based on the known or estimated physical properties of the soils and represent the judgment and opinions of engineers and soil scientists who have worked in this county or in other counties where the soils are similar.

The ratings as to suitability for winter grading apply only to the soil material and not to the bedrock. These ratings depend largely on the texture of the soil, the natural water content, and the depth to the water table in winter. Clay soils are rated poor. They are difficult to handle when wet and must be dried to the proper moisture content for compaction. Also, they are difficult to excavate when frozen. They should not be used in the compacted road section. Fine sands and silts that have a high water table in winter are rated very poor. In such soils, extensive ice lenses can develop. If this frozen material is placed in the compacted road section, differential settlement may occur in the embankment when the ice melts.

The susceptibility of a soil to frost action depends on the texture of the soil material, the length of time the temperature is below freezing, and the depth to the water table

TABLE 5.—*Brief descriptions of soils*

[Properties of the Cardiff, Chester, Croton, Elioak, Lehigh, Lewisberry, Manor, Penn, and Readington soils are based on analyses of soil by these analyses and by analyses of soils in nearby counties. Except for permeability

Map symbol	Soil	Depth to seasonal water table	Depth to bedrock	Brief description of soil and site [1]
		Ft.	*Ft.*	
AaA AaB2	Altavista silt loam, 0 to 3 percent slopes. Altavista silt loam, 3 to 8 percent slopes, moderately eroded.	1½ to 2½	4 to 7	4 to 7 feet of moderately well drained silt loam to silty clay loam on stream terraces; soil material derived mainly from schist.
AgB2 AgC2 AgD3 ArB ArD	Arendtsville gravelly loam, 3 to 8 percent slopes, moderately eroded. Arendtsville gravelly loam, 8 to 15 percent slopes, moderately eroded. Arendtsville gravelly loam, 15 to 25 percent slopes, severely eroded. Arendtsville very stony loam, 0 to 8 percent slopes. Arendtsville very stony loam, 8 to 25 percent slopes.	More than 6	6 to 10	6 to 10 feet of well-drained gravelly loam to clay loam on very old deltas; soil material derived from aporhyolite, metabasalt, sericite schist, and quartzite. The very stony phases have rounded stones 10 to 20 inches in diameter on the surface and throughout the profile.

See footnotes at end of table.

during that period. Silts and fine sands that have a high water table are highly susceptible to frost action.

The suitability of a soil for use as road subgrade or road fill depends largely on the texture and the natural water content. Highly plastic soils are poor for road subgrade. For fill they are poor or fair, depending on how much water they contain and how difficult they are to handle, to dry, and to compact. Highly micaceous soils are poor for subgrade and fair for fill. They are difficult to compact and are highly erodible. They can be used only on gentle slopes and should be covered with fast-growing vegetation.

In estimating the ratings of the soils as sources of topsoil, the uppermost 8 to 12 inches was generally considered.

Vertical alinement of highways calls for careful consideration as to the kind of soil material and the need for drainage. The factors to be considered include instability, shallowness to bedrock, presence of boulders, presence of highly plastic clay or highly erodible soil in cut sections, seepage, high water table, and flooding. If there is a perched water table, a survey should be made to determine whether interceptor drains or underdrains are needed before highway cuts are made. If the perched water table is close to the pavement, differential volume changes may occur, particularly within the freezing zone, and the decrease in bearing capacity of the saturated or thawed foundation material may cause deterioration of the pavement. Seepage in the backslopes of cuts may result in slumping or sliding of the underlying material. It is common practice to establish the vertical location of roads so that a minimum of cutting and filling will be required.

Roads on flood plains need to be constructed on continuous embankments so that they will be at least 2 to 4 feet above high water. Materials suitable for use in the embankments can be obtained from the adjoining bottom lands and uplands.

For most of the uses listed in table 6, very stony soils have an additional limitation because of the presence of boulders on the surface and in the soil. Some nonstony soils have had the boulders removed from the surface but still contain some in the lower horizons.

TEST DATA.—Table 7 presents data obtained by laboratory tests of 27 samples of soils that occur extensively in York County. Although three samples of each kind of soil were taken, each in a different locality, the test data may not show the maximum degree of variation in properties in the B and C horizons. Also, since all samples were taken at a depth of 5 feet or less, the test data may not be an adequate basis for estimating the characteristics of the soil material in deep cuts in rolling and hilly areas.

The data were obtained by mechanical analyses and by tests made to determine the liquid limit and the plastic limit. Mechanical analyses were made by combining the sieve and hydrometer methods. Percentages of clay obtained by the hydrometer method should not be used as a basis for naming soil textural classes.

The liquid limit and plastic limit tests measure 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 a solid to a semisolid, or plastic, state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil passes from a solid to a plastic state. The liquid limit is the moisture content at which the material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is in a plastic condition.

Table 7 also gives compaction, or moisture-density, data for the samples tested. If a soil material is compacted at successively higher moisture content, assuming that the compactive effort remains constant, the density of the compacted material will increase until the optimum moisture content is reached. After that, density decreases with increase in moisture content. The highest dry density obtained in the compaction test is termed maximum dry density. Moisture-density data are important in earthwork, for as a rule optimum stability is obtained if the soil is compacted to about the maximum dry density. This is most easily done at the optimum moisture content.

and their estimated physical properties

samples by the Pennsylvania Department of Highways. Properties of other soils are estimates interpolated from the data obtained and available moisture capacity, the properties of the surface layer were not estimated]

Depth from surface	Classification		Percentage passing sieve—			Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Optimum moisture [2]	Maximum dry density [3]
	Unified	AASHO	No. 4	No. 10	No. 200						
In.						*In. per hr.*	*In. per in. of depth*	*pH*		*Pct.*	*Lb. per cu. ft.*
0 to 10						2.0 to 6.2	0. 27				
10 to 23	CL	A–6	100	100	80 to 90	0.6 to 2.0	. 24	5. 8	Moderate	18	100
23 to 60	ML–CL	A–6	100	100	75 to 85	0.6 to 2.0	. 18	4. 8	Moderate	16	105
0 to 10						2.0 to 6.2	. 19				
10 to 34	GM–GC	A–4	65 to 75	60 to 65	40 to 50	2.0 to 6.2	. 17	5. 8	Low	12	120
34 to 48+	GM–GC	A–4	65 to 75	55 to 60	40 to 45	2.0 to 6.2	. 15	5. 4	Low	10	125

TABLE 5.—*Brief descriptions of soils and*

Map symbol	Soil	Depth to seasonal water table	Depth to bedrock	Brief description of soil and site [1]
		Ft.	*Ft.*	
AbA	Ashton loam, 0 to 3 percent slopes.	More than 5	6 to 8	6 to 8 feet of well-drained loam to sandy clay loam on low stream terraces; soil material washed mainly from soils derived from limestone but includes some material from soils derived from sandstone and shale.
AbB	Ashton loam, 3 to 8 percent slopes.			
AtA	Athol loam and silt loam, 0 to 3 percent slopes.	More than 5	4 to 6	4 to 6 feet of well-drained silt loam to clay loam underlain by limestone conglomerate and red Triassic sandstone and shale.
AtB2	Athol loam and silt loam, 3 to 8 percent slopes, moderately eroded.			
AtC2	Athol loam and silt loam, 8 to 15 percent slopes, moderately eroded.			
AtC3	Athol loam and silt loam, 8 to 15 percent slopes, severely eroded.			
AtD2	Athol loam and silt loam, 15 to 25 percent slopes, moderately eroded.			
AtD3	Athol loam and silt loam, 15 to 25 percent slopes, severely eroded.			
AtE2	Athol loam and silt loam, 25 to 35 percent slopes, moderately eroded.			
BdA	Bedford silt loam, 0 to 3 percent slopes.	1½ to 2½	4 to 7	4 to 7 feet of moderately well drained silt loam and silty clay loam derived from colluvium and alluvium of limestone and calcareous shale.
BdB2	Bedford silt loam, 3 to 8 percent slopes, moderately eroded.			
BdB3	Bedford silt loam, 3 to 8 percent slopes, severely eroded.			
BdC2	Bedford silt loam, 8 to 15 percent slopes, moderately eroded.			
BdC3	Bedford silt loam, 8 to 15 percent slopes, severely eroded.			
BeA	Bermudian silt loam, 0 to 3 percent slopes.	More than 6	3 to 9	3 to 8 feet of silt loam to loam on flood plains; soil material washed from red Triassic sandstone and shale uplands. Subject to occasional overflow. High bottom phases not subject to overflow and are about 3½ feet in depth.
BhA	Bermudian silt loam, high bottom, 0 to 3 percent slopes.			
BhB	Bermudian silt loam, high bottom, 3 to 8 percent slopes.			
BmA	Birdsboro silt loam, 0 to 3 percent slopes.	More than 3	4 to 7	4 to 7 feet of well-drained silt loam and silty clay loam on stream terraces; derived mainly from red Triassic sandstone and shale materials.
BmB2	Birdsboro silt loam, 3 to 8 percent slopes, moderately eroded.			
BmC2	Birdsboro silt loam, 8 to 15 percent slopes, moderately eroded.			
Bn	Bowmansville silt loam.	0 to 1½	4 to 8	4 to 8 feet of poorly drained silt loam on flood plains; soil material washed from red Triassic sandstone and shale. Subject to periodic flooding.
Bo	Bowmansville silt loam, local alluvium.			
BrB2	Brecknock channery silt loam, 3 to 8 percent slopes, moderately eroded.	More than 3	1½ to 3	1½ to 3 feet of well-drained silt loam and silty clay loam on uplands; underlain by metamorphosed sandstone and shale. The very stony phases have stones from 10 inches to 3 feet in diameter.
BrC	Brecknock channery silt loam, 8 to 15 percent slopes.			
BrC2	Brecknock channery silt loam, 8 to 15 percent slopes, moderately eroded.			
BrC3	Brecknock channery silt loam, 8 to 15 percent slopes, severely eroded.			
BrD	Brecknock channery silt loam, 15 to 25 percent slopes.			
BrD2	Brecknock channery silt loam, 15 to 25 percent slopes, moderately eroded.			
BrD3	Brecknock channery silt loam, 15 to 25 percent slopes, severely eroded.			
BrE2	Brecknock channery silt loam, 25 to 35 percent slopes, moderately eroded.			
BvD	Brecknock very stony silt loam, 8 to 25 percent slopes.			
BvF	Brecknock very stony silt loam, 25 to 65 percent slopes.			

See footnotes at end of table.

their estimated physical properties—Continued

Depth from surface	Classification		Percentage passing sieve—			Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Optimum moisture [2]	Maximum dry density [3]
	Unified	AASHO	No. 4	No. 10	No. 200						
In.						*In. per hr.*	*In. per in. of depth*	*pH*		*Pct.*	*Lb. per cu. ft.*
0 to 10						2.0 to 6.2	.22				
10 to 36	CL	A-4	100	100	75 to 85	2.0 to 6.2	.20	5.8	Moderate	14	115
36 to 72	ML-CL	A-4	100	100	70 to 80	2.0 to 6.2	.19	6.0	Moderate	15	114
0 to 8						2.0 to 6.2	.26				
8 to 32	ML-CL	A-7	100	85 to 95	70 to 80	2.0 to 6.2	.21	5.7	Moderate	22	104
32 to 48	SC-SM	A-6	80 to 90	70 to 80	40 to 45	2.0 to 6.2	.17	6.1	Moderate	20	116
0 to 8						2.0 to 6.2	.28				
8 to 34	CL	A-6	85 to 95	75 to 85	65 to 75	2.0 to 6.2	.24	5.8	Moderate	20	106
34 to 60	CL	A-7	80 to 90	75 to 85	65 to 75	0.6 to 2.0	.22	5.3	Moderate	22	102
0 to 8						2.0 to 6.2	.28				
8 to 36+	ML-CL	A-4	90 to 95	80 to 90	70 to 80	2.0 to 6.2	.24	5.8	Low	16	106
0 to 8						2.0 to 6.2	.27				
8 to 36	CL	A-6	90 to 95	80 to 90	70 to 80	2.0 to 6.2	.23	5.4	Moderate	16	111
36 to 60+	ML	A-4	85 to 95	75 to 85	60 to 75	2.0 to 6.2	.22	5.4	Low	13	113
0 to 8						2.0 to 6.2	.22				
8 to 96	ML-CL	A-4	100	90 to 95	75 to 90	0.6 to 2.0	(4)	5.2	Low	19	101
0 to 9						2.0 to 6.2	.23				
9 to 22	ML-CL	A-4	70 to 80	60 to 70	50 to 60	2.0 to 6.2	.22	5.4	Low	15	112
22 to 30	ML-CL	A-4	75 to 85	65 to 75	55 to 65	0.6 to 2.0	.19	5.2	Low	16	110

TABLE 5.—*Brief descriptions of soils and*

Map symbol	Soil	Depth to seasonal water table	Depth to bedrock	Brief description of soil and site [1]
		Ft.	*Ft.*	
CaB2	Cardiff slaty silt loam, 3 to 8 percent slopes, moderately eroded.	More than 3	1½ to 3	1½ to 3 feet of well-drained slaty silt loam on uplands; underlain by slate.
CaC2	Cardiff slaty silt loam, 8 to 15 percent slopes, moderately eroded.			
CaC3	Cardiff slaty silt loam, 8 to 15 percent slopes, severely eroded.			
CaD2	Cardiff slaty silt loam, 15 to 25 percent slopes, moderately eroded.			
CaD3	Cardiff slaty silt loam, 15 to 25 percent slopes, severely eroded.			
CaE3	Cardiff slaty silt loam, 25 to 35 percent slopes, severely eroded.			
CcB3	Catoctin channery silt loam, 3 to 8 percent slopes, severely eroded.	More than 3	1 to 2	1 to 2 feet of well-drained silt loam on uplands; underlain by aporhyolite or metabasalt.
CcC3	Catoctin channery silt loam, 8 to 15 percent slopes, severely eroded.			
CcD3	Catoctin channery silt loam, 15 to 25 percent slopes, severely eroded.			
ChA	Chester silt loam, 0 to 3 percent slopes.	More than 5	4 to 6	4 to 6 feet of well-drained silt loam and silty clay loam on uplands; underlain by schist or phyllite.
ChA2	Chester silt loam, 0 to 3 percent slopes, moderately eroded.			
ChB	Chester silt loam, 3 to 8 percent slopes.			
ChB2	Chester silt loam, 3 to 8 percent slopes, moderately eroded.			
ChB3	Chester silt loam, 3 to 8 percent slopes, severely eroded.			
ChC2	Chester silt loam, 8 to 15 percent slopes, moderately eroded.			
Ck	Chewacla silt loam.	1½ to 2½	4 to 6	4 to 6 feet of moderately well drained silt loam and silty clay loam on bottom lands; washed principally from soils developed from schist, phyllite, diabase, and metabasalt. Subject to periodic overflow.
CoA	Conestoga silt loam, 0 to 3 percent slopes.	More than 5	4 to 6	4 to 6 feet of well-drained silt loam and silty clay loam on uplands; underlain by calcareous schist.
CoA2	Conestoga silt loam, 0 to 3 percent slopes, moderately eroded.			
CoB2	Conestoga silt loam, 3 to 8 percent slopes, moderately eroded.			
CoB3	Conestoga silt loam, 3 to 8 percent slopes, severely eroded.			
CoC2	Conestoga silt loam, 8 to 15 percent slopes, moderately eroded.			
CoC3	Conestoga silt loam, 8 to 15 percent slopes, severely eroded.			
CoD3	Conestoga silt loam, 15 to 25 percent slopes, severely eroded.			
Cp	Congaree silt loam.	More than 3	4 to 7	4 to 7 feet of well-drained silt loam on bottom lands; soil material washed primarily from upland soils derived from schist and phyllite.
CrA	Croton silt loam, 0 to 3 percent slopes.	0 to 1½	3 to 6	3 to 6 feet of poorly drained silt loam, silty clay loam, and silty clay underlain by Triassic shale or sandstone. The very stony phase has irregularly shaped stones from 10 inches to 3 feet in diameter on the surface and throughout the profile.
CrA2	Croton silt loam, 0 to 3 percent slopes, moderately eroded.			
CrB	Croton silt loam, 3 to 8 percent slopes.			
CrB2	Croton silt loam, 3 to 8 percent slopes, moderately eroded.			
CvB	Croton very stony silt loam, 0 to 8 percent slopes.			

See footnotes at end of table.

their estimated physical properties—Continued

Depth from surface	Classification		Percentage passing sieve—			Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Optimum moisture [2]	Maximum dry density [3]
	Unified	AASHO	No. 4	No. 10	No. 200						
In.						*In. per hr.*	*In. per in. of depth*	*pH*		*Pct.*	*Lb. per cu. ft.*
0 to 10						2.0 to 6.2	.13				
10 to 20	GM	A-2-4	50 to 60	40 to 50	25 to 35	2.0 to 6.2	.16	5.6	Low	18	110
0 to 9						2.0 to 6.2	.23				
9 to 22	ML-CL	A-6	85 to 95	75 to 85	65 to 75	2.0 to 6.2	.17	5.4	Moderate	16	112
0 to 11						2.0 to 6.2	.25				
11 to 30	ML-CL	A-6	90 to 100	90 to 95	70 to 80	2.0 to 6.2	.22	6.7	Moderate	19	107
30 to 44+	SM	A-2-4	75 to 90	70 to 80	20 to 30	2.0 to 6.2	.16	5.2	Low	17	110
0 to 24	ML-CL	A-4	100	90 to 100	90 to 95	2.0 to 6.2	.27	5.9	Low	18	110
24 to 60	ML-CL	A-6	90 to 100	85 to 95	80 to 90	0.6 to 2.0	.21	5.5	Moderate	20	105
0 to 8						2.0 to 6.2	.27				
8 to 36	MH	A-7	100	95 to 100	85 to 95	2.0 to 6.2	.23	5.6	Moderate to high.	18	107
36 to 72	ML	A-7	95 to 100	85 to 95	80 to 90	2.0 to 6.2	.17	5.8	Moderate	21	104
0 to 10						2.0 to 6.2	.27				
10 to 50	CL	A-6	85 to 95	75 to 90	70 to 80	2.0 to 6.2	.22	5.4	Moderate	15	110
0 to 10						2.0 to 6.2	.22				
10 to 27	CH	A-7-6	100	100	85 to 95	0 to 0.2	.21	5.2	High	21	101
27 to 36	CL	A-6	100	100	85 to 90	0 to 0.2	.19	5.2	Moderate	16	112

TABLE 5.—*Brief descriptions of soils and*

Map symbol	Soil	Depth to seasonal water table	Depth to bedrock	Brief description of soil and site [1]
		Ft.	*Ft.*	
DuA	Duffield silt loam, 0 to 3 percent slopes.	More than 5	3 to 6	4 to 6 feet of well-drained silt loam and silty clay loam on uplands; underlain by siliceous or cherty limestone.
DuA2	Duffield silt loam, 0 to 3 percent slopes, moderately eroded.			
DuB	Duffield silt loam, 3 to 8 percent slopes.			
DuB2	Duffield silt loam, 3 to 8 percent slopes, moderately eroded.			
DuC2	Duffield silt loam, 8 to 15 percent slopes, moderately eroded.			
DuD2	Duffield silt loam, 15 to 25 percent slopes, moderately eroded.			
DyC3	Duffield silty clay, 8 to 15 percent slopes, severely eroded.			
EcB2	Edgemont channery loam, 3 to 8 percent slopes, moderately eroded.	More than 5	3 to 7	3 to 7 feet of well-drained channery loam and clay loam on uplands; underlain by quartzite. The very stony phases have irregularly shaped stones from 10 inches to 5 feet in diameter on the surface and throughout the profile.
EcC2	Edgemont channery loam, 8 to 15 percent slopes, moderately eroded.			
EcC3	Edgemont channery loam, 8 to 15 percent slopes, severely eroded.			
EcD2	Edgemont channery loam, 15 to 25 percent slopes, moderately eroded.			
EcD3	Edgemont channery loam, 15 to 25 percent slopes, severely eroded.			
EdB	Edgemont silt loam, 3 to 8 percent slopes.			
EdB2	Edgemont silt loam, 3 to 8 percent slopes, moderately eroded.			
EdB3	Edgemont silt loam, 3 to 8 percent slopes, severely eroded.			
EdC	Edgemont silt loam, 8 to 15 percent slopes.			
EdC2	Edgemont silt loam, 8 to 15 percent slopes, moderately eroded.			
EdC3	Edgemont silt loam, 8 to 15 percent slopes, severely eroded.			
EdD2	Edgemont silt loam, 15 to 25 percent slopes, moderately eroded.			
EdD3	Edgemont silt loam, 15 to 25 percent slopes, severely eroded.			
EgE2	Edgemont soils, 25 to 35 percent slopes, moderately eroded.			
EhB	Edgemont very stony loam, 0 to 8 percent slopes.			
EhD	Edgemont very stony loam, 8 to 25 percent slopes.			
EhF	Edgemont very stony loam, 25 to 60 percent slopes.			
EkA	Elioak silt loam, 0 to 3 percent slopes.	More than 7	4 to 7	4 to 6 feet of well-drained silt loam and silty clay loam on uplands; underlain by schist.
EkB	Elioak silt loam, 3 to 8 percent slopes.			
EkB2	Elioak silt loam, 3 to 8 percent slopes, moderately eroded.			
EkC	Elioak silt loam, 8 to 15 percent slopes.			
EkC2	Elioak silt loam, 8 to 15 percent slopes, moderately eroded.			
EkC3	Elioak silt loam, 8 to 15 percent slopes, severely eroded.			
ElA	Elk silt loam, 0 to 3 percent slopes.	More than 5	3 to 7	3 to 6 feet of well-drained silt loam and silty clay loam or silty clay on stream terraces; derived mainly from limestone materials.
ElB2	Elk silt loam, 3 to 8 percent slopes, moderately eroded.			
ElC2	Elk silt loam, 8 to 15 percent slopes, moderately eroded.			

See footnotes at end of table.

their estimated physical properties—Continued

Depth from surface	Classification		Percentage passing sieve—			Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Optimum moisture [2]	Maximum dry density [3]
	Unified	AASHO	No. 4	No. 10	No. 200						
In.						*In. per hr.*	*In. per in. of depth*	*pH*		*Pct.*	*Lb. per cu. ft.*
0 to 8						2.0 to 6.2	.27				
8 to 36	CL	A–7	100	90 to 95	85 to 95	2.0 to 6.2	.22	5.3	Moderate	18	108
36 to 52	CL	A–7	100	90 to 95	80 to 90	0.6 to 2.0	.20	7.0	Moderate	19	106
0 to 8						2.0 to 6.2	.18				
8 to 30	SM	A–2	75 to 85	70 to 80	20 to 30	2.0 to 6.2	.17	5.0	Low	11	122
30 to 40+	SM	A–2	70 to 80	60 to 75	20 to 30	2.0 to 6.2	.13	4.8	Low	10	121
0 to 10						2.0 to 6.2	.25				
10 to 44	SM–SC	A–7–6	80 to 85	70 to 80	40 to 50	2.0 to 6.2	.22	5.8	Low	20	107
44 to 56	GM	A–2–4	60 to 65	50 to 60	30 to 40	2.0 to 6.2	.16	5.4	Low	18	110
0 to 8						2.0 to 6.2	.28				
8 to 31	ML	A–7	90 to 100	80 to 90	75 to 85	2.0 to 6.2	.23	5.6	Moderate	23	100
31 to 70	MH	A–7	85 to 95	75 to 85	70 to 80	2.0 to 6.2	.18	6.1	Moderate to high.	27	96

TABLE 5.—*Brief descriptions of soils and*

Map symbol	Soil	Depth to seasonal water table	Depth to bedrock	Brief description of soil and site [1]
		Ft.	*Ft.*	
GcB	Glenelg channery silt loam, 3 to 8 percent slopes.	More than 5--	2 to 4------	2 to 3 feet of well-drained channery silt loam and silty clay loam on uplands; underlain by schist and phyllite.
GcB2	Glenelg channery silt loam, 3 to 8 percent slopes, moderately eroded.			
GcB3	Glenelg channery silt loam, 3 to 8 percent slopes, severely eroded.			
GcC	Glenelg channery silt loam, 8 to 15 percent slopes.			
GcC2	Glenelg channery silt loam, 8 to 15 percent slopes, moderately eroded.			
GcC3	Glenelg channery silt loam, 8 to 15 percent slopes, severely eroded.			
GcD	Glenelg channery silt loam, 15 to 25 percent slopes.			
GcD2	Glenelg channery silt loam, 15 to 25 percent percent slopes, moderately eroded.			
GcD3	Glenelg channery silt loam, 15 to 25 percent slopes, severely eroded.			
GnA	Glenville silt loam, 0 to 3 percent slopes.	1½ to 2½-----	3 to 7------	3 to 6 feet of moderately well drained silt loam, silty clay loam, and loam; underlain by schist and phyllite; generally occurs in depressions or at the base of slopes.
GnB	Glenville silt loam, 3 to 8 percent slopes.			
GnB2	Glenville silt loam, 3 to 8 percent slopes, moderately eroded.			
Gu	Guthrie silt loam.	0 to 1½------	4 to 7------	4 to 6 feet of poorly drained silt loam and silty clay on uplands; underlain by limestone materials.
HaA	Hagerstown silt loam, 0 to 3 percent slopes.	More than 5--	4 to 7------	4 to 6 feet of well-drained silt loam to clay on uplands; underlain by relatively pure limestone.
HaA2	Hagerstown silt loam, 0 to 3 percent slopes, moderately eroded.			
HaB2	Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded.			
HaC2	Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded.			
HaD2	Hagerstown silt loam, 15 to 25 percent slopes, moderately eroded.			
HcB3	Hagerstown silty clay, 3 to 8 percent slopes, severely eroded.			
HcC3	Hagerstown silty clay, 8 to 15 percent slopes, severely eroded.			
HdD3	Hagerstown and Duffield silty clay loams, 15 to 25 percent slopes, severely eroded.			
HfB2	Highfield channery silt loam, 3 to 8 percent slopes, moderately eroded.	More than 5--	3 to 4------	3 to 4 feet of well-drained channery silt loam and silty clay loam on uplands; underlain by aporhyolite or metabasalt. The very stony phases have irregularly shaped stones of from 10 inches to 3 feet on the surface and throughout the profile.
HfC2	Highfield channery silt loam, 8 to 15 percent slopes, moderately eroded.			
HgB	Highfield very stony silt loam, 0 to 8 percent slopes.			
HhD	Highfield and Catoctin very stony silt loams, 8 to 25 percent slopes.			
Hn	Huntington silt loam.	More than 3--	3 to 8------	3 to 6 feet of well-drained silt loam and silty clay loam on flood plains; soil material washed from predominantly limestone uplands. Subject to occasional flooding.
HuA	Huntington silt loam, local alluvium, 0 to 3 percent slopes.			
HuB	Huntington silt loam, local alluvium, 3 to 8 percent slopes.			
La	Lamington silt loam.	½ to 1-------	4 to 7------	4 to 6 feet of somewhat poorly drained to poorly drained silt loam and silty clay loam on stream terraces; soil material derived mainly from red Triassic sandstone and shale uplands.

See footnotes at end of table.

their estimated physical properties—Continued

Depth from surface	Classification		Percentage passing sieve—			Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Optimum moisture [2]	Maximum dry density [3]
	Unified	AASHO	No. 4	No. 10	No. 200						
In.						*In. per hr.*	*In. per in. of depth*	*pH*		*Pct.*	*Lb. per cu. ft.*
0 to 8						2.0 to 6.2	.25				
8 to 25	ML	A-4	90 to 100	85 to 95	55 to 65	2.0 to 6.2	.21	5.4	Low	15	115
25 to 50	ML	A-4	90 to 100	85 to 95	50 to 55	2.0 to 6.2	.15	5.0	Low	13	117
0 to 10						2.0 to 6.2	.25				
10 to 26	ML-CL	A-4	90 to 100	85 to 95	65 to 75	0.6 to 2.0	.22	5.0	Low	16	110
26 to 60+	MH	A-7	80	75	50	0.6 to 2.0	.19	5.0	Moderate to high.	13	114
0 to 10						2.0 to 6.2	.22				
10 to 40	CL	A-4	100	95 to 100	80 to 90	0.2 to 0.6	.19	5.0	Moderate	15	115
40 to 80	CL	A-6	95 to 100	95 to 100	75 to 85	<0.2	.17	5.4	Moderate	14	116
0 to 8						2.0 to 6.2	.28				
8 to 40	MH-CH	A-7	100	100	80 to 90	0.6 to 2.0	.21	6.8	High	26	92
40+	CH	A-7	100	100	85 to 95	0.6 to 2.0	.18	7.0	High	25	96
0 to 10						2.0 to 6.2	.27				
10 to 24	ML-CL	A-6	85 to 95	80 to 90	70 to 80	2.0 to 6.2	.22	5.8	Low	20	105
24 to 36	ML	A-4	100	85 to 95	75 to 85	2.0 to 6.2	.20	5.4	Low	19	108
0 to 12						2.0 to 6.2	.28				
12 to 30	ML	A-4	100	90 to 95	80 to 90	2.0 to 6.2	.23	6.2	Low	17	107
30+	ML-CL	A-6	100	90 to 100	85 to 95	2.0 to 6.2	.21	6.4	Moderate	18	105
0 to 10						2.0 to 6.2	.23				
10 to 36	ML-CL	A-6	100	100	85 to 95	0.0 to 0.2	.19	5.2	Moderate	21	101
36+	CL	A-6	100	100	80 to 90	0.6 to 2.0	.17	4.8	Moderate	18	110

TABLE 5.—*Brief descriptions of soils and*

Map symbol	Soil	Depth to seasonal water table	Depth to bedrock	Brief description of soil and site [1]
		Ft.	*Ft.*	
LcB2	Lansdale channery loam, 3 to 8 percent slopes, moderately eroded.	More than 3	2 to 3½	Moderately deep to deep, well-drained loam and sandy loam on uplands; underlain by gray Triassic rocks.
LcC2	Lansdale channery loam, 8 to 15 percent slopes, moderately eroded.			
LcC3	Lansdale channery loam, 8 to 15 percent slopes, severely eroded.			
LcD2	Lansdale channery loam, 15 to 25 percent slopes, moderately eroded.			
LdA2	Lansdale loam, 0 to 3 percent slopes, moderately eroded.			
LdB2	Lansdale loam, 3 to 8 percent slopes, moderately eroded.			
LdB3	Lansdale loam, 3 to 8 percent slopes, severely eroded.			
LdC3	Lansdale loam, 8 to 15 percent slopes, severely eroded.			
Le	Lawrence silt loam.	1 to 2	4 to 7	4 to 6 feet of somewhat poorly drained silt loam and silty clay loam on uplands; underlain by limestone.
LfC3	Legore clay loam, 8 to 15 percent slopes, severely eroded.	More than 20	1 to 2	1 to 2 feet of well-drained gritty silt loam and clay loam on uplands; underlain by diabase.
LfD3	Legore clay loam, 15 to 25 percent slopes, severely eroded.			
LfE3	Legore clay loam, 25 to 35 percent slopes, severely eroded.			
LgB2	Legore silt loam, 3 to 8 percent slopes, moderately eroded.			
LgB3	Legore silt loam, 3 to 8 percent slopes, severely eroded.			
LgD2	Legore silt loam, 15 to 25 percent slopes, moderately eroded.			
LhA	Lehigh channery silt loam, 0 to 3 percent slopes.	1½ to 2	2½ to 3½	2½ to 3½ feet of silt loam and heavy silt loam on uplands; underlain by baked Triassic sandstone and shale. The stony phases have stones between 10 inches and 3 feet in diameter on the surface and throughout the profile.
LhB	Lehigh channery silt loam, 3 to 8 percent slopes.			
LhB2	Lehigh channery silt loam, 3 to 8 percent slopes, moderately eroded.			
LhB3	Lehigh channery silt loam, 3 to 8 percent slopes, severely eroded.			
LhC	Lehigh channery silt loam, 8 to 15 percent slopes.			
LhC2	Lehigh channery silt loam, 8 to 15 percent slopes, moderately eroded.			
LhC3	Lehigh channery silt loam, 8 to 15 percent slopes, severely eroded.			
LhD2	Lehigh channery silt loam, 15 to 25 percent slopes, moderately eroded.			
LhE3	Lehigh channery silt loam, 15 to 25 percent slopes, severely eroded.			
LlB	Lehigh very stony silt loam, 0 to 8 percent.			
LlD	Lehigh very stony silt loam, 8 to 25 percent slopes.			
LmB	Lewisberry sandy loam, 3 to 8 percent slopes.	More than 6	4 to 7	4 to 7 feet of well-drained fine sandy loam and sandy loam on uplands; underlain by quartz conglomerate and Triassic sandstone. The stony phases have somewhat rounded to irregularly shaped stones 10 inches to 3 feet in diameter on the surface and throughout the profile.
LmB2	Lewisberry sandy loam, 3 to 8 percent slopes, moderately eroded.			
LmC	Lewisberry sandy loam, 8 to 15 percent slopes.			
LmC2	Lewisberry sandy loam, 8 to 15 percent slopes, moderately eroded.			
LmD2	Lewisberry sandy loam, 15 to 25 percent slopes, moderately eroded.			
LmE2	Lewisberry sandy loam, 25 to 45 percent slopes, moderately eroded.			
LnD	Lewisberry and Lansdale very stony loams, 8 to 25 percent slopes.			
LrF	Lewisberry and Lansdale very stony sandy loams, 26 to 60 percent slopes.			

See footnotes at end of table.

their estimated physical properties—Continued

Depth from surface	Classification		Percentage passing sieve—			Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Optimum moisture [2]	Maximum dry density [3]
	Unified	AASHO	No. 4	No. 10	No. 200						
In.						*In. per hr.*	*In. per in. of depth*	*pH*		*Pct.*	*Lb. per cu. ft.*
0 to 8						2.0 to 6.2	.21				
8 to 30	CL	A–6	90 to 100	85 to 95	55 to 65	2.0 to 6.2	.19	5.4	Moderate	13	118
30 to 37	SM–SC	A–4	85 to 95	80 to 90	35 to 45	2.0 to 6.2	.17	5.0	Low	11	123
0 to 10						0.6 to 2.0	.25				
10 to 40	ML–CL	A–4	100	90 to 100	85 to 95	0.2 to 0.6	.22	5.6	Low	14	110
40+	CL	A–6	100	90 to 100	80 to 95	0.2 to 0.6	.18	5.8	Moderate	16	112
0 to 8						2.0 to 6.2	.22				
8 to 17	SM	A–4	100	75 to 85	40 to 45	2.0 to 6.2	.15	6.5	Low	23	100
0 to 10						0.6 to 2.0	.25				
10 to 22	CL	A–6	75 to 85	65 to 80	60 to 70	0.2 to 0.6	.22	5.4	Moderate	17	108
22 to 36	ML–CL	A–6	70 to 75	60 to 70	55 to 65	0.2 to 0.6	.19	5.2	Low	21	104
0 to 10						2.0 to 6.2	.13				
10 to 39	SM–SC	A–4	80 to 90	75 to 85	40 to 45	2.0 to 6.2	.18	5.0	Low	13	119
39 to 60	SC	A–6	80 to 90	75 to 85	40 to 45	2.0 to 6.2	.18	5.0	Low	13	121

TABLE 5.—*Brief descriptions of soils and*

Map symbol	Soil	Depth to seasonal water table	Depth to bedrock	Brief description of soil and site [1]
		Ft.	*Ft.*	
Ls	Lindside silt loam.	1½ to 2	3 to 7	3 to 7 feet of moderately well drained silt loam and silty clay loam on flood plains; soil material washed from predominantly limestone uplands.
MfB	Manor channery loam, 3 to 8 percent slopes.	More than 4	2 to 4	2 to 4 feet of well-drained silt loam and silty clay loam on uplands; underlain by schist and phyllite. The stony phases have stones from 10 inches to 2 feet in diameter on the surface and throughout the profile.
MfB2	Manor channery loam, 3 to 8 percent slopes, moderately eroded.			
MfB3	Manor channery loam, 3 to 8 percent slopes, severely eroded.			
MfC	Manor channery loam, 8 to 15 percent slopes.			
MfC2	Manor channery loam, 8 to 15 percent slopes, moderately eroded.			
MfC3	Manor channery loam, 8 to 15 percent slopes, severely eroded.			
MfD	Manor channery loam, 15 to 25 percent slopes.			
MfD2	Manor channery loam, 15 to 25 percent slopes, moderately eroded.			
MfD3	Manor channery loam, 15 to 25 percent slopes, severely eroded.			
MfE	Manor channery loam, 25 to 45 percent slopes.			
MfE2	Manor channery loam, 25 to 45 percent slopes, moderately eroded.			
MfE3	Manor channery loam, 25 to 45 percent slopes, severely eroded.			
MfF	Manor channery loam, 45 to 60 percent slopes.			
MgB	Manor very stony loam, 0 to 8 percent slopes.			
MgD2	Manor very stony loam, 8 to 25 percent slopes, moderately eroded.			
MgF2	Manor very stony loam, 26 to 75 percent slopes, moderately eroded.			
Mm	Melvin silt loam.	0 to 1	4 to 7	4 to 7 feet of poorly drained silt loam and silty clay loam or silty clay on flood plains; soil material washed from predominantly limestone uplands.
MnB2	Montalto channery silt loam, 3 to 8 percent slopes, moderately eroded.	More than 5	3 to 5	3 to 5 feet of well-drained channery silt loam or silty clay loam on uplands; underlain by diabase. The stony phases have rounded stones up to 6 feet in diameter on the surface and throughout the profile.
MnC2	Montalto channery silt loam, 8 to 15 percent slopes, moderately eroded.			
MnD2	Montalto channery silt loam, 15 to 25 percent slopes, moderately eroded.			
MoC3	Montalto channery silty clay loam, 8 to 15 percent slopes, severely eroded.			
MsD	Montalto extremely stony silt loam, 8 to 25 percent slopes.			
MsF	Montalto extremely stony silt loam, 25 to 60 percent slopes.			
MtB	Montalto very stony silt loam, 3 to 8 percent slopes.			
MtD	Montalto very stony silt loam, 8 to 25 percent slopes.			
MtF	Montalto very stony silt loam, 25 to 60 percent slopes.			
MuA	Mount Lucas silt loam, 0 to 3 percent slopes.	1½ to 2	3 to 7	4 to 6 feet of moderately well drained silt loam and silty clay loam on uplands; underlain by diabase. The stony phase has rounded stones up to 5 feet in diameter on the surface and throughout the profile.
MuB	Mount Lucas silt loam, 3 to 8 percent slopes.			
MuB2	Mount Lucas silt loam, 3 to 8 percent slopes, moderately eroded.			
MvB	Mount Lucas very stony silt loam, 0 to 8 percent slopes.			

See footnotes at end of table.

their estimated physical properties—Continued

Depth from surface	Classification		Percentage passing sieve—			Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Optimum moisture [2]	Maximum dry density [3]
	Unified	AASHO	No. 4	No. 10	No. 200						
In.						*In. per hr.*	*In. per in. of depth*	*pH*		*Pct.*	*Lb. per cu. ft.*
0 to 24	ML-CL	A-4	100	90 to 100	70 to 80	2.0 to 6.2	.28		Low	18	105
24+	ML-CL	A-6	100	90 to 100	75 to 85	0.6 to 2.0	.22	6.0	Moderate	17	108
0 to 10						2.0 to 6.2	.22				
10 to 17	GM	A-6	55 to 65	45 to 55	40 to 45	2.0 to 6.2	.20	6.4	Low	18	112
17 to 28	GM	A-5	60 to 70	55 to 65	40 to 45	2.0 to 6.2	.14	6.6	Low	18	110
0 to 10						0.6 to 2.0	.23				
10 to 36+	CL	A-6	100	100	85 to 95	0.2 to 0.6	(4)	5.6	Moderate	14	118
0 to 10						2.0 to 6.2	.27				
10 to 45	MH	A-7	95 to 100	90 to 95	85 to 95	2.0 to 6.2	.23	5.6	Moderate to high.	27	94
45 to 56	MH	A-7	95 to 100	85 to 95	80 to 90	2.0 to 6.2	.17	5.8	Moderate to high.	30	87
0 to 10						2.0 to 6.2	.27				
10 to 26	MH	A-7	85 to 95	80 to 90	75 to 85	2.0 to 6.2	.20	5.4	Moderate to high.	16	94
26 to 45	MH	A-7	80 to 90	75 to 85	70 to 80	0.6 to 2.0	.16	5.6	Moderate to high.	20	88

TABLE 5.—*Brief descriptions of soils and*

Map symbol	Soil	Depth to seasonal water table	Depth to bedrock	Brief description of soil and site [1]
		Ft.	*Ft.*	
MwA	Murrill gravelly loam, 0 to 3 percent slopes.	More than 4	4 to 9	4 to 7 feet of well-drained gravelly loam and gravelly silty clay loam; soils formed in colluvium and are underlain by limestone. The very stony phases have irregularly shaped stones from 10 inches to 3 feet in diameter on the surface and throughout the profile.
MwB	Murrill gravelly loam, 3 to 8 percent slopes.			
MwB2	Murrill gravelly loam, 3 to 8 percent slopes, moderately eroded.			
MwC2	Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded.			
MwC3	Murrill gravelly loam, 8 to 15 percent slopes, severely eroded.			
MxB	Murrill very stony loam, 0 to 8 percent slopes.			
MxD	Murrill very stony loam, 8 to 25 percent slopes.			
PeB2	Penn loam, 3 to 8 percent slopes, moderately eroded.	More than 4	1½ to 3	1½ to 3 feet of well-drained loam and sandy loam on uplands; underlain by red Triassic sandstone and shale. The very stony phases have stones up to 3 feet in diameter on the surface and throughout the profile.
PeB3	Penn loam, 3 to 8 percent slopes, severely eroded.			
PeC2	Penn loam, 8 to 15 percent slopes, moderately eroded.			
PeC3	Penn loam, 8 to 15 percent slopes, severely eroded.			
PhD3	Penn soils, 15 to 25 percent slopes, severely eroded.			
PhE3	Penn soils, 25 to 35 percent slopes, severely eroded.			
PhF3	Penn soils, 35 to 60 percent slopes, severely eroded.			
PmB	Penn very stony loam, 0 to 8 percent slopes.			
PmD	Penn very stony loam, 8 to 25 percent slopes.			
PmF	Penn very stony loam, 25 to 60 percent slopes.			
PnA	Penn-Lansdale loams, 0 to 3 percent slopes.			
PnB2	Penn-Lansdale loams, 3 to 8 percent slopes, moderately eroded.			
PnB3	Penn-Lansdale loams, 3 to 8 percent slopes, severely eroded.			
PnC2	Penn-Lansdale loams, 8 to 15 percent slopes, moderately eroded.			
PnC3	Penn-Lansdale loams, 8 to 15 percent slopes, severely eroded.			
PnD3	Penn-Lansdale loams, 15 to 25 percent slopes, severely eroded.			
PgA2	Penn silt loam, 0 to 3 percent slopes, moderately eroded.	More than 4	1½ to 3	1½ to 3 feet of well-drained silt loam on uplands; underlain by red Triassic sandstone and shale.
PgB	Penn silt loam, 3 to 8 percent slopes.			
PgB2	Penn silt loam, 3 to 8 percent slopes, moderately eroded.			
PgB3	Penn silt loam, 3 to 8 percent slopes, severely eroded.			
PgC	Penn silt loam, 8 to 15 percent slopes.			
PgC2	Penn silt loam, 8 to 15 percent slopes, moderately eroded.			
PgC3	Penn silt loam, 8 to 15 percent slopes, severely eroded.			
PgD	Penn silt loam, 15 to 25 percent slopes.			
PgD2	Penn silt loam, 15 to 25 percent slopes, moderately eroded.			
PfB3	Penn shaly silt loam, 3 to 8 percent slopes, severely eroded.			
PfC3	Penn shaly silt loam, 8 to 15 percent slopes, severely eroded.			
PfD3	Penn shaly silt loam, 15 to 25 percent slopes, severely eroded.			
PrB2	Penn and Readington shaly silt loams, 3 to 8 percent slopes, moderately eroded.	1	1 to 2	1 to 2 feet of moderately well drained shaly silt loam on uplands; underlain by red Triassic sandstone and shale.
PrB3	Penn and Readington shaly silt loams, 3 to 8 percent slopes, severely eroded.			
PrC3	Penn and Readington shaly silt loams, 8 to 15 percent slopes, severely eroded.			

See footnotes at end of table.

their estimated physical properties—Continued

Depth from surface	Classification		Percentage passing sieve—			Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Optimum moisture [2]	Maximum dry density [3]
	Unified	AASHO	No. 4	No. 10	No. 200						
In.						*In. per hr.*	*In. per in. of depth*	*pH*		*Pct.*	*Lb. per cu. ft.*
0 to 10						2.0 to 6.2	.27				
10 to 40	CL	A-7	85 to 95	75 to 85	60 to 75	2.0 to 6.2	.23	5.6	Moderate	18	108
40 to 72	CL	A-7	85 to 95	75 to 85	60 to 75	2.0 to 6.2	.19	6.0	Moderate	19	106
0 to 10						2.0 to 6.2	.22				
10 to 24	ML-CL	A-6	90 to 100	85 to 95	60 to 70	2.0 to 6.2	.13	4.5	Moderate	19	106
24 to 32	ML-CL	A-6	80 to 90	70 to 80	55 to 65	2.0 to 6.2	.08	4.8	Moderate	18	105
0 to 10						2.0 to 6.2	.25				
10 to 24	CL	A-4	95 to 100	95 to 100	70 to 80	2.0 to 6.2	.22	4.7	Low	14	119
24 to 35	ML-CL	A-4	100	100	70 to 80	2.0 to 6.2	.15	5.0	Low	14	120
0 to 10						2.0 to 6.2	.23		Low		
10 to 18	GM-GC	A-4	55 to 65	45 to 55	40 to 45	0.6 to 2.0	.25	4.5	Low	15	115

TABLE 5.—*Brief descriptions of soils and*

Map symbol	Soil	Depth to seasonal water table	Depth to bedrock	Brief description of soil and site [1]
		Ft.	*Ft.*	
PsB2	Pequea silt loam, 3 to 8 percent slopes, moderately eroded.	More than 3	1½ to 2½	1½ to 2½ feet of well-drained silt loam on uplands; underlain by calcareous schist.
PsC2	Pequea silt loam, 8 to 15 percent slopes, moderately eroded.			
PsC3	Pequea silt loam, 8 to 15 percent slopes, severely eroded.			
PsD3	Pequea silt loam, 15 to 25 percent slopes, severely eroded.			
PsE2	Pequea silt loam, 25 to 35 percent slopes, moderately eroded.			
RaA	Raritan silt loam, 0 to 3 percent slopes.	1½ to 2½	4 to 8	4 to 7 feet of moderately well drained silt loam and silty clay loam on stream terraces; soil material derived primarily from red Triassic sandstone and shale.
RaB2	Raritan silt loam, 3 to 8 percent slopes, moderately eroded.			
RdA	Readington silt loam, 0 to 3 percent slopes.	More than 2	3 to 5	3 to 5 feet of moderately well drained and somewhat poorly drained silt and silty clay loam on uplands; underlain by Triassic sandstone and shale.
RdB	Readington silt loam, 3 to 8 percent slopes.			
RdB2	Readington silt loam, 3 to 8 percent slopes, moderately eroded.			
Ro	Rowland silt loam.	1½ to 2½	4 to 8	4 to 7 feet of moderately well drained silt loam and silty clay loam on flood plains; soil material washed primarily from Triassic red sandstone and shale uplands. Subject to flooding.
ScA	Sciotoville silt loam, 0 to 3 percent slopes.	1½ to 2½	4 to 7	4 to 6 feet of moderately well drained silt loam and silty clay loam on stream terraces; soil material derived from acid rock.
ScB	Sciotoville silt loam, 3 to 8 percent slopes.			
SsC3	Steinsburg channery loam, 8 to 15 percent slopes, severely eroded.	More than 3	1 to 2	1 to 2 feet of well-drained to excessively drained channery sandy loam on uplands; underlain by yellowish to pinkish Triassic sandstone.
SsD3	Steinsburg channery loam, 15 to 25 percent slopes, severely eroded.			
SsE2	Steinsburg channery loam, 25 to 35 percent slopes, moderately eroded.			
SsE3	Steinsburg channery loam, 25 to 35 percent slopes, severely eroded.			
WaA	Watchung silt loam, 0 to 3 percent slopes.	0 to 1	3 to 5	3 to 5 feet of poorly drained silt loam to silty clay loam on uplands or in depressions; underlain by diabase. The very stony phase has rounded stones up to 6 feet in diameter on the surface and throughout the profile.
WaB	Watchung silt loam, 3 to 5 percent slopes.			
WcB	Watchung very stony silt loam, 0 to 8 percent slopes.			
Wd	Wehadkee silt loam.	0 to 1	5 to 8	5 to 8 feet of poorly drained silt loam and silty clay loam on bottom lands. Subject to periodic overflow.
We	Wehadkee silt loam, local alluvium, 3 to 8 percent slopes.			
WgB2	Wheeling silt loam, 3 to 8 percent slopes, moderately eroded.	More than 6	5 to 8	5 to 8 feet of silt loam and silty clay loam or sandy clay loam on stream terraces; soil material derived principally from acid rock.
WgC2	Wheeling silt loam, 8 to 15 percent slopes, moderately eroded.			
WhB2	Whiteford silt loam, 3 to 8 percent slopes, moderately eroded.	More than 4	2½ to 3½	2½ to 3 feet of well-drained silt loam and silty clay loam on uplands; underlain by slate.
WhC2	Whiteford silt loam, 8 to 15 percent slopes, moderately eroded.			
WkA	Wickham silt loam, 0 to 3 percent slopes.	More than 3	4 to 7	4 to 7 feet of well-drained silt loam and silty clay loam on stream terraces; soil material derived principally from schist, phyllite, and diabase.
WkB2	Wickham silt loam, 3 to 8 percent slopes, moderately eroded.			

See footnotes at end of table.

their estimated physical properties—Continued

Depth from surface	Classification		Percentage passing sieve—			Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Optimum moisture [2]	Maximum dry density [3]
	Unified	AASHO	No. 4	No. 10	No. 200						
In.						*In. per hr.*	*In. per in. of depth*	*pH*		*Pct.*	*Lb. per cu. ft.*
0 to 8						2.0 to 6.2	.22				
8 to 20	ML	A-4	90 to 100	85 to 95	65 to 75	2.0 to 6.2	.19	6.8	Low	17	107
20 to 26	ML	A-4	85 to 95	75 to 85	60 to 70	2.0 to 6.2	.13	7.0	Low	19	102
0 to 10						2.0 to 6.2	.27				
10 to 25	CL	A-6	100	90 to 100	85 to 95	2.0 to 6.2	.24	4.4	Moderate	19	105
25 to 46	ML-CL	A-7	100	90 to 100	85 to 95	0.6 to 2.0	.18	4.2	Moderate	20	108
0 to 12						2.0 to 6.2	.26				
12 to 25	ML-CL	A-4	95 to 100	85 to 95	80 to 90	0.62 to 2.0	.23	4.8	Low	18	109
25 to 36	ML-CL	A-6	95 to 100	85 to 95	65 to 75	0.0 to 0.2	.18	4.6	Moderate	16	114
0 to 24	ML-CL	A-4	100	95 to 100	85 to 95	2.0 to 2.6	.27	5.7	Low	18	110
24 to 56	ML-CL	A-6	90 to 100	85 to 95	80 to 90	0.6 to 2.0	.22	5.3	Moderate	20	105
0 to 10						2.0 to 6.2	.27				
10 to 24	CL	A-6	95 to 100	85 to 95	75 to 85	2.0 to 6.2	.23	5.6	Moderate	15	114
24 to 50	ML-CL	A-6	100	90 to 100	85 to 95	0.6 to 2.0	.17	5.4	Moderate	17	111
0 to 9						2.0 to 6.2	.13				
9 to 18	GM-GC	A-4	40 to 50	40 to 45	35 to 40	2.0 to 6.2	.11	4.5	Low	14	114
0 to 9						2.0 to 2.6	.22				
9 to 36	MH	A-7	80 to 90	70 to 80	60 to 70	0.6 to 2.0	.18	6.2	Moderate to high.	20	104
36 to 50	ML-CL	A-7	70 to 80	60 to 70	55 to 65	<2.0	.15	6.4	Moderate	22	100
0 to 10						2.0 to 6.2	.22				
10 to 40	ML	A-7	100	100	80 to 90	0.6 to 2.0	(4)	5.4	Moderate	23	97
0 to 10						2.0 to 6.0	.28				
10 to 32	CL	A-6	100	85 to 95	70 to 85	2.0 to 6.2	.24	5.6	Moderate	14	118
32 to 60+	CL	A-6	90 to 100	85 to 95	70 to 80	2.0 to 6.2	.22	5.4	Moderate	14	116
0 to 8						2.0 to 6.2	.27				
8 to 30	ML-CL	A-6	80 to 90	75 to 85	70 to 80	2.0 to 6.2	.22	5.5	Moderate	19	108
30 to 38	GM-GC	A-2	50 to 60	45 to 55	35	2.0 to 6.2	.17	5.3	Low	13	114
0 to 8						2.0 to 6.2	.27				
8 to 36	CL	A-7	100	90 to 100	85 to 95	2.0 to 6.2	.22	5.5	Moderate	20	105
36 to 60	ML-CL	A-6	90 to 100	85 to 95	75 to 85	2.0 to 6.2	.21	5.6	Moderate	18	107

TABLE 5.—*Brief descriptions of soils and*

Map symbol	Soil	Depth to seasonal water table	Depth to bedrock	Brief description of soil and site [1]
		Ft.	*Ft.*	
Wo	Worsham silt loam.	0 to 1	4 to 7	4 to 7 feet of somewhat poorly drained to poorly drained silt and silty clay loam formed from colluvium or residuum; generally occurs in depressions or at the base of slopes.

[1] For more complete descriptions of individual soils see pages 76 to 135.
[2] For compaction.
[3] When compacted at optimum moisture. Estimates are based on AASHO Designation: T99–57, Method A, in which only the material passing the No. 4 sieve is compacted. For those soils

TABLE 6.—*Engineering*

[Very stony soils and other soils obviously unsuitable

Soil series	Adaptability to winter grading	Susceptibility to frost action	Suitability of material for—			Soil features that affect vertical alinement of highways	Soil features that adversely affect suitability for—		
			Road subgrade	Road fill	Topsoil		Dikes	Farm ponds	
								Reservoir area	Embankment
Altavista	Fair	Moderate	Poor [1]	Fair [1]	Good	Hardpan			
Ashton	Good	Moderately low.	Good	Good	Good	Occasional flooding.		Rapid permeability.	
Arendtsville	Good	Low	Good	Good	Fair		Rapid permeability.	Rapid permeability.	
Athol	Good	Moderate	Good	Good	Good		Rapid permeability.	Rapid permeability.	
Bedford	Poor	Moderate	Poor	Fair	Good	Seasonal high water table.			
Bermudian	Fair	Moderate	Fair	Fair	Good	Flooding	Rapid permeability.	Rapid permeability.	
Birdsboro	Good	Moderate	Fair	Good	Good			Rapid permeability.	
Bowmansville	Very poor	High	Poor	Poor	Fair	Flooding	Instability	Rapid permeability.	Instability
Brecknock	Good	Moderate	Good	Good	Fair	Boulders; shallowness to bedrock.		Shallowness to bedrock.	
Cardiff	Good	Moderately low.	Fair	Good	Good	Shallowness over hard slate bedrock.	Rapid permeability.	Shallowness to bedrock.	

See footnote at end of table.

their estimated physical properties—Continued

Depth from surface	Classification		Percentage passing sieve—			Permeability	Available moisture capacity	Reaction	Shrink-swell potential	Optimum moisture [2]	Maximum dry density [3]
	Unified	AASHO	No. 4	No. 10	No. 200						
In.						*In. per hr.*	*In. per in. of depth*	*pH*		*Pct.*	*Lb. per cu. ft.*
0 to 8						2.0 to 6.2	.22				
8 to 36	CH	A–7	100	100	70 to 80	0.6 to 0.2	.19	5.6	High	20	104
36 to 48	CL	A–7	100	100	65 to 75	<.02	.17	5.0	Moderate	14	113

containing material retained on the No. 4 sieve, the optimum moisture will be lower and the maximum dry density higher than these estimated values.

[4] Free water.

interpretations

for the stated purposes are not included]

Soil features that adversely affect suitability for—Continued							
Agricultural drainage	Irrigation	Terraces and diversions	Waterways	Building sites	Infiltration fields for septic tank effluent	Infiltration fields for industrial effluent	Pipelines (construction and maintenance)
	Slow permeability in lower part of subsoil.			Seasonal high water table.	Seasonal high water table; slow permeability in lower part of subsoil.	Seasonal high water table; slow permeability in lower part of subsoil.	Fluctuating water table.
		Occasional flooding.		Occasional flooding.	Occasional flooding.	Occasional flooding.	Occasional flooding.
	Slow permeability in lower part of subsoil.			Seasonal high water table.	Seasonal high water table; slow permeability in lower part of subsoil.	Seasonal high water table; slow permeability in lower part of subsoil.	Fluctuating water table.
		Flooding		Flooding	Flooding	Flooding	Flooding.
Flooding; high water table.	High water table.	Flooding	Flooding; lack of outlets.	Flooding	Flooding	Flooding	Flooding.
	Slow permeability in substratum.	Shallowness	Shallowness	Shallowness	Slow permeability in substratum.	Slow permeability in substratum.	
		Shallowness	Shallowness	Shallowness	Shallowness	Hard slate substratum.	Hard slate substratum.

TABLE 6.—*Engineering*

[Very stony soils and other soils obviously unsuitable

Soil series	Adaptability to winter grading	Susceptibility to frost action	Suitability of material for—			Soil features that affect vertical alinement of highways	Soil features that adversely affect suitability for—		
			Road subgrade	Road fill	Topsoil		Dikes	Farm ponds	
								Reservoir area	Embankment
Catoctin	Good	Moderately low.	Fair	Good	Good	Shallowness to bedrock.		Shallowness to bedrock.	
Chester	Good	Moderate	Poor [1]	Fair [1]	Good	Erodibility in cut slopes.	Rapid permeability; instability.		Instability
Chewacla	Poor	Moderately high.	Poor [1]	Fair [1]	Good	Flooding	Instability		Instability
Conestoga	Good	Moderate	Poor	Fair	Good		Rapid permeability; instability.		Instability
Congaree	Fair	Moderate	Poor [1]	Fair [1]	Good	Flooding; high water table.	Instability	Rapid permeability.	Instability
Croton	Poor	High	Poor	Poor	Fair	High water table; plasticity.	Instability		
Duffield	Good	Moderate	Fair	Good	Good			Rapid permeability.	
Edgemont	Good	Low	Good	Good	Fair	Boulders	Rapid permeability.	Rapid permeability.	
Elioak	Good	Moderate	Poor [1]	Fair [1]	Good	Erodibility in cut slopes.	Rapid permeability; instability.	Rapid permeability.	Instability
Elk	Fair	Moderate	Fair	Fair	Good	Plasticity	Instability		
Glenelg	Good	Moderately low.	Poor [1]	Fair [1]	Good	Erodibility in cut slopes; shallowness to bedrock in some places.	Instability	Rapid permeability.	Instability
Glenville	Poor	Moderately high.	Poor [1]	Fair [1]	Good	Seasonal high water table; hardpan.	Instability		
Guthrie	Very poor	High	Poor	Poor	Poor	High water table; hardpan.			
Hagerstown	Fair	Moderate	Poor	Fair	Good		Instability	Rapid permeability; sinkholes.	
Highfield	Good	Moderate	Fair	Fair	Good	Boulders			
Huntington	Fair	Moderate	Fair	Fair	Good	Flooding		Rapid permeability.	
Lamington	Poor	High	Poor	Poor	Poor	Seasonal high water table; hardpan.			

See footnote at end of table.

interpretations—Continued

for the stated purposes are not included]

Soil features that adversely affect suitability for—Continued							
Agricultural drainage	Irrigation	Terraces and diversions	Waterways	Building sites	Infiltration fields for septic tank effluent	Infiltration fields for industrial effluent	Pipelines (construction and maintenance)
		Shallowness	Shallowness	Shallowness	Shallowness		
Lack of outlets.	Seasonal high water table.	Flooding	Flooding; lack of outlets.	Flooding	Flooding	Flooding	Flooding.
		Flooding	Flooding; lack of outlets.	Flooding; high water table.	Flooding	Flooding	Flooding; fluctuating high water table.
Slow permeability.	Wetness; slow permeability.			High water table.	High water table; slow permeability.	High water table; slow permeability.	Fluctuating high water table.
Slow permeability in lower part of subsoil.	Slow permeability in lower part of subsoil.			Seasonal high water table.	Seasonal high water table.	Seasonal high water table; slow permeability in lower part of subsoil.	Fluctuating high water table.
Slow permeability.	Wetness; slow permeability.			High water table.	High water table; slow permeability.	High water table; slow permeability.	Fluctuating high water table.
					Pollution of ground water.	Pollution of ground water.	Rock ledges.
		Flooding	Flooding	Flooding	Flooding	Flooding	Flooding.
Slow permeability.	Wetness; slow permeability.			Seasonal high water table.	Slow permeability; seasonal high water table.	Slow permeability and seasonal high water table.	Fluctuating water table.

TABLE 6.—*Engineering*

[Very stony soils and other soils obviously unsuitable

Soil series	Adaptability to winter grading	Susceptibility to frost action	Suitability of material for—			Soil features that affect vertical alinement of highways	Soil features that adversely affect suitability for—		
			Road subgrade	Road fill	Topsoil		Dikes	Farm ponds	
								Reservoir area	Embankment
Lansdale	Good	Moderate	Good	Good	Good	Boulders; shallowness to bedrock.		Rapid permeability.	
Lawrence	Poor	High	Poor	Fair	Fair	Seasonal high water table; hardpan.			
Legore	Good	Moderately low.	Fair	Fair	Fair	Shallowness to hard diabase bedrock; boulders.	Rapid permeability.	Rapid permeability; shallowness to bedrock.	Instability; permeability.
Lehigh	Fair	Moderately high.	Fair	Fair	Fair	Seasonal high water table; hardpan; shallowness to bedrock.	Instability		
Lewisberry	Good	Low	Good	Good	Fair			Rapid permeability.	Rapid permeability
Lindside	Fair to poor	Moderately high.	Fair	Fair	Good	Flooding; high water table.		Rapid permeability.	
Manor	Good	Moderately low.	Fair [1]	Fair [1]	Fair	Boulders; shallowness to bedrock.	Instability	Rapid permeability.	Instability
Melvin	Poor	High	Poor	Poor	Fair	Flooding; high water table.	Instability	Rapid permeability.	
Montalto	Fair	Moderate	Poor	Fair	Good	Shallowness to hard diabase bedrock; boulders.	Instability		
Mount Lucas	Poor	Moderately high.	Poor	Poor	Good	Seasonal high water table; plasticity.			
Murrill	Good	Moderately low.	Good	Good	Good		Rapid permeability.	Rapid permeability.	
Penn (loams)	Good	Moderately low.	Good	Good	Good	Shallowness to bedrock.	Rapid permeability.	Rapid permeability.	
Penn (silt loams)	Good	Moderate	Fair	Good	Good	Shallowness to bedrock.			
Penn-Lansdale.	Good	Moderate	Good	Good	Good	Shallowness to bedrock.		Rapid permeability.	
Penn and Readington.	Poor	High	Fair	Good	Fair	Seasonal high water table; shallowness to bedrock.	Rapid permeability.	Shallowness to bedrock.	

See footnote at end of table.

interpretations—Continued

for the stated purposes are not included]

Soil features that adversely affect suitability for—Continued							
Agricultural drainage	Irrigation	Terraces and diversions	Waterways	Building sites	Infiltration fields for septic tank effluent	Infiltration fields for industrial effluent	Pipelines (construction and maintenance)
						Shallowness	
Slow permeability.	Wetness; slow permeability.	Shallowness	Shallowness	Shallowness		Shallowness	
		Shallowness	Shallowness	Shallowness		Shallowness	Hard diabase.
Slow permeability in lower part of subsoil.	Slow permeability in lower part of subsoil.			Seasonal high water table.	Seasonal high water table; slow permeability in lower part of subsoil.	Seasonal high water table; slow permeability in lower part of subsoil.	Fluctuating water table.
Flooding; lack of outlets.		Flooding	Flooding	Flooding; high water table.	Flooding; high water table.	Flooding; high water table.	Flooding; fluctuating high water table.
		Shallowness	Shallowness			Shallowness	Shallowness.
Flooding; lack of outlets	Wetness	Flooding	Flooding	Flooding; high water table.	Flooding; high water table.	Flooding; high water table.	Flooding; high water table.
							Hard diabase substratum.
Slow permeability in lower part of subsoil.	Slow permeability in lower part of subsoil.			Seasonal high water table.	Seasonal high water table; slow permeability in lower part of subsoil.	Seasonal high water table; permeability of lower subsoil.	Fluctuating water table.
						Shallowness	
						Shallowness	
						Shallowness	
Shallowness	Wetness	Shallowness	Shallowness	Seasonal high water table.	Seasonal high water table; shallowness.	Seasonal high water table; shallowness.	Fluctuating water table; shallowness.

TABLE 6.—*Engineering*

[Very stony soils and other soils obviously unsuitable

Soil series	Adaptability to winter grading	Susceptibility to frost action	Suitability of material for—			Soil features that affect vertical alinement of highways	Soil features that adversely affect suitability for—		
			Road subgrade	Road fill	Topsoil		Dikes	Farm ponds	
								Reservoir area	Embankment
Pequea	Good	Moderately low.	Poor [1]	Fair [1]	Fair	Erodibility in cut slopes; shallowness to bedrock.	Instability	Rapid permeability.	Instability
Raritan	Poor	Moderately high.	Fair	Fair	Good	Seasonal high water table; hardpan.			
Readington	Fair	Moderately high.	Fair	Fair	Fair	Seasonal high water table.			
Rowland	Poor	Moderately high.	Fair	Fair	Good	Flooding; high water table.		Rapid permeability.	
Sciotoville	Poor	Moderately high.	Fair	Fair	Good	Seasonal high water table.			
Steinsburg	Good	Low	Good	Good	Poor	Shallowness to bedrock.	Rapid permeability.	Rapid permeability; shallowness to bedrock.	
Watchung	Poor	High	Poor	Poor	Poor	High water table; hardpan; shalness to bedrock.			
Wehadkee	Very poor	High	Poor	Poor	Poor	Flooding; high water table.	Instability	Rapid permeability.	Instability
Wheeling	Good	Moderate	Good	Good	Good			Rapid permeability.	
Whiteford	Good	Moderate	Good	Good	Good	Shallowness to hard slate bedrock.		Rapid permeability.	
Wickham	Good	Moderate	Poor [1]	Fair [1]	Good		Instability		Instability
Worsham	Poor	High	Poor [1]	Poor [1]	Poor	High water table; hardpan; plasticity.	Instability		Instability

[1] These soils are highly micaceous and are difficult to compact although particle sizes are generally within desirable range.

interpretations—Continued

for the stated purposes are not included]

Soil features that adversely affect suitability for—Continued							
Agricultural drainage	Irrigation	Terraces and diversions	Waterways	Building sites	Infiltration fields for septic tank effluent	Infiltration fields for industrial effluent	Pipelines (construction and maintenance)
----	----	----	Shallowness	----	----	Shallowness	Shallowness.
Slow permeability in lower part of subsoil.	Slow permeability in lower part of subsoil.	----	----	Seasonal high water table.	Seasonal high water table; slow permeability in lower part of subsoil.	Seasonal high water table; slow permeability of lower subsoil.	Fluctuating water table.
Slow permeability in lower part of subsoil.	Slow permeability in lower part of subsoil.	----	----	Seasonal high water table.	Seasonal high water table; slow permeability in lower part of subsoil.	Seasonal high water table; slow permeability in lower part of subsoil.	Fluctuating water table.
Flooding; lack of outlets.	----	Flooding	Flooding	Flooding; high water table.	Flooding; high water table.	Flooding; high water table.	Flooding; fluctuating water table.
Slow permeability in lower part of subsoil.	Slow permeability in lower part of subsoil.	----	----	Seasonal high water table.	Seasonal high water table; slow permeability in lower part of subsoil.	Seasonal high water table; slow permeability in lower part of subsoil.	Fluctuating water table.
----	Rapid permeability.	Shallowness	Shallowness	Shallowness	Shallowness	Shallowness	Shallowness.
Wetness	Slow permeability.	----	----	High water table.	Seasonal high water table; slow permeability.	Seasonal high water table; slow permeability.	Fluctuating high water table.
Flooding; lack of outlets.	Wetness; high water table.	Flooding	Flooding; lack of outlets.	High water table; flooding.	High water table; flooding.	High water table; flooding.	High water table; flooding.
----	----	----	----	----	----	----	
----	----	----	----	----	----	Slate substratum.	Slate substratum.
----	----	----	----	----	----	----	
Slow permeability.	Wetness; slow permeability.	----	----	High water table.	Slow permeability; high water table.	Slow permeability; high water table.	Fluctuating high water table.

TABLE 7. —*Engineering*

[Tests performed by the Pennsylvania Highway Department in accordance with

Soil type and location of sample	Parent material	Report no.	Depth	Horizon	Moisture-density [1]		Mechanical analysis [2]
					Maximum dry density	Optimum moisture	Discarded in field sampling (estimate)
							Larger than 3 in.
			Inches		*Lb. per cu. ft.*	*Percent*	*Percent*
Cardiff slaty silt loam.							
1½ miles south of Peach Bottom (modal)	Peach Bottom slate.	BB–25405	13 to 18	B_{22}	110	18	
1½ miles east of Cardiff (mostly silty solum)	Peach Bottom slate.	BB–28705	18 to 29	B_{22}	109	17	
½ mile southeast of Delta (mostly channery and slaty).	Peach Bottom slate.	BB–28706	16 to 24	B_{22}	115	14	
Chester silt loam.							
1 mile west of Fawn Grove (modal)	Schist.	BB–24992	17 to 23	B_{22}	109	19	
		BB–24993	34 to 44	C_2	112	16	
160 feet west of Route 74 on Route T–648 (intergrading to Glenelg).	Schist.	BB–28703	18 to 28	B_{22}	105	20	15
		BB–28704	33 to 44	C_1	109	19	20
On Route 66013, 1 mile south of Gatchellville (intergrading to Elioak).	Schist.	BB–28709	27 to 39	B_{22}	107	19	
		BB–28710	45 to 56	C_1	109	19	
Croton silt loam.							
1 mile southwest of Dover (modal)	Triassic red shale and sandstone.	BB–24990	15 to 29	B_{21g}	101	21	
		BB–24991	27 to 34	C_{1g}	112	16	
½ mile south of Admire on Route 66007 (associated with Lansdale).	Red and yellow Triassic sandstone.	BC–890	14 to 21	B_{2g}	113	14	
		BC–891	21 to 27	C_1	122	12	
On Route T–851, ½ mile northwest of intersection with Route 66186 (associated with Lehigh).	Triassic red shale.	BC–1724	16 to 21	B_{22g}	111	15	
		BC–1725	21 to 27	C_{1g}	109	17	
Elioak silt loam.							
0.1 mile southwest of intersection of Route T–638 and Route T–567 (modal).	Wissahickon schist.	BC–32603	23 to 32	B_{22}	107	20	
		BC–32604	44 to 50	C_1	110	18	
2 miles northwest of New Park on Route 851 (deeper and more clayey).	Wissahickon schist.	BC–32608	24 to 35	B_{22}	101	22	
		BC–32607	51 to 70	C_1	104	20	
2¼ miles east of Stewartstown (more coarse fragments).	Wissahickon schist.	BC–32605	22 to 36	B_{22}	104	21	1
		BC–32606	46 to 56	C_1	110	17	1
Lehigh channery silt loam.							
On Route 66034, ⅛ mile south of intersection of Route 190 (modal).	Metamorphosed Gettysburg shale.	BB–24630	14 to 22	B_{22g}	108	17	
		BB–24631	22 to 32	C_1	104	21	
Route T–833, ¼ mile northeast of intersection with old Route 111 (best B horizon development).	Metamorphosed Triassic red siltstone.	BC–884	16 to 23	B_{22g}	110	17	
		BC–885	27 to 34	C_1	108	17	
On Route 7899, 1,000 feet west of intersection with Route T–858 (most sandy and channery).	Metamorphosed Triassic sandstone.	BC–886	20 to 30	B_{22g}	100	19	40
		BC–887	30 to 41	C_1	102	19	
Lewisberry very stony sandy loam.							
⅛ mile northeast of Mt. Zion Elementary School in Fairview Township (modal).	Triassic sandstone and conglomerate.	BB–24632	24 to 31	B_{22}	119	13	
		BB–24633	39 to 44	C_1	121	12	

See footnotes at end of table.

test data

standard procedures of the American Association of State Highway Officials]

Mechanical analysis [2]—Continued															Liquid limit	Plasticity index	Classification	
Percentage passing sieve [3]—											Percentage smaller than [3]—						AASHO [4]	Unified [5]
3 in.	2 in.	1½ in.	1 in.	¾ in.	⅜ in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 60 (0.25 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
----	100	85	81	70	60	54	47	40	38	34	33	28	19	14	37	10	A–2–4(0)	GM.
----	-----	100	81	72	60	53	48	41	39	37	35	30	21	16	39	11	A–6(1)	GM.
----	100	98	82	77	63	52	44	36	36	34	33	29	19	14	34	12	A–2–6(0)	GM–GC.
----	-----	-----	-----	100	99	98	97	92	87	73	70	57	37	28	40	13	A–6(9)	ML–CL.
----	-----	-----	100	96	90	85	81	72	61	27	22	16	10	6	35	2	A–2–4(0)	SM.
100	76	48	44	42	37	34	32	29	28	26	25	22	17	14	44	15	A–2–7(1)	GM.
----	100	83	61	55	41	34	29	24	22	19	18	15	12	11	46	14	A–2–7(0)	GM.
----	100	90	90	90	86	81	76	69	64	50	48	41	33	30	44	14	A–7–5(5)	SM.
----	-----	100	95	94	88	84	78	70	62	40	34	27	19	17	37	2	A–4(1)	SM.
----	-----	-----	-----	-----	-----	-----	-----	100	99	98	96	82	56	46	52	28	A–7–6(18)	CH.
----	-----	-----	-----	-----	-----	-----	100	97	94	83	78	63	42	32	30	12	A–6(9)	CL.
----	-----	-----	-----	-----	100	99	98	89	81	63	58	50	37	31	35	17	A–6(8)	CL.
----	-----	100	96	95	94	93	85	70	57	32	26	21	17	15	25	4	A–2–4(0)	SM–SC.
----	-----	-----	-----	-----	-----	-----	-----	-----	100	83	77	63	48	42	36	19	A–6(12)	CL.
----	-----	-----	-----	-----	-----	-----	-----	-----	100	86	79	64	44	34	31	14	A–6(10)	CL.
----	100	90	87	82	79	77	75	69	64	48	45	40	34	32	46	19	A–7–6(6)	SM–SC.
----	100	84	77	72	67	65	64	58	52	31	26	21	16	14	39	6	A–2–4(0)	GM.
----	-----	100	92	89	87	84	77	73	68	58	56	48	37	32	45	13	A–7–5(6)	ML.
----	100	91	79	76	68	62	55	45	40	28	26	20	16	14	44	5	A–2–5(0)	GM.
100	90	90	81	76	70	68	65	58	55	45	43	36	28	24	44	14	A–7–5(3)	GM.
100	83	83	80	74	66	59	54	48	45	38	37	27	17	12	32	5	A–4(1)	GM.
----	100	91	85	83	80	78	76	73	72	70	68	59	42	30	36	15	A–6(9)	CL.
100	82	74	72	65	60	57	55	51	50	47	45	39	27	19	35	11	A–6(3)	GM–GC.
----	-----	-----	100	97	97	97	96	92	91	86	83	69	46	35	37	11	A–6(8)	ML–CL.
100	97	86	74	72	68	66	64	61	60	56	53	47	31	23	38	12	A–6(5)	ML–CL.
100	55	46	35	33	31	29	27	27	27	24	22	18	9	5	31	2	A–1–b(0)	GM.
100	74	66	51	48	41	38	36	31	31	28	25	22	12	6	29	5	A–2–4(0)	GM–GC.
----	-----	100	93	91	88	86	83	68	59	45	42	37	27	21	30	8	A–4(2)	SM–SC.
----	100	96	94	93	86	81	73	58	48	38	36	30	24	19	31	11	A–6(1)	SC.

TABLE 7.—*Engineering*

Soil type and location of sample	Parent material	Report no.	Depth	Horizon	Moisture-density [1]		Mechnical analysis [2]
					Maximum dry density	Optimum moisture	Discarded in field sampling (estimate)
							Larger than 3 in.
			Inches		*Lb. per cu. ft.*	*Percent*	*Percent*
Lewisberry sandy loam.							
800 feet south of Frogtown (most gravelly and sandy).	Triassic conglomerate.	BB-24634	17 to 25	B_{22}	118	12	
		BB-24635	36 to 54	C_1	121	14	
¾ mile southwest of Navoo (finest textured)	Triassic sandstone and conglomerate.	BB-24636	30 to 40	B_{22}	122	12	
		BB-24637	45 to 56	C	122	11	
Manor channery silt loam.							
¼ mile southwest of Loganville (modal)	Schist.	BB-24994	10 to 17	B_2	112	18	
		BB-24995	17 to 25	C_1	110	18	
Intersection of Route 66013 and Route T-587 (deep, micaceous saprolyte).	Schist.	BB-28708	11 to 18	B_2	108	16	
		BB-28707	26 to 80	C	105	16	
Route 124, ¾ mile north of York Furnace (shallow, very channery).	Schist.	BB-28711	8 to 20	B_2	111	15	50
Penn silt loam.							
1¼ miles southwest of Dover (modal)	Triassic shale.	BB-24987	14 to 21	B_{21}	119	14	
		BB-24988	24 to 30	C_1	120	14	
¾ mile east of Big Mount (intergrading to Bucks)	Red Triassic shale.	BC-892	15 to 24	B_2	110	16	
		BC-893	24 to 32	C_1	111	16	
½ mile northwest of Big Mount (intergrading to Penn loam).	Red Triassic shale and sandstone.	BC-894	8 to 13	B_1	114	14	
		BC-895	13 to 26	C_1	118	15	
Readington silt loam.							
1 mile southwest of Dover (modal)	Triassic shale.	BB-24986	19 to 25	B_{22}	109	18	
		BB-24989	30 to 36	C_1	114	16	
¼ mile south of Admire (intergrading to Lansdale)	Red and yellow Triassic sandstone and shale.	BC-888	23 to 30	B_{22g}	110	16	
		BC-889	32 to 39	C_1	121	11	
2 miles west of Davidsburg (intergrading to Lehigh)	Triassic red shale.	BC-1726	17 to 23	B_{22g}	103	20	
		BC-1727	23 to 28	C_{1g}	100	21	

[1] Determined in accordance with AASHO Designation: T 99–57, The Moisture-Density Relations of Soils, Method A (*1*).

[2] According to AASHO Designation: T 88 (*1*). Results obtained by this procedure may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service. 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 more than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method

test data—Continued

Mechanical analysis [2]—Continued															Liquid limit	Plastic index	Classification	
Percentage passing sieve [3]—											Percentage smaller than [3]—						AASHO [4]	Unified [5]
3 in.	2 in.	1½ in.	1 in.	¾ in.	⅜ in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 60 (0.25 mm).	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
----	100	94	94	92	89	86	83	70	60	46	44	36	32	26	28	9	A-4(2)	SC.
----	-----	100	97	97	95	93	90	75	61	40	37	30	23	20	25	6	A-4(1)	SM-SC.
----	-----	-----	-----	-----	-----	100	99	85	65	43	41	35	29	22	23	6	A-4(2)	SM-SC.
----	-----	-----	-----	100	99	99	99	87	63	35	32	25	24	22	26	8	A-2-4(0)	SC.
----	-----	100	85	80	71	63	56	47	44	38	36	28	20	15	40	12	A-6(1)	GM.
----	-----	100	93	90	75	66	58	51	48	40	36	28	19	14	41	7	A-5(1)	GM.
----	-----	100	93	89	84	82	79	72	65	43	39	28	18	13	36	3	A-4(2)	SM.
----	-----	-----	100	99	91	87	83	75	62	28	22	12	6	4	39	0	A-2-4(0)	SM.
100	86	67	57	53	41	34	29	24	21	11	10	7	4	3	36	0	A-1-a(0)	GP-GM.
----	-----	-----	-----	-----	100	99	99	90	86	75	71	57	37	28	28	8	A-4(8)	CL.
----	-----	-----	-----	-----	-----	-----	100	90	86	75	70	55	34	25	27	7	A-4(8)	ML-CL.
----	-----	100	97	95	93	92	90	88	86	70	65	52	34	26	32	8	A-4(7)	ML-CL.
----	-----	100	99	97	92	88	82	76	73	57	49	38	23	20	29	4	A-4(4)	ML.
----	100	95	93	93	90	86	82	76	71	55	48	36	22	15	28	5	A-4(4)	ML-CL.
100	82	72	67	65	57	52	49	44	41	35	30	25	18	14	28	7	A-2-4(0)	GM-GC.
----	-----	-----	-----	100	99	95	88	85	84	77	72	56	36	26	33	10	A-4(8)	ML-CL.
----	-----	-----	-----	-----	100	98	93	73	67	56	53	45	30	22	33	11	A-6(5)	ML-CL.
----	-----	-----	-----	-----	-----	-----	100	95	92	86	85	68	43	30	31	10	A-4(8)	ML-CL.
----	-----	-----	100	99	99	98	97	65	49	31	27	24	17	13	24	0	A-2-4(0)	SM.
----	-----	-----	-----	-----	-----	-----	100	98	98	94	92	84	65	52	44	21	A-7-6(13)	CL.
----	-----	100	91	90	85	84	82	76	75	71	69	63	50	42	44	22	A-7-6(13)	CL.

and the material more than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis data used in this table are not suitable for use in naming textural classes for soils.

[3] Based on sample as received in laboratory. Laboratory test data not corrected for amount discarded in field sampling.

[4] Based on Standard Specifications for Highway Materials and Methods of Sampling and Testing (*1*).

[5] Based on The Unified Soil Classification System (*14*).

Descriptions of the Soils

In this section, the soils of York County are described in detail. The soil map at the back of this report gives the location and distribution of all the soils described, and table 8 gives the approximate acreage and proportionate extent of the soils. Technical terms used in describing the soils are defined in the Glossary at the back of this report.

TABLE 8.—*Approximate acreage and proportionate extent of soils*

Soil	Acres	Percent
Altavista silt loam, 0 to 3 percent slopes	513	0. 1
Altavista silt loam, 3 to 8 percent slopes, moderately eroded	130	(1)
Arendtsville gravelly loam, 3 to 8 percent slopes, moderately eroded	105	(1)
Arendtsville gravelly loam, 8 to 15 percent slopes, moderately eroded	143	(1)
Arendtsville gravelly loam, 15 to 25 percent slopes, severely eroded	72	(1)
Arendtsville very stony loam, 0 to 8 percent slopes	18	(1)
Arendtsville very stony loam, 8 to 25 percent slopes	116	(1)
Ashton loam, 0 to 3 percent slopes	390	. 1
Ashton loam, 3 to 8 percent slopes	235	(1)
Athol loam and silt loam, 0 to 3 percent slopes	33	(1)
Athol loam and silt loam, 3 to 8 percent slopes, moderately eroded	594	. 1
Athol loam and silt loam, 8 to 15 percent slopes, moderately eroded	358	. 1
Athol loam and silt loam, 8 to 15 percent slopes, severely eroded	355	. 1
Athol loam and silt loam, 15 to 25 percent slopes, moderately eroded	99	(1)
Athol loam and silt loam, 15 to 25 percent slopes, severely eroded	363	. 1
Athol loam and silt loam, 25 to 35 percent slopes, moderately eroded	120	(1)
Bedford silt loam, 0 to 3 percent slopes	2, 808	. 5
Bedford silt loam, 3 to 8 percent slopes, moderately eroded	1, 040	. 2
Bedford silt loam, 3 to 8 percent slopes, severely eroded	8	(1)
Bedford silt loam, 8 to 15 percent slopes, moderately eroded	5	(1)
Bedford silt loam, 8 to 15 percent slopes, severely eroded	2	(1)
Bermudian silt loam, 0 to 3 percent slopes	598	. 1
Bermudian silt loam, high bottom, 0 to 3 percent slopes	23	(1)
Bermudian silt loam, high bottom, 3 to 8 percent slopes	42	(1)
Birdsboro silt loam, 0 to 3 percent slopes	126	(1)
Birdsboro silt loam, 3 to 8 percent slopes, moderately eroded	925	. 2
Birdsboro silt loam, 8 to 15 percent slopes, moderately eroded	128	(1)
Bowmansville silt loam	2, 196	. 4
Bowmansville silt loam, local alluvium	132	(1)
Brecknock channery silt loam, 3 to 8 percent slopes, moderately eroded	214	(1)
Brecknock channery silt loam, 8 to 15 percent slopes	28	(1)
Brecknock channery silt loam, 8 to 15 percent slopes, moderately eroded	29	(1)
Brecknock channery silt loam, 8 to 15 percent slopes, severely eroded	829	. 1
Brecknock channery silt loam, 15 to 25 percent slopes	40	(1)
Brecknock channery silt loam, 15 to 25 percent slopes, moderately eroded	195	(1)
Brecknock channery silt loam, 15 to 25 percent slopes, severely eroded	435	. 1
Brecknock channery silt loam, 25 to 35 percent slopes, moderately eroded	74	(1)
Brecknock very stony silt loam, 8 to 25 percent slopes	1, 697	0. 3
Brecknock very stony silt loam, 25 to 65 percent slopes	870	. 1
Cardiff slaty silt loam, 3 to 8 percent slopes, moderately eroded	2, 598	. 4
Cardiff slaty silt loam, 8 to 15 percent slopes, moderately eroded	3, 052	. 5
Cardiff slaty silt loam, 8 to 15 percent slopes, severely eroded	600	. 1
Cardiff slaty silt loam, 15 to 25 percent slopes, moderately eroded	382	. 1
Cardiff slaty silt loam, 15 to 25 percent slopes, severely eroded	480	. 1
Cardiff slaty silt loam, 25 to 35 percent slopes, severely eroded	123	(1)
Catoctin channery silt loam, 3 to 8 percent slopes, severely eroded	20	(1)
Catoctin channery silt loam, 8 to 15 percent slopes, severely eroded	288	(1)
Catoctin channery silt loam, 15 to 25 percent slopes, severely eroded	224	(1)
Chester silt loam, 0 to 3 percent slopes	290	(1)
Chester silt loam, 0 to 3 percent slopes, moderately eroded	144	(1)
Chester silt loam, 3 to 8 percent slopes	7, 948	1. 4
Chester silt loam, 3 to 8 percent slopes, moderately eroded	53, 413	9. 1
Chester silt loam, 3 to 8 percent slopes, severely eroded	490	. 1
Chester silt loam, 8 to 15 percent slopes, moderately eroded	28, 396	4. 9
Chewacla silt loam	13, 330	2. 3
Conestoga silt loam, 0 to 3 percent slopes	211	(1)
Conestoga silt loam, 0 to 3 percent slopes, moderately eroded	333	. 1
Conestoga silt loam, 3 to 8 percent slopes, moderately eroded	9, 564	1. 6
Conestoga silt loam, 3 to 8 percent slopes, severely eroded	280	(1)
Conestoga silt loam, 8 to 15 percent slopes, moderately eroded	1, 026	. 2
Conestoga silt loam, 8 to 15 percent slopes, severely eroded	727	. 1
Conestoga silt loam, 15 to 25 percent slopes, severely eroded	352	. 1
Congaree silt loam	546	. 1
Croton silt loam, 0 to 3 percent slopes	8, 022	1. 4
Croton silt loam, 0 to 3 percent slopes, moderately eroded	88	(1)
Croton silt loam, 3 to 8 percent slopes	1, 002	. 2
Croton silt loam, 3 to 8 percent slopes, moderately eroded	416	. 1
Croton very stony silt loam, 0 to 8 percent slopes	72	(1)
Duffield silt loam, 0 to 3 percent slopes	1, 023	. 2
Duffield silt loam, 0 to 3 percent slopes, moderately eroded	364	. 1
Duffield silt loam, 3 to 8 percent slopes	394	. 1
Duffield silt loam, 3 to 8 percent slopes, moderately eroded	5, 133	. 9
Duffield silt loam, 8 to 15 percent slopes, moderately eroded	1, 779	. 3
Duffield silt loam, 15 to 25 percent slopes, moderately eroded	125	(1)

See footnote at end of table.

TABLE 8.—*Approximate acreage and proportionate extent of soils*—Continued

Soil	Acres	Percent
Duffield silty clay, 8 to 15 percent slopes, severely eroded	310	0.1
Edgemont channery loam, 3 to 8 percent slopes, moderately eroded	3,452	.6
Edgemont channery loam, 8 to 15 percent slopes, moderately eroded	4,940	.8
Edgemont channery loam, 8 to 15 percent slopes, severely eroded	880	.2
Edgemont channery loam, 15 to 25 percent slopes, moderately eroded	1,099	.2
Edgemont channery loam, 15 to 25 percent slopes, severely eroded	1,222	.2
Edgemont silt loam, 3 to 8 percent slopes	157	(1)
Edgemont silt loam, 3 to 8 percent slopes, moderately eroded	1,439	.2
Edgemont silt loam, 3 to 8 percent slopes, severely eroded	97	(1)
Edgemont silt loam, 8 to 15 percent slopes	19	(1)
Edgemont silt loam, 8 to 15 percent slopes, moderately eroded	934	.2
Edgemont silt loam, 8 to 15 percent slopes, severely eroded	137	(1)
Edgemont silt loam, 15 to 25 percent slopes, moderately eroded	154	(1)
Edgemont silt loam, 15 to 25 percent slopes, severely eroded	110	(1)
Edgemont soils, 25 to 35 percent slopes, moderately eroded	418	.1
Edgemont very stony loam, 0 to 8 percent slopes	980	.2
Edgemont very stony loam, 8 to 25 percent slopes	7,907	1.4
Edgemont very stony loam, 25 to 60 percent slopes	3,836	.7
Elioak silt loam, 0 to 3 percent slopes	85	(1)
Elioak silt loam, 3 to 8 percent slopes	1,690	.3
Elioak silt loam, 3 to 8 percent slopes, moderately eroded	10,775	1.8
Elioak silt loam, 8 to 15 percent slopes	345	.1
Elioak silt loam, 8 to 15 percent slopes, moderately eroded	2,367	.4
Elioak silt loam, 8 to 15 percent slopes, severely eroded	1,341	.2
Elk silt loam, 0 to 3 percent slopes	542	.1
Elk silt loam, 3 to 8 percent slopes, moderately eroded	958	.2
Elk silt loam, 8 to 15 percent slopes, moderately eroded	93	(1)
Glenelg channery silt loam, 3 to 8 percent slopes	2,532	.4
Glenelg channery silt loam, 3 to 8 percent slopes, moderately eroded	11,822	2.0
Glenelg channery silt loam, 3 to 8 percent slopes, severely eroded	496	.1
Glenelg channery silt loam, 8 to 15 percent slopes	5,634	1.0
Glenelg channery silt loam, 8 to 15 percent slopes, moderately eroded	16,915	2.9
Glenelg channery silt loam, 8 to 15 percent slopes, severely eroded	16,188	2.8
Glenelg channery silt loam, 15 to 25 percent slopes	437	.1
Glenelg channery silt loam, 15 to 25 percent slopes, moderately eroded	733	.1
Glenelg channery silt loam, 15 to 25 percent slopes, severely eroded	3,656	.6
Glenville silt loam, 0 to 3 percent slopes	6,734	1.2
Glenville silt loam, 3 to 8 percent slopes	3,970	.7
Glenville silt loam, 3 to 8 percent slopes, moderately eroded	374	.1
Guthrie silt loam	358	.1
Hagerstown silt loam, 0 to 3 percent slopes	671	.1
Hagerstown silt loam, 0 to 3 percent slopes, moderately eroded	157	(1)
Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded	3,751	0.6
Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded	297	.1
Hagerstown silt loam, 15 to 25 percent slopes, moderately eroded	35	(1)
Hagerstown silty clay, 3 to 8 percent slopes, severely eroded	59	(1)
Hagerstown silty clay, 8 to 15 percent slopes, severely eroded	312	.1
Hagerstown and Duffield silty clay loams, 15 to 25 percent slopes, severely eroded	152	(1)
Highfield channery silt loam, 3 to 8 percent slopes, moderately eroded	325	.1
Highfield channery silt loam, 8 to 15 percent slopes, moderately eroded	180	(1)
Highfield very stony silt loam, 0 to 8 percent slopes	12	(1)
Highfield and Catoctin very stony silt loams, 8 to 25 percent slopes	537	.1
Huntington silt loam	1,348	.2
Huntington silt loam, local alluvium, 0 to 3 percent slopes	156	(1)
Huntington silt loam, local alluvium, 3 to 8 percent slopes	219	(1)
Lamington silt loam	502	.1
Lansdale loam, 0 to 3 percent slopes, moderately eroded	162	(1)
Lansdale loam, 3 to 8 percent slopes, moderately eroded	1,557	.3
Lansdale loam, 3 to 8 percent slopes, severely eroded	174	(1)
Lansdale loam, 8 to 15 percent slopes, severely eroded	652	.1
Lansdale channery loam, 3 to 8 percent slopes, moderately eroded	2,796	.5
Lansdale channery loam, 8 to 15 percent slopes, moderately eroded	1,774	.3
Lansdale channery loam, 8 to 15 percent slopes, severely eroded	835	.1
Lansdale channery loam, 15 to 25 percent slopes, moderately eroded	492	.1
Lawrence silt loam	820	.1
Legore silt loam, 3 to 8 percent slopes, moderately eroded	964	.2
Legore silt loam, 3 to 8 percent slopes, severely eroded	845	.1
Legore silt loam, 15 to 25 percent slopes, moderately eroded	64	(1)
Legore clay loam, 8 to 15 percent slopes, severely eroded	981	.2
Legore clay loam, 15 to 25 percent slopes, severely eroded	1,574	.3
Legore clay loam, 25 to 35 percent slopes, severely eroded	279	(1)
Lehigh channery silt loam, 0 to 3 percent slopes	283	(1)
Lehigh channery silt loam, 3 to 8 percent slopes	234	(1)
Lehigh channery silt loam, 3 to 8 percent slopes, moderately eroded	259	(1)
Lehigh channery silt loam, 3 to 8 percent slopes, severely eroded	5,609	1.0
Lehigh channery silt loam, 8 to 15 percent slopes	971	.2
Lehigh channery silt loam, 8 to 15 percent slopes, moderately eroded	192	(1)
Lehigh channery silt loam, 8 to 15 percent slopes, severely eroded	1,356	.2
Lehigh channery silt loam, 15 to 25 percent slopes, moderately eroded	2,866	.5
Lehigh channery silt loam, 15 to 25 percent slopes, severely eroded	30	(1)

See footnote at end of table.

TABLE 8.—*Approximate acreage and proportionate extent of soils*—Continued

Soil	Acres	Percent
Lehigh very stony silt loam, 0 to 8 percent slopes	268	(1)
Lehigh very stony silt loam, 8 to 25 percent slopes	214	(1)
Lewisberry sandy loam, 3 to 8 percent slopes	531	0. 1
Lewisberry sandy loam, 3 to 8 percent slopes, moderately eroded	51	(1)
Lewisberry sandy loam, 8 to 15 percent slopes	924	. 2
Lewisberry sandy loam, 8 to 15 percent slopes, moderately eroded	1, 142	. 2
Lewisberry sandy loam, 15 to 25 percent slopes, moderately eroded	127	(1)
Lewisberry sandy loam, 25 to 45 percent slopes, moderately eroded	63	(1)
Lewisberry and Lansdale very stony loams, 8 to 25 percent slopes	994	. 2
Lewisberry and Lansdale very stony sandy loams, 26 to 60 percent slopes	253	(1)
Lindside silt loam	4, 219	. 7
Made land, Duffield and Conestoga materials	329	. 1
Made land, Penn and Lansdale materials, gently sloping	514	. 1
Made land, Penn and Lansdale materials, strongly sloping	102	(1)
Made land, Wheeling and Sciotoville materials	1, 080	. 2
Manor channery loam, 3 to 8 percent slopes	974	. 2
Manor channery loam, 3 to 8 percent slopes, moderately eroded	8, 844	1. 5
Manor channery loam, 3 to 8 percent slopes, severely eroded	163	(1)
Manor channery loam, 8 to 15 percent slopes	5, 580	1. 0
Manor channery loam, 8 to 15 percent slopes, moderately eroded	28, 623	4. 9
Manor channery loam, 8 to 15 percent slopes, severely eroded	10, 278	1. 8
Manor channery loam, 15 to 25 percent slopes	8, 290	1. 4
Manor channery loam, 15 to 25 percent slopes, moderately eroded	10, 288	1. 8
Manor channery loam, 15 to 25 percent slopes, severely eroded	29, 047	5. 0
Manor channery loam, 25 to 45 percent slopes	3, 161	. 5
Manor channery loam, 25 to 45 percent slopes, moderately eroded	1, 991	. 3
Manor channery loam, 25 to 45 percent slopes, severely eroded	6, 640	1. 1
Manor channery loam, 45 to 60 percent slopes	424	. 1
Manor very stony loam, 0 to 8 percent slopes	172	(1)
Manor very stony loam, 8 to 25 percent slopes, moderately eroded	2, 637	. 5
Manor very stony loam, 25 to 75 percent slopes, moderately eroded	11, 501	2. 0
Melvin silt loam	1, 156	. 2
Montalto channery silt loam, 3 to 8 percent slopes, moderately eroded	3, 065	. 5
Montalto channery silt loam, 8 to 15 percent slopes, moderately eroded	700	. 1
Montalto channery silt loam, 15 to 25 percent slopes, moderately eroded	114	(1)
Montalto channery silty clay loam, 8 to 15 percent slopes, severely eroded	1, 244	. 2
Montalto extremely stony silt loam, 8 to 25 percent slopes	1, 744	. 3
Montalto extremely stony silt loam, 25 to 60 percent slopes	1, 433	. 2
Montalto very stony silt loam, 3 to 8 percent slopes	1, 176	. 2
Montalto very stony silt loam, 8 to 25 percent slopes	5, 678	1. 0
Montalto very stony silt loam, 25 to 60 percent slopes	1, 159	. 2
Mount Lucas silt loam, 0 to 3 percent slopes	382	. 1
Mount Lucas silt loam, 3 to 8 percent slopes	485	. 1
Mount Lucas silt loam, 3 to 8 percent slopes, moderately eroded	891	0. 2
Mount Lucas very stony silt loam, 0 to 8 percent slopes	783	. 1
Murrill gravelly loam, 0 to 3 percent slopes	96	(1)
Murrill gravelly loam, 3 to 8 percent slopes	20	(1)
Murrill gravelly loam, 3 to 8 percent slopes, moderately eroded	1, 463	. 3
Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded	303	. 1
Murrill gravelly loam, 8 to 15 percent slopes, severely eroded	157	(1)
Murrill very stony loam, 0 to 8 percent slopes	29	(1)
Murrill very stony loam, 8 to 25 percent slopes	354	. 1
Penn silt loam, 0 to 3 percent slopes, moderately eroded	347	. 1
Penn silt loam, 3 to 8 percent slopes	379	. 1
Penn silt loam, 3 to 8 percents slopes, moderately eroded	11, 688	2. 0
Penn silt loam, 3 to 8 percent slopes, severely eroded	7, 349	1. 3
Penn silt loam, 8 to 15 percent slopes	164	(1)
Penn silt loam, 8 to 15 percent slopes, moderately eroded	1, 422	. 2
Penn silt loam, 8 to 15 percent slopes, severely eroded	12, 811	2. 2
Penn silt loam, 15 to 25 percent slopes	64	(1)
Penn silt loam, 15 to 25 percent slopes, moderately eroded	126	(1)
Penn loam, 3 to 8 percent slopes, moderately eroded	7, 325	1. 3
Penn loam, 3 to 8 percent slopes, severely eroded	3, 627	. 6
Penn loam, 8 to 15 percent slopes, moderately eroded	1, 468	. 3
Penn loam, 8 to 15 percent slopes, severely eroded	8, 459	1. 4
Penn shaly silt loam, 3 to 8 percent slopes, severely eroded	234	(1)
Penn shaly silt loam, 8 to 15 percent slopes, severely eroded	461	. 1
Penn shaly silt loam, 15 to 25 percent slopes, severely eroded	2, 046	. 3
Penn soils, 15 to 25 percent slopes, severely eroded	4, 765	. 8
Penn soils, 25 to 35 percent slopes, severely eroded	970	. 2
Penn soils, 35 to 60 percent slopes, severely eroded	11	(1)
Penn very stony loam, 0 to 8 percent slopes	859	. 1
Penn very stony loam, 8 to 25 percent slopes	8, 484	1. 5
Penn very stony loam, 25 to 60 percent slopes	3, 543	. 6
Penn-Lansdale loams, 0 to 3 percent slopes	97	(1)
Penn-Lansdale loams, 3 to 8 percent slopes, moderately eroded	3, 205	. 5
Penn-Lansdale loams, 3 to 8 percent slopes, severely eroded	1, 046	. 2
Penn-Lansdale loams, 8 to 15 percent slopes, moderately eroded	310	. 1
Penn-Lansdale loams, 8 to 15 percent slopes, severely eroded	666	. 1
Penn-Lansdale loams, 15 to 25 percent slopes, severely eroded	79	(1)
Penn and Readington shaly silt loams, 3 to 8 percent slopes, moderately eroded	241	(1)
Penn and Readington shaly silt loams, 3 to 8 percent slopes, severely eroded	359	. 1
Penn and Readington shaly silt loams, 8 to 15 percent slopes, severely eroded	85	(1)
Pequea silt loam, 3 to 8 percent slopes, moderately eroded	106	(1)

See footnote at end of table.

TABLE 8.—*Approximate acreage and proportionate extent of soils*—Continued

Soil	Acres	Percent	Soil	Acres	Percent
Pequea silt loam, 8 to 15 percent slopes, moderately eroded	92	(1)	Steinsburg channery loam, 25 to 35 precent slopes, severely eroded	168	(1)
Pequea silt loam, 8 to 15 percent slopes, severely eroded	103	(1)	Watchung silt loam, 0 to 3 percent slopes	2, 493	0. 4
Pequea silt loam, 15 to 25 percent slopes, severely eroded	173	(1)	Watchung silt loam, 3 to 5 percent slopes	504	. 1
Pequea silt loam, 25 to 35 percent slopes, moderately eroded	82	(1)	Watchung very stony silt loam, 0 to 8 percent slopes	4, 477	. 8
Raritan silt loam, 0 to 3 percent slopes	354	0. 1	Wehadkee silt loam	2, 253	. 4
Raritan silt loam, 3 to 8 percent slopes, moderately eroded	761	. 1	Wehadkee silt loam, local alluvium, 3 to 8 percent slopes	390	. 1
Readington silt loam, 0 to 3 percent slopes	4, 194	. 7	Wheeling silt loam, 3 to 8 percent slopes, moderately eroded	52	(1)
Readington silt loam, 3 to 8 percent slopes	2, 314	. 4	Wheeling silt loam, 8 to 15 percent slopes, moderately eroded	48	(1)
Readington silt loam, 3 to 8 percent slopes, moderately eroded	1, 676	. 3	Whiteford silt loam, 3 to 8 percent slopes, moderately eroded	77	(1)
Rowland silt loam	6, 165	1. 1	Whiteford silt loam, 8 to 15 percent slopes, moderately eroded	47	(1)
Sciotoville silt loam, 0 to 3 percent slopes	117	(1)	Wickham silt loam, 0 to 3 percent slopes	125	(1)
Sciotoville silt loam, 3 to 8 percent slopes	66	(1)	Wickham silt loam, 3 to 8 percent slopes, moderately eroded	190	(1)
Steinsburg channery loam, 8 to 15 percent slopes, severely eroded	322	. 1	Worsham silt loam	1, 028	. 2
Steinsburg channery loam, 15 to 25 percent slopes, severely eroded	1, 402	. 2	Mines and Pits	626	. 1
Steinsburg channery loam, 25 to 35 percent slopes, moderately eroded	68	(1)	Total	584, 960	100. 0

[1] Less than 0.1 percent.

Altavista Series

This series consists of deep, moderately well drained soils on stream terraces. The parent material was old alluvium washed from uplands underlain by schist and phyllite.

These soils are commonly near or adjacent to the Congaree and other soils of the bottom lands and to the Chester soils of the uplands. They differ from the soils of the bottom lands in being above flood stage and in having a better developed profile. They differ from the Chester soils in being less well drained, in having a thicker solum, and in being mottled and finer textured in the lower part of the subsoil.

Because of their small acreage, the Altavista soils in York County are of little agricultural importance. They occur principally along the West Branch of Codorus Creek, in the central part of the county.

Typical profile of Altavista silt loam, 0 to 3 percent slopes, in a cultivated field 1 mile northwest of York New Salem:

A_p 0 to 8 inches, dark-brown (10YR 3/3) silt loam; moderate, medium and fine, granular structure; very friable; pH 6.0; abrupt, wavy lower boundary; 6 to 10 inches thick.

A_3 8 to 11 inches, brown (10YR 4/3) silt loam; weak, fine, subangular blocky structure breaking to moderate, medium, granular structure; friable; pH 5.8; clear, wavy lower boundary; 2 to 4 inches thick.

B_1 11 to 14 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, platy structure breaking to moderate, medium and fine, subangular blocky structure; thin, partial clay films on ped faces; pH 5.5; friable to firm; clear, wavy lower boundary; 2 to 4 inches thick.

B_{21} 14 to 18 inches, yellowish-brown (10YR 5/4 to 5/6) silty clay loam; weak, medium, platy structure breaking to moderate, fine, angular and subangular blocky structure; thin, partial clay films on ped faces; firm; pH 5.8; gradual, wavy lower boundary; 2 to 6 inches thick.

B_{22} 18 to 23 inches, yellowish-brown (10YR 5/6) silty clay; moderate, medium and fine, angular and subangular blocky structure; thin, continuous clay films on ped faces; very firm when moist, slightly sticky and slightly plastic when wet; pH 5.8; clear, wavy lower boundary; 5 to 9 inches thick.

B_{3g} 23 to 34 inches +, light yellowish-brown to yellowish-brown silty clay; many, medium, distinct mottles of light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6); strong, medium and fine, angular and subangular blocky structure; thin, continuous clay films on ped faces; very firm when moist, slightly sticky and slightly plastic when wet; pH 4.8; clear, wavy lower boundary; 8 to 13 inches thick.

The surface layer is brown to grayish brown. The depth to mottling is ordinarily between 18 and 26 inches but ranges from 15 to 30 inches. The thickness of the alluvial deposit in which these soils formed is generally about 5 feet but ranges from 4 to 7 feet. From 5 to 15 percent of the surface layer consists of gravel-sized fragments of milky quartz, rose quartz, and quartzite.

The Altavista soils are acid and are moderately high in fertility. Their available moisture capacity is moderately high to high. In winter and early in spring the water table is high. Tilth is good.

These soils are not well suited to alfalfa or to potatoes or other root crops.

Altavista silt loam, 0 to 3 percent slopes (AaA).—The profile of this soil is like the profile described as typical of the series. The depth to bedrock is generally more than 5 feet. Runoff is slow. Drainage is impeded in the lower part of the subsoil, and the water table is seasonally high. The erosion hazard is only slight.

This soil is all in cultivation. It is fairly well suited to corn, hay, and pasture. It is not suited to alfalfa or to potatoes. A suitable rotation consists of a row crop, a small grain, and hay.

Disposal of water is required. Diversion terraces at the base of nearby hillsides help to control runoff. Graded

rows, graded strips, and drainage terraces should be used where practical. Tiling and bedding are feasible in some places. Pastures should be seeded to moisture-tolerant grasses and legumes. (Capability unit IIw-2; woodland group 11.)

Altavista silt loam, 3 to 8 percent slopes, moderately eroded (AaB2).—This soil is eroded to the extent that the plow layer is a mixture of the original surface layer and the subsoil. Nevertheless, the depth to bedrock is generally more than 4 feet. Runoff is moderate. The lower part of the subsoil is slowly permeable, and the water table is high in winter and in the early part of spring.

All of this soil is cultivated. Because it is wet, it warms up rather slowly in spring. Corn, small grain, and moisture-tolerant hay and pasture plants do fairly well, but potatoes and alfalfa do not. The rotation should be no more intensive than the following: Corn, a cover crop, a small grain sown in spring, and 2 years of hay.

Erosion control and water control are necessary. Where suitable outlets exist, diversion terraces at the base of adjoining hillsides help to control runoff. Graded rows, graded strips, and drainage terraces also help to dispose of water and to control erosion. Maintaining the supply of organic matter is important. (Capability unit IIe-7; woodland group 11.)

Arendtsville Series

This series consists of deep, well-drained, gently sloping to moderately steep soils on uplands. The surface layer is dark-brown gravelly loam, and the subsoil is yellowish-red to dark reddish-brown gravelly silty clay loam to loam. The parent material weathered from very old fanglomerate.

These soils are commonly near or adjacent to the Penn and the Highfield soils. They are more gravelly than the Penn soils and are much deeper to bedrock. They are more reddish throughout than the Highfield soils and are deeper to bedrock.

The Arendtsville soils in York County are of limited extent. They are all in the far northwestern part of the county.

Typical profile of Arendtsville gravelly loam, 8 to 15 percent slopes, moderately eroded, in an idle field 2½ miles west of Clear Spring and ⅛ mile northeast of the York-Adams County line:

A_p 0 to 8 inches, dark-brown (7YR 3/2) gravelly loam; weak, fine, granular structure; friable; pH 6.2; clear, smooth lower boundary; 7 to 9 inches thick.

B_1 8 to 15 inches, yellowish-red (5YR 4/6) gravelly silt loam; weak, fine, subangular blocky structure; friable; pH 6.0; gradual, smooth lower boundary; 5 to 9 inches thick.

B_{21} 15 to 23 inches, dark reddish-brown (5YR 3/4) gravelly silty clay loam; weak, fine and medium, subangular blocky structure; thin, discontinuous clay films on ped faces; friable when moist, slightly sticky and slightly plastic when wet; pH 5.5; gradual, wavy lower boundary; 6 to 10 inches thick.

B_{22} 23 to 35 inches, reddish-brown (5YR 4/3) gravelly fine silt loam; weak, medium, subangular blocky structure; thin, discontinuous clay films on ped faces; friable when moist, slightly plastic when wet; pH 5.5; gradual, wavy lower boundary; 10 to 16 inches thick.

B_3 35 to 43 inches, reddish-brown (2.5YR 4/4) gravelly loam; weak, medium and coarse, subangular blocky structure; friable when moist, slightly plastic and slightly sticky when wet; pH 5.0; 8 to 13 inches thick.

C_1 43 inches +, reddish-brown (5YR 4/3) gravelly loam; some clay films in pores and on top of pebbles; friable when moist, slightly sticky when wet; thickness variable.

The surface layer ranges in texture from gravelly loam to gravelly silty clay loam. The B horizon ranges from silt loam to silty clay loam in texture and from dark reddish brown to yellowish red in color. The C horizon is thick. The depth to bedrock is 5 to 12 feet. Gravel and stones, on the surface and in the profile, constitute 5 to 40 percent of the soil material. Where the Arendtsville soils merge with the Penn or Readington soils, there are noticeable amounts of Triassic red shale. Small dikes of intrusive basic rock impart a slightly darker and browner color to the soil in some spots.

The Arendtsville soils are strongly acid and moderately fertile. Tilth is good. The available moisture capacity is moderately low. Leaching of the surface layer is rather rapid. These soils are especially well suited to orchards because of their deep, permeable, well-aerated subsoil. They tend to be somewhat droughty for row crops, but they are well suited to deep-rooted legumes and grasses.

Arendtsville gravelly loam, 3 to 8 percent slopes, moderately eroded (AgB2).—This soil is on rather broad, gently sloping ridges. The profile is deeper than the one described as typical of the series, and the soil is less droughty. The depth to the C horizon is about 48 inches. The plow layer is a mixture of the original surface layer and the subsoil. Included are a few small areas that are only slighty eroded.

This is an excellent orchard soil. Trees should be planted on the contour, each row on a small terrace, and should be lined up and down the hill to facilitate air drainage. Crop rotations should include 2 years of hay in every 4 years or, at the minimum, 1 year of hay in every 3 years. Conserving moisture and maintaining the organic-matter content are major management needs. Contour strips, diversion terraces, and grassed waterways are needed on the longer slopes. Because leaching is rapid, several small applications of fertilizer are better then a single large application. (Capability unit IIe-3; woodland group 1.)

Arendtsville gravelly loam, 8 to 15 percent slopes, moderately eroded (AgC2).—This soil occurs on moderately sloping hillsides. The profile is like the one described as typical of the series. The plow layer is a mixture of the orginal surface layer and the subsoil. A few shallow gullies have formed. Included are a few small areas that are only slightly eroded.

This is a good soil for orchards. Trees should be planted on the contour and should be lined up and down the hill to facilitate air drainage. A crop rotation should include 2 years of hay in every 4 years.

Increasing the organic-matter content and conserving moisture are major management needs. Contour strips, diversion terraces, and grassed waterways are needed on the longer slopes. Because fertilizer is leached out rapidly, several small applications are better than a single large one. (Capability unit IIIe-3; woodland group 5.)

Arendtsville gravelly loam, 15 to 25 percent slopes, severely eroded (AgD3).—The profile of this soil is shallower than the profile described as typical of the series. Erosion has removed most of the original surface layer, and patches of subsoil are exposed. Gullies are

common. Runoff is moderately rapid. The available moisture capacity is moderately low.

All of this soil has been cultivated, but some is now idle and reverting to woodland. This soil is best suited to woodland. It is droughty and, if disturbed, is subject to further erosion. Fair pastures of drought-resistant, deep-rooted grasses and legumes can be established. Pastures need very careful management. Lime and fertilizer must be applied, and grazing must be controlled. Diversion terraces may be needed on long slopes and just above gullied areas. Some fields are suitable for sodded orchards. Wooded areas should be protected from grazing and from fire. (Capability unit VIe–2; woodland group 7.)

Arendtsville very stony loam, 0 to 8 percent slopes (ArB).—Stones cover 3 to 15 percent of the surface of this soil, and there are stones throughout the profile. Much of the acreage is wooded. Cultivation is impractical, but areas where light machinery can be used are good for orchards and fair for pastures. Pastures should be seeded to drought-resistant grasses and legumes, limed and fertilized according to need as indicated by soil tests, and protected from overgrazing. Where possible, a seedbed should be prepared by disking. Mowing to control weeds is difficult but can be made easier by removing stones from the surface. (Capability unit VIs–1; woodland group 1.)

Arendtsville very stony loam, 8 to 25 percent slopes (ArD).—Stones cover 3 to 15 percent of the surface of this soil, and there are stones throughout the profile. Most of the acreage is wooded and should remain so. Cultivation is impractical, but areas where light machinery can be used are fair for pastures and orchards. Pastures should be seeded to drought-resistant grasses and legumes, limed and fertilized, and protected from overgrazing. Where possible, a seedbed should be prepared by disking. Mowing to control weeds is difficult but can be made easier by removing stones. (Capability unit VIs–1; woodland group 5.)

Ashton Series

This series consists of deep, well-drained soils on low stream terraces. The surface layer is brown to dark-brown loam, and the subsoil is brown to dark-brown or reddish-brown silt loam or sandy loam that is gravelly in places. The parent material was alluvium washed from uplands underlain by limestone, sandstone, and shale.

These soils are generally near or adjacent to the Huntington and Lindside soils. They differ from both in being above the normal flood plain and in having a better developed profile. The Lindside soils are less well drained than the Ashton soils and are mottled in the subsoil.

Because of their small acreage, the Ashton soils in York County are of little importance in agriculture. They occur along the Susquehanna River southeast and northwest of York Haven and also in the northern part of the county along Yellow Breeches Creek.

Typical profile of Ashton loam, 0 to 3 percent slopes, in a cultivated area 1 mile southeast of York Haven:

A_p 0 to 10 inches, brown to dark-brown (10YR 4/3) loam; moderate, fine, granular structure; very friable; pH 6.0; abrupt, smooth lower boundary; 8 to 11 inches thick.

B_1 10 to 18 inches, brown to dark-brown (7.5YR 4/4) silt loam; moderate, medium, platy structure; friable; pH 5.5; clear, smooth lower boundary; 6 to 14 inches thick.

B_2 18 to 38 inches, reddish-brown (5YR 4/4) silt loam; moderate, medium, subangular blocky structure; friable; pH 5.8; gradual, wavy lower boundary; 15 to 25 inches thick.

C_1 38 to 55 inches +, dominantly reddish-brown (5YR 4/4) sandy loam streaked with reddish gray (5YR 5/2); about 60 percent gravel; weak, medium, subangular blocky structure; very friable; pH 6.0; 20 to 30 inches thick.

The alluvial deposit in which these soils formed is 30 to 60 inches thick. The subsoil ranges from silt loam to sandy loam in texture and from reddish brown to yellowish brown in color. In places the C horizon is stratified with beds of gravel. Depending on the source of the alluvium, the C horizon is strongly acid to nearly neutral.

The Ashton soils are medium acid to nearly neutral. Their fertility is moderately high. Tilth is good, permeability is good, and the available moisture capacity is moderate. Crops respond to lime, fertilizer, and suitable rotations. In places the gravel in the C horizon has commercial value.

Ashton loam, 0 to 3 percent slopes (AbA).—This soil is on low, nearly level stream terraces that are flooded occasionally. It is generally on the highest part of the terrace, adjacent to more strongly sloping Ashton soils and, in places, to soils of the Huntington catena (see table 9, p. 138). The depth to bedrock is ordinarily more than 7 feet.

Much of the acreage is in industrial sites. If used for farming, this soil is suitable for intensive cultivation. It is excellent for truck crops. It is slightly droughty, but tilth is very good and there is little or no erosion hazard. Good yields can be obtained under ordinary good management. Barnyard manure, green manure, and crop residues are needed to help maintain the organic-matter content. A suitable rotation consists of a row crop, a cover crop, a row crop, a small grain, and hay. Slopes that are near the upper limit of the slope range should be farmed on the contour. Nearby streams provide water for irrigation of truck crops.

Industrial and commercial sites should be protected from floods by floodwalls, levees, or other means. Effluent from industrial waste and from sewage infiltrates readily. (Capability unit I–1; woodland group 2.)

Ashton loam, 3 to 8 percent slopes (AbB).—This soil is ordinarily more than 6 feet deep over bedrock. It is flooded occasionally. Ordinarily, it lies between Ashton loam, 0 to 3 percent slopes, and soils of the Huntington catena (see table 9). The slopes are short.

Much of the acreage is being used for industrial sites, but this soil is suitable for all crops commonly grown in the county. It should be farmed on the contour. The organic-matter content should be maintained by growing crops in a suitable rotation, applying barnyard manure, growing green-manure crops, and utilizing crops residues. A suitable rotation consists of a row crop, a cover crop, a small grain, and hay. This is a good soil for truck crops. Nearby streams provide water for irrigation. Lime and fertilizer should be applied according to the results of soil tests. Industrial and commercial sites need protection from floods. (Capability unit IIe–2; woodland group 2.)

Athol Series

This series consists of deep, well-drained, nearly level to steep soils on uplands. The surface layer is dark reddish-brown loam or silt loam, and the subsoil is reddish-brown to yellowish-red fine silt loam, silty clay loam, or clay loam. The parent material weathered from calcareous conglomerate and sandstone. Moderate slopes predominate.

These soils are commonly near or adjacent to the Penn and Lewisberry soils. They are deeper and less acid than the Penn soils, and they are finer textured and less acid than the Lewisberry soils.

Typical profile of Athol silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 1½ miles northwest of Clear Spring:

- A_p 0 to 8 inches, dark reddish-brown (5YR 3/3) silt loam; weak, medium and fine, granular structure; very friable; pH 6.0; abrupt, wavy lower boundary; 7 to 10 inches thick.
- B_1 8 to 11 inches, reddish-brown (5YR 4/4) fine silt loam; weak, fine, platy structure breaking to weak, very fine, subangular blocky structure; very friable; pH 5.8; clear, wavy lower boundary; 2 to 4 inches thick.
- B_{21} 11 to 14 inches, reddish-brown (5YR 4/4) silty clay loam; weak, fine and very fine, subangular blocky structure; thin, discontinuous clay films; friable; clear, wavy lower boundary; 2 to 5 inches thick.
- B_{22} 14 to 23 inches, yellowish-red (5YR 4/8) silty clay loam to silty clay; moderate, fine, subangular blocky structure breaking to very fine, subangular blocky structure; thin, mostly continous clay films; firm; pH 5.7; clear, wavy lower boundary; 7 to 12 inches thick.
- B_3 23 to 32 inches, yellowish-red (5YR 4/6) clay loam; weak, medium and fine, subangular blocky structure; thin, discontinuous clay films; firm; pH 5.6; clear, wavy lower boundary; 7 to 11 inches thick.
- C_1 32 to 40 inches, yellowish-red to red (5YR 4/6 to 2.5YR 4/6) shaly clay loam; some black coatings on shale fragments; moderate, coarse, blocky structure; firm; pH 6.1; 6 to 12 inches thick.
- D_r 40 inches +, conglomerate limestone and sandstone.

The texture of the surface soil may be either loam or silt loam. In this county the two textures are mapped in undifferentiated units. Areas of loam with some inclusions of silty clay loam occur along Yellow Breeches Creek, near the junction of the creek and Millers Run. Most of the areas of silt loam are southwest of Dillsburg. The color of the surface soil is dark reddish brown to brown, and the color of the subsoil is yellowish red to reddish brown. In texture, the subsoil ranges from fine silt loam to clay loam. Small areas of gravelly loam are included in the mapping units.

The Athol soils are moderately acid to nearly neutral. They are moderately high in natural fertility. They are permeable and have good tilth. The available moisture capacity is moderately low to moderately high, depending on the texture of the surface layer. Where the surface layer is loam, leaching is rather rapid.

Athol loam and silt loam, 0 to 3 percent slopes (AtA).—This soil is on moderately broad ridgetops. Almost all of it is wooded. The profile is deeper than the one described as typical of the series. The depth to bedrock is about 50 inches.

The surface is covered with a mat of mull-like organic matter about an inch thick. Under this mat is about 3 inches of pale-brown loam or silt loam, and below that, 3 to 8 inches of light-brown to light reddish-brown loam or silt loam.

Management of the woodland should include selective cutting, protection from fire and grazing, and underplanting with desirable kinds of trees.

Cleared areas of this soil can be used intensively for crops if barnyard manure is applied and green-manure crops are grown. On slopes near the upper limit of the slope range, cover crops and contour cultivation may be needed. (Capability unit I–2; woodland group 2.)

Athol loam and silt loam, 3 to 8 percent slopes, moderately eroded (AtB2).—The profile of the silt loam in this unit is like the profile described as typical of the series.

This soil occurs on rather narrow, irregularly shaped ridgetops. It is suited to all crops commonly grown in the county. Good yields can be obtained if crops are grown in a suitable rotation, erosion is controlled, barnyard manure is applied, and cover crops are grown. Hay should be grown at least once in a 3-year rotation. The shorter slopes should be farmed on the contour. On the longer slopes, stripcropping, cropland terraces, diversion terraces, and grassed waterways are needed to control erosion and to conserve moisture. Alfalfa, red clover, and other legumes grown for hay do very well. Tall grasses and legumes are suitable for intensively managed pastures. Lime and fertilizer should be applied according to the results of soil tests. (Capability unit IIe–1; woodland group 2.)

Athol loam and silt loam, 8 to 15 percent slopes, moderately eroded (AtC2).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is about 33 inches.

This soil is used mostly for crops, but small areas are being used for pasture. A row crop should not be grown more than once in every 4 years. Erosion should be controlled by contour farming, contour stripcropping, sodding waterways, and growing cover crops. Alfalfa, red clover, and other legumes grown for hay do very well. For pastures, mixtures of tall grasses and legumes are suitable. Livestock should be kept off the pastures until late in spring, when the roots are well established. Lime and fertilizer should be applied according to the results of soil tests. (Capability unit IIIe–1; woodland group 6.)

Athol loam and silt loam, 8 to 15 percent slopes, severely eroded (AtC3).—This soil is only about 20 inches deep over bedrock. Most of the original surface layer has been lost through erosion, and patches of reddish-brown silty clay loam are exposed. Shallow gullies are common, and a few gullies have cut down to the bedrock.

Most of this soil is idle or in rather poor pasture. It is best suited to long-term hay or pasture. A row crop should not be grown more than once in a 5-year rotation. Controlling gullies usually requires smoothing, mulching, heavy seeding, and the application of large quantities of lime and fertilizer. Reseeding should be done in alternate contour strips. Diversion terraces are needed on the longer slopes, and sod should be established in all waterways. (Capability unit IVe–1; woodland group 8.)

Athol loam and silt loam, 15 to 25 percent slopes, moderately eroded (AtD2).—This soil is only about 22 inches deep over bedrock. It has been eroded to the extent that the surface layer is a mixture of the original surface layer and the subsoil. In most areas there are a few shallow gullies.

This soil is suited to hay or pasture. Most of it is now used for pasture. When reseeding is necessary, a row crop can be grown for 1 year, then a small grain for 1 year

before the pasture or hay mixture is seeded. On long slopes, the reseeding should be done in alternate contour strips. Diversion terraces should be constructed where possible, and all waterways should be sodded. A mixture of alfalfa and grasses does well. Legumes and deep-rooted grasses provide more pasturage than bluegrass. (Capability unit IVe–1; woodland group 6.)

Athol loam and silt loam, 15 to 25 percent slopes, severely eroded (AtD3).—This soil is only about 15 inches deep over bedrock. It has been eroded to the extent that all the original surface layer has been lost, and the present surface layer is mostly reddish-brown silty clay loam. Shallow gullies are common, and a few gullies have cut down to bedrock.

Most of this soil is idle or in low-grade pasture. It is generally unsuitable for cultivation, and it has rather severe limitations for pasture. If used for pasture it should be seeded in alternate strips, and the seedbed should be prepared by disking and leaving the grass mulch on or near the surface. Wherever suitable outlets exist, diversion terraces should be constructed on long slopes and above gullied areas. Gullied areas need to be mulched, smoothed, and heavily seeded. Overgrazing should be prevented. Areas planted to trees should be protected from grazing. (Capability unit VIe–1; woodland group 8.)

Athol loam and silt loam, 25 to 35 percent slopes, moderately eroded (AtE2).—This soil is only about 15 inches deep over bedrock. In most areas there are a few shallow gullies.

Most of this soil was clear cut of timber and became low-grade pasture. It is now reverting to its natural vegetation. It can be used for woods or, to a limited extent, for pasture. In most areas it is difficult to use equipment for seeding, mowing, and controlling brush.

Woodland management should include selective cutting, culling of undesirable species, protection from fire and grazing, and planting trees of desirable species. (Capability unit VIe–1; woodland group 10.)

Bedford Series

This series consists of deep, moderately well drained, level and gently sloping soils on uplands, in depressions, and on toe slopes. The surface soil is dark-brown silt loam, the upper part of the subsoil is yellowish-brown silty clay loam, and the lower part of the subsoil is mottled, yellowish-brown silty clay. The parent material was residuum or colluvium derived from limestone or calcareous schist.

The Bedford soils are commonly near or adjacent to the Conestoga and Hagerstown soils. They differ from the Conestoga soils in having a mottled and finer textured lower subsoil. They differ from the Hagerstown soils in having a mottled lower subsoil and in being less red throughout.

Profile of Bedford silt loam, 0 to 3 percent slopes, in a cultivated area 1½ miles northeast of Hanover:

- A_p 0 to 8 inches, dark-brown (10YR 4/3 to 3/3) silt loam; moderate, medium and fine, granular structure; very friable; pH 6.0; abrupt, wavy lower boundary; 7 to 10 inches thick.
- A_3 8 to 10 inches, dark yellowish-brown (10YR 4/4) fine silt loam; weak, fine and very fine, subangular blocky structure and moderate, fine, granular structure; friable; pH 6.0; clear, wavy lower boundary; 0 to 3 inches thick.
- B_1 10 to 15 inches, yellowish-brown (10YR 5/6) silty clay loam; weak, medium, platy structure breaking to fine and very fine, subangular blocky structure; friable; pH 5.8; clear, wavy lower boundary; 4 to 6 inches thick.
- B_{21} 15 to 19 inches, yellowish-brown (10YR 5/6) silty clay loam; weak, thick, platy structure breaking to moderate, medium and fine, subangular blocky structure; thin, discontinuous clay films on ped faces; few small iron and manganese concretions; firm when moist, sticky when wet; pH 5.6; clear, wavy lower boundary; 4 to 6 inches thick.
- B_{21g} 19 to 25 inches, yellowish-brown (10YR 5/6) silty clay; common, medium, faint, brownish-yellow (10YR 6/8), brown (10YR 5/3), and strong-brown (7.5YR 5/6) mottles; moderate, medium and fine, angular and subangular blocky structure; thin, mostly continuous clay films on ped faces; firm when moist, very sticky when wet; pH 5.8; clear, wavy lower boundary; 5 to 7 inches thick.
- B_{22g} 25 to 28 inches, yellowish-brown (10YR 5/6) gritty silty clay; common, medium, distinct, light brownish-gray (10YR 6/2), pale-brown (10YR 6/3), and reddish-yellow (7.5YR 6/8) mottles; moderate, coarse and medium, platy and subangular blocky structure breaking to fine, subangular blocky; thin, mostly continuous clay films on ped faces; some black iron and manganese films; very firm when moist, very sticky when wet; pH 5.6; clear, wavy lower boundary; 1 to 4 inches thick.
- B_{3g} 28 to 34 inches, yellowish-brown (10YR 5/6) silty clay or clay; common, coarse, distinct mottles of light brownish gray (10YR 6/2), reddish yellow (7.5YR 6/8), and yellow (10YR 8/6); 5 to 10 percent quartz and schist fragments up to ½ inch in diameter; moderate, coarse, columnar breaking to moderate, coarse and medium, subangular blocky structure; thin, mostly continuous clay films and some black iron and manganese films; very firm when moist, plastic when wet; pH 5.3; clear, wavy lower boundary; 4 to 8 inches thick.
- C_1 34 to 36 inches, yellowish-brown (10YR 5/6) and strong-brown (7.5YR 5/6) schisty clay or clay loam; 20 to 50 percent partly weathered schist fragments; weak, medium and thin, platy structure; firm when moist, slightly plastic when wet; pH 5.3; abrupt, wavy lower boundary; 1 to 4 inches thick.
- C_2 36 to 40 inches +, partly weathered black, gray, and yellowish-brown schist.

The color of the surface soil is dark yellowish brown to dark brown, and that of the subsoil is yellowish brown to strong brown. The texture of the subsoil is dominantly silty clay loam, but in the lower part it ranges to silty clay. The depth to mottling is ordinarily 18 to 26 inches, but the range in depth is 15 to 30 inches. Where the parent material was weathered from limestone, the soils are darker colored and less micaceous than where the parent material was weathered from calcareous schist. In some places there is a little gravel in the profile.

The Bedford soils are medium acid to nearly neutral. The natural fertility is high. The available moisture capacity is high. Tilth is fair to good. The water table is high during the winter and in the early part of spring.

Bedford silt loam, 0 to 3 percent slopes (BdA).—This soil occurs on the uplands and at the head of drainageways. The profile is like the one described as typical of the series. Runoff is slow. Movement of water through the lower part of the subsoil is impeded, and consequently the water table is high in winter and in the early part of spring. There is little or no erosion hazard.

Most of this soil is cleared. In use it is about equally divided between crops and pasture. Drainage is the primary management problem. Bedding and open drains are feasible in some places. Drainage terraces, graded

strips, and graded rows can be used on slopes near the upper limit of the slope range. Tile drainage is not satisfactory, because of slow permeability in the lower part of the subsoil. In some areas a foot or more of recent local alluvium, washed from adjoining slopes, covers the original surface. In these areas tile is more effective because the alluvium is more permeable than the original soil.

This soil cannot be worked till rather late in the spring. If drained, fertilized, and limed, it is fairly well suited to corn, spring-sown grain, and moisture-tolerant grasses and legumes. For pasture, bluegrass does well, except in the hot summer months. Ladino clover also grows well. (Capability unit IIw–3; woodland group 12.)

Bedford silt loam, 3 to 8 percent slopes, moderately eroded (BdB2).—This soil is on toe slopes at the base of residual limestone slopes and in the upper part of draws below areas of Conestoga soils. Runoff from adjacent slopes has caused some erosion. A few shallow gullies have formed. The lower part of the subsoil is slowly permeable, and consequently the water table is high in winter and in the early part of spring.

In use this soil is about equally divided between crops and pasture. Erosion control and water control are necessary. Diversion terraces that have suitable outlets are needed to divert water that runs off the higher slopes. Graded rows, graded strips, and drainage terraces should also be used. Corn, spring-sown grains, and moisture-tolerant pasture and hay plants do fairly well. This is not a suitable soil for potatoes. Alfalfa will do fairly well for about 3 years; heaving is a problem. The crop rotation should be no more intensive than the following: corn, a cover crop, spring-sown small grain, and 2 years of hay.

Bluegrass does well in pastures, except in the hot summer months. Ladino clover is also well suited. (Capability unit IIe–6; woodland group 12.)

Bedford silt loam, 3 to 8 percent slopes, severely eroded (BdB3).—The profile of this soil is shallower than the profile described as typical of the series. More than 75 percent of the original surface layer has been lost through erosion, and the subsoil is exposed in most places. A few shallow gullies have formed.

This soil has been cropped heavily in the past. Building up and maintaining the organic-matter content, in order to conserve moisture and improve the soil structure, is a major management need. Cover crops, barnyard manure, and crop residues should be used. A row crop should be grown no more often than once in 4 years. Erosion can be controlled by graded rows, graded strips, and drainage terraces. Random tiling to drain a few wet spots may be advisable.

Tall grasses and legumes, under careful management, will provide good pasture. Bluegrass does well, except in the hot summer months. Ladino clover is also well suited. (Capability unit IIIe–6; woodland group 12.)

Bedford silt loam, 8 to 15 percent slopes, moderately eroded (BdC2).—The profile of this soil is somewhat shallower than the profile described as typical of the series. The plow layer is a mixture of the remaining surface soil and the upper part of the subsoil. Because the slowly permeable subsoil is near the surface, runoff is fairly rapid.

Most of this soil is used for crops. The crop rotation should include 2 years of hay in every 4 years. Cover crops, crop residues, and barnyard manure should be used to supply organic matter. Graded rows, graded strips, diversion terraces, and grassed waterways are needed to control runoff and prevent further erosion. Corn, alfalfa, spring-sown grain, and moisture-tolerant pasture and hay plants do fairly well.

Bluegrass is good in pastures, except in the hot summer months. Ladino clover is also well suited. (Capability unit IIIe–6; woodland group 13.)

Bedford silt loam, 8 to 15 percent slopes, severely eroded (BdC3).—Most of the original surface layer has been removed from this soil by erosion. In many places the yellowish-brown subsoil is exposed, and in other places only a very thin layer of the original surface soil remains. In some places there are gullies. The depth to the weathered parent material is about 25 to 30 inches. The slowly permeable, mottled subsoil is very near the surface; consequently, runoff is much more rapid than on the slightly eroded Bedford soils.

Most of this soil is now idle or used as pasture. It is suitable for long-term hay or pasture. It is no longer suitable for intensive cropping. A row crop should be grown only for the purpose of reestablishing long-term hay or pasture. Reseeding should be done in alternate graded strips. Diversion terraces may be needed in some places to control water that runs off the adjacent slopes and to reduce the possibility of further erosion. Special practices to control gullying are needed in some places. Deep-rooted grasses and legumes should be used in pastures. (Capability unit IVe–7; woodland group 13.)

Bermudian Series

This series consists of deep, well-drained, nearly level to gently sloping soils on flood plains and high bottoms. The surface layer is dark reddish-brown silt loam, and the subsoil is dark reddish-brown to reddish-brown silt loam to silty clay loam. The parent material was recent alluvium, mostly washed from the Penn, Readington, and Lansdale soils, all of which are on uplands and formed from material weathered from Triassic sandstone and shale. Also included in the parent material was some alluvium washed from the Lewisberry sandy loams and some derived from soils underlain by metamorphosed gray Triassic rock.

The Bermudian soils are commonly next to streambanks and are associated with the Rowland and Bowmansville soils. They are better drained than the Rowland soils and have a redder and unmottled subsoil. They are much better drained than the Bowmansville soils and lack the predominantly grayish color and mottling of those soils.

Typical profile of Bermudian silt loam, 0 to 3 percent slopes, in a cultivated area 1½ miles southwest of York Haven:

- A_p 0 to 8 inches, dark reddish-brown (5YR 3/3) silt loam; weak, fine, granular structure; very friable; medium acid; clear, smooth lower boundary; 6 to 9 inches thick.
- C_1 8 to 30 inches, dark reddish-brown (5YR 3/3) silt loam; weak, fine, subangular blocky structure; friable; strongly acid; gradual, wavy lower boundary; 15 to 36 inches thick.
- C_2 30 to 50 inches +, reddish-brown (2.5YR 4/4) silty clay loam; weak, medium, subangular blocky structure; friable; slightly sticky and slightly plastic; very strongly acid; 15 to 30 inches thick.

There are small areas in which the surface layer is sandy loam instead of silt loam. Most of these areas are on bottoms where some of the alluvium was washed from the Lewisberry sandy loams. In places there is fine sandy

loam, sandy loam, or gravel just beneath the silt loam surface layer.

The color is dark reddish brown to brownish gray. The darker colors occur where the parent material included alluvium derived from the metamorphosed gray rock.

In the lower part of the profile, there may be faint clay films on the peds.

The Bermudian soils are acid, permeable, and moderately fertile. Tilth is good, and the available moisture capacity is good. Crops respond to lime, fertilizer, and proper rotation. The major hazard is the possibility of a flood during the growing season. Ordinarily, floods occur only in winter and early in spring and are of limited extent and of short duration.

Bermudian silt loam, 0 to 3 percent slopes (BeA).—Many areas of this soil are on narrow bottoms next to steep or moderately steep uplands; others are on wider bottoms as strips between the streambanks and areas of the lower lying Rowland or, less commonly, Bowmansville soils. The profile is like the one described as typical of the series. Runoff is slow, and internal drainage is medium.

Although much of it is used for pasture, this soil is suitable for intensive use for any of the crops commonly grown in the county. Except for areas that are likely to be flooded during the growing season, it is particularly well suited to truck crops. The nearby streams can supply water to irrigate these crops. Cover crops help to protect the soil from scouring by floods.

Areas that, because of floods, are not suitable for crops make excellent pasture if fertilized and limed. Bluegrass and white Dutch clover do well as pasture plants, because the moisture supply is adequate and the growing season is relatively cool. (Capability unit I–1; woodland group 1.)

Bermudian silt loam, high bottom, 0 to 3 percent slopes (BhA).—This soil is on high bottoms and is seldom flooded. The profile is similar to the one described as typical of the series. The depth to bedrock is about 5 feet. Runoff is slow.

This soil is suitable for intensive cultivation of all crops commonly grown in the county, if the organic-matter content is maintained and lime and fertilizer are applied according to needs. Cover crops and barnyard manure will supply the necessary organic matter. Slopes that are near the upper limit of the slope range should be farmed on the contour. The following crop rotations are suitable: a row crop, a cover crop, a row crop, a small grain, and hay; or, a row crop, a cover crop, and a row crop.

This is a good soil for pasture. It is well suited to deep-rooted grasses and legumes. (Capability unit I–1; woodland group 1.)

Bermudian silt loam, high bottom, 3 to 8 percent slopes (BhB).—This soil is on high bottoms and is seldom flooded. The profile is shallower than the profile described as typical of the series. The depth to bedrock is about 4 feet.

This soil is suitable for all crops commonly grown in the county. All cultivation should be on the contour. There are a few fairly long slopes on which contour stripcropping, cropland terraces, and diversion terraces should be used. Natural drainageways should be kept in sod. Rotations should include 1 year of hay in every 3 years. Yields are high if crops are grown in suitable rotations, green manure and barnyard manure are utilized, and lime and fertilizer are applied according to the results of soil tests. (Capability unit IIe–2; woodland group 1.)

Birdsboro Series

This series consists of deep, well-drained soils on stream terraces above flood level. The surface soil is reddish-brown silt loam, and the subsoil is reddish-brown to dark reddish-brown silty clay loam. The parent material was alluvium. All or most of it washed from uplands where the soils are underlain by red Triassic sandstone and shale.

The Birdsboro soils are generally on the edges of terraces between the Raritan soils and soils of the Bermudian catena. They are better drained than the Raritan soils and have a redder and unmottled subsoil. They have a more strongly developed profile than the soils of the Bermudian catena.

Because of their small acreage, the Birdsboro soils in York County are of little importance in agriculture. They occur mostly as rather narrow bands on the edges of terraces along Conewago Creek.

Typical profile of Birdsboro silt loam, 0 to 3 percent slopes, in a cultivated area 1 mile south of Harmony Grove:

- A_p 0 to 8 inches, reddish-brown (2.5YR 4/4) silt loam; moderate, fine, granular structure; friable; pH 6.6; abrupt, smooth lower boundary; 6 to 10 inches thick.
- B_1 8 to 15 inches, reddish-brown (2.5YR 4/4) silt loam; moderate, fine, subangular blocky structure; friable; pH 6.2; clear, smooth lower boundary; 5 to 9 inches thick.
- B_2 15 to 23 inches, dark reddish-brown (2.5YR 3/4) silty clay loam; moderate, medium, subangular blocky structure; friable; pH 5.7; gradual, wavy lower boundary; 6 to 12 inches thick.
- B_3 23 to 38 inches, dark reddish-brown (2.5YR 3/4) silty clay loam; moderate, strong, subangular blocky structure; faint clay films on ped faces; firm; pH 5.0; gradual, wavy lower boundary; 10 to 20 inches thick.
- C_1 38 to 45 inches +, dark reddish-brown (2.5YR 3/4) silt loam; structureless; about 10 percent gravel; pH 4.8; 6 to 20 inches thick.

In some small areas the texture of the surface layer is loam instead of silt loam. The color of the surface layer is brown to reddish brown, and that of the subsoil is yellowish red to dark reddish brown. The texture of the subsoil ranges from silt loam to sandy clay loam. Ordinarily, the solum is between 30 and 38 inches thick, but in some places it is as much as 70 inches thick. Areas where the solum is less than 24 inches thick are generally included with the Penn soils. On old, high terraces along Yellow Breeches Creek are small areas of some highly leached soils that formed in mixed alluvium derived from sandstone and limestone and that have a grayish surface layer and a yellowish-brown subsoil.

These soils are well suited to all the crops grown in the county. They are acid and are moderately high in fertility. Tilth is good. Permeability and the available moisture capacity are good. Crops respond to lime, fertilizer, and proper rotation.

Birdsboro silt loam, 0 to 3 percent slopes (BmA).—This nearly level soil is on terraces, generally next to Birdsboro silt loam, 3 to 8 percent slopes, moderately eroded. The profile is like that described as typical of the series. The depth to bedrock is about 5 feet. A few small areas are moderately eroded, but there is almost no erosion problem.

All of this soil is cultivated. It is suitable for all the common crops, and it can be used intensively if care is taken to preserve the soil structure and maintain the organic-matter content. Slopes near the upper limit of the slope range should be farmed on the contour. The following rotations are suitable: a row crop, a small grain, and hay; or, a row crop, a cover crop, and a small grain or hay. This is a good soil for truck crops. The nearby streams are convenient sources of water for irrigation. (Capability unit I–3; woodland group 1.)

Birdsboro silt loam, 3 to 8 percent slopes, moderately eroded (BmB2). — This soil is eroded to the extent that the plow layer is a mixture of the original surface layer and the subsoil. As a result, the profile is a little shallower than the one described as typical of the series, and the plow layer is a little finer textured than that in the typical profile. There are a few shallow gullies that can be obliterated by plowing and cultivating. The shorter slopes should be farmed on the contour. The few fairly long slopes need contour strips, cropland terraces, diversion terraces, and grassed waterways.

This soil is suitable for all the crops commonly grown in the county. It is good for truck crops, which can be irrigated with water from the nearby streams. At least 1 year of hay should be included in a 3-year rotation. Adding organic matter will increase yields substantially. Barnyard manure, green manure, and crop residues can be used to supply the additional organic matter.

Well-managed pastures of tall grasses and legumes have high carrying capacity. (Capability unit IIe–2; woodland group 1.)

Birdsboro silt loam, 8 to 15 percent slopes, moderately eroded (BmC2). —Most of this soil occurs as rather narrow bands along tributaries that flow from the uplands across the terraces to the main streams. Some is on short slopes, below areas of Birdsboro silt loam, 3 to 8 percent slopes, moderately eroded, and above areas of soils of the Bermudian catena, which are on the bottom lands. The profile is shallower than the one described as typical of the series. The depth to bedrock is about 48 inches.

This soil is practically all in crops. It is well suited to all the crops commonly grown in the county. It is erodible and consequently should not be used for row crops more than once in 4 years. It should be farmed on the contour, and it needs barnyard manure, cover crops, and crop residues to supply organic matter and to preserve the structure.

Well-managed pastures of tall grasses and legumes have fairly high carrying capacity. (Capability unit IIIe–2; woodland group 5.)

Bowmansville Series

This series consists of deep, poorly drained soils on flood plains. The surface layer is dark grayish-brown silt loam, the upper part of the subsoil is light brownish-gray silty clay loam, and the lower part of the subsoil is gray and reddish-brown silty clay loam to silty clay. Both the surface soil and the subsoil are mottled.

These soils are commonly near or adjacent to the Rowland and Bermudian soils. They are more poorly drained than the Rowland soils, which are mottled only in the subsoil, and much more poorly drained than the Bermudian soils, which are unmottled throughout.

Typical profile of Bowmansville silt loam in a hayfield 1 mile northwest of Lewisberry:

A_p 0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; few, fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, granular structure; friable; pH 5.8; abrupt, smooth lower boundary; 5 to 10 inches thick.

C_{1g} 8 to 20 inches, light brownish-gray (10YR 6/2) silty clay loam; common, medium, distinct, light-gray (10YR 7/2) and strong-brown (7.5YR 5/6) mottles; weak, fine, subangular blocky structure; firm when moist, slightly plastic when wet; pH 5.4; gradual, smooth lower boundary; 10 to 15 inches thick.

C_{2g} 20 to 36 inches +, mottled gray (N 7/0) and reddish-brown (10YR 5/4) silty clay loam to silty clay; firm; pH 5.2; 20 to 40 inches thick.

The color of the surface soil is dark grayish brown to light brownish gray, and that of the subsoil is mottled light brownish gray to mottled gray. The texture of the subsoil ranges from silty clay loam to silty clay. Mottling ordinarily begins at a depth of about 7 inches, but it may begin anywhere from the surface to a depth of 12 inches. Between the Harrisburg State Airport and the Pennsylvania Turnpike is an inclusion of dark-colored, wet soil formed from alluvium washed from limestone and covered by a fairly thick recent overwash of Triassic material.

The Bowmansville soils are strongly acid and are moderately low in fertility. They have poor tilth. Unless drained they have a high water table during much of the growing season. Where the stream channels are deep enough and suitable outlets exist, drainage can be improved. Flooding is the principal hazard.

Bowmansville silt loam (Bn).—Where the depth to the normal level of the stream is 25 inches or more, this soil is somewhat removed from the streambank. Where the depth to the normal level of the stream is less than 25 inches, this soil may extend to the streambank. Floods are frequent, and the water table is high during much of the growing season.

This soil is not productive unless it is drained. Deepening and straightening the stream channels lowers the water table and reduces the possibility of floods. Open drains are feasible where there are suitable outlets, and in a few places tiling is beneficial.

If drained and protected from floods, this soil is fairly well suited to late-season corn and small grain. A suitable rotation consists of corn, a cover crop, a spring-sown small grain, and hay for 2 years. Pastures should not be grazed when wet. Undrained areas are excellent for wetland development as wildlife habitats. (Capability unit IIIw–1; woodland group 17.)

Bowmansville silt loam, local alluvium (Bo).—This nearly level soil is on toe slopes and around the head of drainageways, generally next to the Penn or the Readington soils. The profile is like the one described as typical of the series, but the original surface layer is covered with material carried by water or by gravity from the adjacent slopes. This soil is not often flooded, but it has a high water table in winter and spring, principally because of seepage.

Drainage is necessary to make this soil productive. Diversion terraces at the base of the adjoining slopes would help to control both runoff and seepage. Some areas can be drained by open drains with suitable outlets, and some by tile.

Much of this soil is in pasture. The pastures should be seeded to moisture-tolerant grasses and legumes. They should not be grazed while wet.

Drained areas are fairly well suited to late-season corn and small grain. A suitable rotation consists of corn, a cover crop, a spring-sown small grain, and 2 years of hay. (Capability unit IIIw–1; woodland group 17.)

Brecknock Series

This series consists of well-drained, shallow to moderately deep, gently sloping to steep soils on uplands. The surface layer is dark grayish-brown channery or stony silt loam, and the subsoil is olive-gray or light olive-gray channery silty clay loam. The parent material weathered from porcelanite and partly metamorphosed sandstone and shale. Moderate slopes predominate.

These soils are commonly near the Penn, Lehigh, and Montalto soils. They are deeper than the Penn soils, and they lack the red colors that are characteristic of the Penn soils. They are better drained than the Lehigh soils and are unmottled in the lower part of the subsoil. They are more acid than the Montalto soils and lack their reddish subsoil.

Profile of Brecknock channery silt loam, 8 to 15 percent slopes, moderately eroded, in an abandoned pasture 1 mile northwest of Alpine:

- A_1 0 to 3 inches, dark grayish-brown (2.5Y 4/2) channery silt loam; weak, fine, granular structure; friable; pH 5.4; gradual, wavy lower boundary; 2 to 4 inches thick.
- A_2 3 to 8 inches, light olive-brown (2.5Y 4/2) channery silt loam; moderate, fine, subangular blocky structure; friable; pH 5.4; gradual, wavy lower boundary; 3 to 7 inches thick.
- B_{21} 8 to 15 inches, light olive-gray (5Y 6/2) channery silty clay loam; moderate, medium, subangular blocky structure; thin, discontinuous clay films on ped faces; firm; pH 5.4; gradual, wavy lower boundary; 5 to 9 inches thick.
- B_{22} 15 to 28 inches, olive-gray (5Y 5/2) channery silty clay loam; strong, medium, blocky structure; distinct, continuous clay films on ped faces; firm when moist, slightly sticky and slightly plastic when wet; pH 5.2; gradual, wavy lower boundary; 10 to 16 inches thick.
- C_1 28 to 36 inches, dark olive-gray (5Y 3/2) stony silt loam; weak, medium, platy structure; firm; pH 5.2; 6 to 10 inches thick.
- D_r 36 inches, dark olive-gray to black porcelanite rock.

The color of the surface layer is very dark grayish brown to gray, and that of the subsoil is light olive gray to very dark grayish brown. The darker colors occur where the parent material was derived from porcelanite, and the lighter colors where it was derived from the partly metamorphosed sandstone and shale. In the area where the parent material was derived from the partly metamorphosed sandstone and shale, the B horizon is thicker and more distinct. The texture of the subsoil ranges from silt loam to silty clay loam. From 20 to 40 percent of the surface layer and from 30 to 70 percent of the subsoil consist of channery or stony fragments. In a few small areas the surface layer is silt loam or slaty silt loam instead of channery silt loam.

The Brecknock soils are strongly acid and moderately low in fertility. They have fair tilth and are permeable. The severely eroded phases have low or moderately low available moisture capacity; the other phases have moderate available moisture capacity.

Brecknock channery silt loam, 3 to 8 percent slopes, moderately eroded (BrB2).—This soil is on narrow ridgetops. The profile is deeper than the one described as typical of the series. The depth to bedrock is about 32 inches. Included are a few small areas that have slopes of 0 to 3 percent.

Most of this soil is cultivated, but some is idle and some is wooded. All cultivation should be on the contour. The longer slopes need grassed waterways, diversion terraces, and contour strips. A 4-year rotation should include 2 years of hay. Green manure and barnyard manure should be used to maintain the organic-matter content. Liming and fertilizing will increase yields. (Capability unit IIe–4; woodland group 20.)

Brecknock channery silt loam, 8 to 15 percent slopes (BrC).—The profile of this soil is somewhat deeper to bedrock than the profile described as typical of the series. A 1-inch layer of black, mull-like material covers the surface, and the upper part of the subsoil is very dark grayish brown.

Practically all of this soil is wooded. Woodland management requirements include selective cutting, removal of scrub trees, and underplanting with trees of suitable species. If any areas are cleared and cultivated, they should be managed carefully and kept in hay 3 years out of every 5. (Capability unit IIIe–4; woodland group 23.)

Brecknock channery silt loam, 8 to 15 percent slopes, moderately eroded (BrC2).—This soil is on moderately steep hillsides, generally between the more nearly level and the steeper Brecknock soils. The profile is like the one described as typical of the series. Permeability is somewhat impeded in the lower part of the subsoil. A few shallow gullies have formed.

Most of this soil is idle or is reverting to second-growth hardwoods and conifers. It is suitable for cultivated crops if well managed. A 5-year rotation should include 3 years of hay. The short slopes should be farmed on the contour, and the long slopes need countour strips, diversion terraces, and grassed waterways. It is important to maintain the organic-matter content and to lime and fertilize according to the results of soil tests.

Pastures should be seeded to deep-rooted grasses and legumes and should not be grazed until late in spring, after the roots are well established. Overgrazing is very harmful. (Capability unit IIIe–4; woodland group 23.)

Brecknock channery silt loam, 8 to 15 percent slopes, severely eroded (BrC3).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is about 20 inches. Most of the original surface layer has been lost through erosion, and the present surface layer is predominantly light olive-gray or olive-gray channery silty clay loam. Gullies are common, and a few have cut to bedrock.

This soil is best suited to long-term hay or very carefully managed pasture. If a row crop is grown, it should be followed by a fall-sown small grain and 4 years of hay. Reseeding should be done in contour strips, and a seedbed should be prepared by disking. Diversion terraces should be used, where suitable outlets are available, to control runoff. Special measures to control gullying are needed in some areas. Lime and fertilizer should be applied according to the results of soil tests. (Capability unit IVe–6; woodland group 25.)

Brecknock channery silt loam, 15 to 25 percent slopes (BrD).—The profile of this soil is shallower than the

profile described as typical of the series. The depth to bedrock is about 25 inches. A 1-inch layer of black, mull-like material covers the surface. The uppermost 9 inches of mineral soil is very dark grayish-brown channery silt loam.

This soil is all wooded and is best left so. If cleared it would be best suited to hay or pasture. A row crop should not be grown more than once in 6 years. (Capability unit IVe–6; woodland group 23.)

Brecknock channery silt loam, 15 to 25 percent slopes, moderately eroded (BrD2).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is about 25 inches. A few shallow gullies have formed.

Most of this soil is being used for pasture, but some is idle and some has reverted to woodland. Long-term hay or very carefully managed pasture is the best use. A row crop should not be grown more than once in 6 years. Reseeding should be done in contour strips, and seedbeds should be disked. Diversion terraces and grassed waterways may be needed in some fields. (Capability unit IVe–6; woodland group 23.)

Brecknock channery silt loam, 15 to 25 percent slopes, severely eroded (BrD3).—The profile of this soil is shallower than the profile described as typical of the Brecknock series. The depth to bedrock is about 15 inches. Gullies are common, and some have penetrated to bedrock. Most of the original surface layer has been lost, and the present surface layer is predominantly light olive-gray or olive-gray channery silty clay loam. This soil is more droughty than the typical soil and contains less organic matter.

This soil is not suited to cultivation. It is best suited to pasture or woodland. Pastures must be seeded to deep-rooted grasses and legumes and carefully managed. Grazing should be controlled. Seedbeds should be disked. Diversion terraces may be needed. Mulching, smoothing, liming, fertilizing, and heavy seeding are needed to control gullying. (Capability unit VIe–3; woodland group 25.)

Brecknock channery silt loam, 25 to 35 percent slopes, moderately eroded (BrE2).—The profile of this soil is shallower than the profile described as typical of the series, and the soil material is more channery. The depth to bedrock is about 13 inches.

This soil is mostly in brush or second-growth hardwoods or is idle. Most of it was clear cut of timber and became low-grade pasture. It is too steep for cultivation but can be used to a limited extent for pasture if cleared of trees. It would make a good wildlife area.

Pastures would produce only a small amount of forage. Hand tools would be needed for seeding and for controlling brush. (Capability unit VIe–3; woodland group 27.)

Brecknock very stony silt loam, 8 to 25 percent slopes (BvD).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is about 28 inches. Stones cover 3 to 15 percent of the surface, and the entire profile is stony.

This soil is mostly wooded and should remain so unless its use for other purposes is absolutely necessary. It is too stony for cultivation, but where light machinery can be used it will provide fair pasture. Where possible, pastures should be prepared for seeding by disking. Mowing to control weeds would be difficult but could be made easier by removing stones. Lime and fertilizer would be needed, and grazing should be carefully controlled. (Capability unit VIs–3; woodland group 23.)

Brecknock very stony silt loam, 25 to 65 percent slopes (BvF).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is about 14 inches. Stones cover about 15 percent of the surface, and the entire profile is stony.

This soil is almost entirely wooded and should remain so. It is too steep and stony for cultivated crops or pasture. Woodland management requirements include selective cutting and underplanting with trees of desirable species. (Capability unit VIIs–1; woodland group 27.)

Cardiff Series

This series consists of shallow to moderately deep, gently sloping to moderately steep, well-drained soils on uplands. The surface layer is dark-brown slaty silt loam, and the subsoil is dark-brown to dark yellowish-brown slaty silt loam. The parent material weathered from slate. Moderate slopes predominate.

These soils are ordinarily near or adjacent to the Whiteford, Glenelg, and Manor soils. They are shallower than the Whiteford soils and more slaty throughout. They are shallower than the Glenelg soils and are slaty instead of channery. They differ from the Manor soils mainly in being slaty instead of channery.

Typical profile of Cardiff slaty silt loam, 3 to 8 percent slopes, moderately eroded, in a peach orchard 1½ miles south of Peach Bottom:

A_p 0 to 8 inches, dark-brown (7.5YR 3/2) slaty silt loam; weak, fine, granular structure; very friable; pH 6.0; abrupt, smooth lower boundary; 7 to 9 inches thick.

B_{21} 8 to 13 inches, dark-brown (7.5YR 3/2) slaty silt loam; weak, thin, platy structure breaking to fine, subangular blocky structure; friable; pH 5.4; clear, wavy lower boundary; 4 to 7 inches thick.

B_{22} 13 to 18 inches, dark yellowish-brown (10YR 3/4) slaty silt loam; weak, thin, platy structure breaking to subangular blocky structure; very thin, discontinuous clay films on ped faces; friable; pH 4.5; clear, wavy lower boundary; 3 to 8 inches thick.

C_1 18 to 27 inches, dark yellowish-brown very slaty silt loam; about 85 percent coarse slate fragments; friable; pH 4.5; gradual, wavy lower boundary; 6 to 12 inches thick.

C_2 27 to 32 inches, weathered black (N 2/0) Peach Bottom slate coated with silt loam.

D_r 32 inches +, Peach Bottom slate.

The surface layer is brown to dark yellowish brown; the subsoil is ordinarily dark yellowish brown but ranges in color from olive brown to very dark grayish brown. The texture of the subsoil ranges from silt loam to silty clay loam. The depth to the C horizon is generally about 20 inches, but it may be as little as 12 inches or as much as 28 inches. Slate fragments make up 20 to 30 percent, by volume, of the surface layer and 50 to 85 percent of the subsoil. In places there are a few quartz fragments.

Included are small areas of soils that formed in material weathered from dense shale and phyllite. These soils are like the Cardiff soils except that they have a yellowish-brown subsoil.

The Cardiff soils are very acid and are moderately low in fertility. Tilth is fair, permeability is moderate to rapid, and the available moisture capacity is moderately low to low. These soils erode easily and leach readily.

Because they are shallow and slaty, they are likely to be droughty during the growing season.

Cardiff slaty silt loam, 3 to 8 percent slopes, moderately eroded (CaB2).—This soil is on moderately broad ridgetops. The profile is like the one described as typical of the series. Included are a few areas that have slopes of 0 to 3 percent. In a few areas that have been cultivated then abandoned and have reverted to woodland, there is a dark-brown to black surface layer, 2 to 4 inches thick, over the A_p horizon.

Most of this soil is cultivated. It is suitable for cultivation if protected by contour farming and grassed waterways. The long slopes need contour strips and diversion terraces. Hay should be grown at least 3 years in a 5-year rotation. The available moisture capacity is moderately low, so it is essential to maintain the supply of organic matter.

Pastures should be seeded to deep-rooted grasses and legumes and should not be grazed until late in spring, after the roots are well established. Overgrazing is very harmful. (Capability unit IIIe–4; woodland group 19.)

Cardiff slaty silt loam, 8 to 15 percent slopes, moderately eroded (CaC2).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is about 25 inches. A few shallow gullies have formed.

Most of this soil has been cleared and is in cultivation, but a few areas have reverted to woodland. Long-term hay or very carefully managed pasture is the best use. If crops are grown, hay should be grown at least 4 out of every 6 years. Diversion terraces and grassed waterways may be needed in some fields, and contour stripcropping should be practiced wherever possible. The available moisture capacity is moderately low. Maintaining the organic-matter content is important.

Overgrazing can be very harmful to this droughty soil, and livestock should be kept off pastures until late in spring after roots are well established. (Capability unit IVe–6; woodland group 22.)

Cardiff slaty silt loam, 8 to 15 percent slopes, severely eroded (CaC3).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is 9 to 17 inches. Most of the original surface layer has been lost through erosion, and patches of the subsoil are exposed. Gullies are common, and a few have cut down to bedrock. Runoff is moderately rapid, and the moisture-holding capacity is low.

This soil has all been cultivated, but some of it is now idle and reverting to woodland. It is generally unsuitable for cultivation. Its best use is pasture or woodland. Diversion terraces should be constructed to protect the eroded areas in pastures. Pastures should be seeded to drought-resistant grasses and legumes and should not be grazed until late in spring. Mulching, smoothing, liming, fertilizing, and heavy seeding are required to reclaim the gullied areas. (Capability unit VIe–3; woodland group 24.)

Cardiff slaty silt loam, 15 to 25 percent slopes, moderately eroded (CaD2).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is about 20 inches. A few shallow gullies have formed. Runoff is moderately rapid.

All of this soil has been cleared. Most of it is now in pasture, a few areas are idle, and a few are cultivated. Because of the slope and the risk of erosion, pasture or woodland is the best use. Diversion terraces with suitable outlets help to control erosion. Pastures should be seeded to drought-resistant grasses and legumes. Overgrazing and grazing early in spring should be prevented. (Capability unit VIe–3; woodland group 22.)

Cardiff slaty silt loam, 15 to 25 percent slopes, severely eroded (CaD3).—The profile of this soil is much shallower than the profile described as typical of the series, and the soil is very droughty. The depth to bedrock is 6 to 12 inches. Practically all of the original surface layer has been lost, and the present surface layer is mostly dark yellowish-brown slaty silt loam. Very little organic matter remains. Gullies are common, and a few have cut down to bedrock.

Much of this soil has been cultivated or used for pasture but is now idle or in low-grade pasture. It is unsuitable for cultivation and is of very limited use for pasture. Woodland is the best use. Pastures need intensive conservation measures, including terracing, heavy seeding, liming, fertilization, and control of gullying. (Capability unit VIIe–2; woodland group 24.)

Cardiff slaty silt loam, 25 to 35 percent slopes, severely eroded (CaE3).—The profile of this soil is much shallower than the profile described as typical of the series, and the soil is very droughty. Almost all of the original surface layer has been lost, and the present surface layer is yellowish-brown slaty silt loam. The depth to bedrock is 4 to 10 inches. Gullies that reach to bedrock are common.

Much of this soil has been used for pasture but is now idle or in scrub pasture. It is unsuitable for cultivation and is of limited use for pasture. Planting it to trees or allowing it to revert to the natural vegetation is the best use. Shallow diversions may be needed above areas planted to trees, to divert water until the seedlings are established. (Capability unit VIIe–2; woodland group 28.)

Catoctin Series

This series consists of shallow to moderately deep, gently sloping to moderately steep, well-drained soils on uplands. The surface layer is yellowish-brown channery silt loam, and the subsoil is yellowish-brown channery silt loam to silty clay loam. The parent material weathered from aporhyolite or metabasalt. Moderate slopes predominate.

These soils are commonly near or adjacent to the Highfield and Edgemont soils. They are shallower than the Highfield soils, somewhat more channery throughout, and coarser textured in the subsoil. They are shallower and finer textured than the Edgemont soils.

Because of their small acreage, the Catoctin soils in York County are of little importance in agriculture. They occur near the Pigeon Hills and also west of Chestnut Hill near the Adams County line.

Typical profile of Catoctin channery silt loam, 3 to 8 percent slopes, severely eroded, in a cultivated field 3 miles west of Clear Spring:

A_p 0 to 4 inches; yellowish-brown (10YR 5/4) channery silt loam; weak, fine, subangular blocky structure; friable; pH 5.6; clear, smooth boundary; 3 to 5 inches thick.

B_2 4 to 11 inches, yellowish-brown (10YR 5/4) channery silt loam; weak, moderate, subangular blocky structure; friable; pH 5.4; clear, wavy lower boundary; 5 to 9 inches thick.

C_1 11 to 15 inches, yellowish-brown (10YR 5/4) very channery

silt loam to silty clay loam; about 50 percent channery fragments; weak, moderate to coarse, subangular blocky structure; pH 5.0; 3 to 5 inches thick.

D_r 15 inches +, aporhyolite.

Most of the Catoctin soils in York County are severely eroded. The depth to bedrock is as little as 5 inches in some places. From 20 to 50 percent of the surface layer consists of channery fragments. Included in the mapping units are small areas of severely eroded Highfield channery silt loam, which has an 8-inch A_p horizon over a foot of weathered metabasalt or aporhyolite. Also included are a few small areas of moderately eroded Catoctin soils; in these areas the depth to bedrock is about 17 inches.

The Catoctin soils are poorly suited to cultivated crops. They are strongly acid and low in fertility. The available moisture capacity is moderately low to low.

Catoctin channery silt loam, 3 to 8 percent slopes, severely eroded (CcB3).—The profile of this soil is similar to the one described as typical of the series. In places the fragments in the surface layer are numerous enough to interfere with cultivation. Shallow gullies are common. The available moisture capacity is moderately low. Included in the unit are a few very small areas, mostly wooded, of less eroded soil that has a dark yellowish-brown A_1 horizon about 9 inches thick.

This soil is best suited to orchards, long-term hay, or carefully managed pasture. Diversion terraces may be needed on the longer slopes. Maintaining the organic-matter content is especially important. Heavy liming, fertilization, and seeding will help to establish a good cover of grasses. If a row crop is grown, it should be followed by a fall-sown small grain and 4 years of hay. (Capability unit IVe–6; woodland group 21.)

Catoctin channery silt loam, 8 to 15 percent slopes, severely eroded (CcC3).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is about 13 inches. Gullies are common, and a few have cut down to bedrock. The available moisture capacity is moderately low. Included in the unit are a few very small areas of less eroded soil that has a dark yellowish-brown A_1 horizon about 7 inches thick and a yellowish-brown channery subsoil.

This soil is unsuitable for cultivation. Pasture or orchard is the best use for it. Diversion terraces are needed to control runoff. Pastures should be seeded to drought-resistant grasses and legumes and should be protected from overgrazing. Heavy liming, fertilization, and seeding help to establish a good cover. (Capability unit VIe–3; woodland group 24.)

Catoctin channery silt loam, 15 to 25 percent slopes, severely eroded (CcD3).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is about 9 inches. Included in the unit are a few very small areas of a less eroded soil that has an A horizon of dark yellowish-brown channery silt loam.

This soil is unsuitable for cultivation and is of very limited use for pasture. It is best suited to trees. Much of it is idle. Pastures need to be seeded to drought-resistant grasses and legumes, limed and fertilized, and protected by diversion terraces with suitable outlets. Special measures are required to control gullies. Grazing should be carefully controlled. (Capability unit VIIe–1; woodland group 24.)

Chester Series

This series consists of deep, nearly level to moderately sloping, well-drained soils on uplands. The surface layer is dark-brown silt loam, and the subsoil is strong-brown to reddish-brown loam or silty clay loam. The parent material weathered from schist or phyllite.

These soils are commonly near or adjacent to the Glenelg, Manor, and Elioak soils. They are deeper than the Glenelg soils and generally less channery. They are considerably deeper than the Manor soils and have a finer textured subsoil. The subsoil is a little coarser textured than that of the Elioak soils and is brown instead of red or yellowish red. Other associated soils are the Worsham and Glenville soils, which are less well drained than the Chester soils.

Typical profile of Chester silt loam, 3 to 8 percent slopes, in a cultivated field 1 mile west of Fawn Grove:

A_p 0 to 11 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; pH 6.4; abrupt, smooth lower boundary; 9 to 12 inches thick.

B_{21} 11 to 17 inches, strong-brown (7.5YR 5/6) silty clay loam; weak, fine and medium, subangular blocky structure; friable; pH 6.6; gradual, wavy lower boundary; 5 to 9 inches thick.

B_{22} 17 to 23 inches, strong-brown (7.5YR 5/6) silty clay loam; weak, fine, subangular blocky structure; thin, discontinuous clay films on ped faces; friable; pH 6.8; gradual, wavy lower boundary; 4 to 9 inches thick.

B_{23} 23 to 28 inches, strong-brown (7.5YR 5/6) fine silt loam; weak, fine, subangular blocky structure; thin, discontinuous clay films on ped faces; friable; pH 6.6; clear, wavy lower boundary; 3 to 7 inches thick.

B_3 28 to 36 inches, strong-brown (7.5YR 5/6) micaceous silt loam; weak, fine and medium, subangular blocky structure; friable; pH 5.2; abrupt, wavy lower boundary; 6 to 10 inches thick.

C_1 36 to 40 inches, reddish-brown (5YR 5/4) micaceous loam; weak, subangular blocky structure grading downward to thin, platy structure; friable; pH 5.6; clear, wavy lower boundary; 2 to 8 inches thick.

C_{21} 40 to 48 inches, strong-brown (7.5YR 5/8) saprolite; weak, thin, platy structure; friable; pH 5.2; gradual, wavy lower boundary; 6 to 14 inches thick.

C_{22} 48 to 60 inches, strong-brown (7.5YR 5/8) saprolite; moderate, thin, platy structure; pH 5.2; 10 to 20 inches thick.

D_r 60 inches +, Wissahickon schist.

The surface layer ranges in color from brown to dark brown, and the subsoil from strong brown to yellowish brown. The lower part of the subsoil is reddish brown in spots. In texture, the subsoil ranges from silty clay loam to silt loam. There is some quartzite gravel throughout the profile. The mica content is highest where the parent material weathered from schist rather than from phyllite. Included in the mapping units are small areas of loam, channery loam, and channery silt loam.

The Chester soils are highly fertile. They have good tilth and permeability. The available moisture capacity is moderately high. If well managed, these soils are very productive. They are suitable for all crops commonly grown in the county.

Chester silt loam, 0 to 3 percent slopes (ChA).—This soil generally occurs on ridgetops. The profile is somewhat deeper than the profile described as typical of the series. The depth to the C horizon is about 46 inches. In wooded areas the surface is covered with about 1 inch of black, granular, mull-like material, and, instead

of the dark-brown A_p horizon, there is a 2-inch layer of very dark grayish-brown silt loam underlain by 10 or 11 inches of yellowish-brown silt loam.

Much of this soil is still in woodland, mostly of oaks but including small numbers of numerous other kinds of trees. Cleared areas are very good for all the common crops of the county. There is little risk of erosion, but slopes near the upper limit of the slope range should be farmed on the contour. Rotations should include crops that provide enough residue to maintain the organic-matter content and preserve the soil structure. (Capability unit I–3; woodland group 1.)

Chester silt loam, 0 to 3 percent slopes, moderately eroded (ChA2).—The profile of this soil is deeper than the profile described as typical of the series. The depth to the C horizon is about 42 inches. The present surface layer is a mixture of the original surface layer and the subsoil. Slopes are generally near the upper limit of the slope range.

This soil is productive if well managed. Where possible, cultivation should be on the contour (fig. 4).

Figure 4.—**Contour crop strips on Chester silt loam. Crop in foreground is potatoes. Light-colored areas are strips from which wheat has been cut.**

A 3-year rotation should include 1 year of hay. Alfalfa and red clover do very well as hay crops, if limed and fertilized. Cover crops, green manure, and barnyard manure help to maintain the organic-matter content and to conserve moisture. (Capability unit IIe–2; woodland group 1.)

Chester silt loam, 3 to 8 percent slopes (ChB).—The profile of this soil is somewhat deeper than the profile described as typical of the series. The depth to the C horizon is about 40 inches. In wooded areas the uppermost part of the profile consists of about 1 inch of black, granular, mull like material underlain by about 10 inches of yellowish-brown silt loam.

Much of this soil is still in woodland, mostly of oaks, but if cleared it is very good for crops. Contour strips, cropland terraces, and diversion terraces are needed. A 3-year rotation should include at least 1 year of hay. (Capability unit IIe–2; woodland group 1.)

Chester silt loam, 3 to 8 percent slopes, moderately eroded (ChB2).—This soil generally occurs on broad, gently sloping ridgetops. The profile is like the profile described as typical of the series.

This soil is suitable for all crops commonly grown in the county. All cultivation should be on the contour. The long slopes need contour strips, cropland terraces, and diversion terraces. Drainageways should be kept in sod. High yields can be obtained if crops are grown in a suitable rotation, green manure and barnyard manure are utilized, and lime and fertilizer are applied according to the results of soil tests. A 4-year rotation should include 2 years of hay. (Capability unit IIe–2; woodland group 1.)

Chester silt loam, 3 to 8 percent slopes, severely eroded (ChB3).—Much of the original surface layer of this soil has been removed by erosion. Patches of subsoil are exposed. The depth to the C horizon is 18 to 28 inches. Shallow gullies are common.

This soil requires intensive conservation practices. Short slopes should be farmed on the contour. The longer slopes need diversion terraces, contour strips, and grassed waterways. Special measures may be needed to control gullying. Organic matter is needed; growing cover crops and utilizing crop residues will help to supply it. A 4-year rotation should include 2 years of hay. (Capability unit IIIe–2; woodland group 3.)

Chester silt loam, 8 to 15 percent slopes, moderately eroded (ChC2).—This soil commonly occurs between the more gently sloping Chester soils and the steeper Glenelg soils. Its profile is shallower than the profile described as typical of the series. The depth to the C horizon is about 30 inches.

This is an extensive and productive soil. It is used for a wide variety of crops, including fruits and vegetables. It is susceptible to erosion, but erosion can be controlled by contour strips, diversion terraces, grassed waterways, and suitable crop rotations. To supply organic matter and to improve tilth, at least 2 years of hay should be included in a 4-year rotation. Lime and fertilizer are needed. (Capability unit IIIe–2; woodland group 5.)

Chewacla Series

This series consists of deep, moderately well drained, nearly level soils on flood plains. The surface layer is brown to dark yellowish-brown silt loam. This is underlain by yellowish-brown silt loam or silty clay loam, which in turn is underlain by mottled yellowish-brown silty clay loam. The soil material washed mostly from uplands underlain by schist, phyllite, diabase, and metabasalt.

These soils commonly occur near or adjacent to the Congaree and Wehadkee soils. They are less well drained than the Congaree soils and have a mottled subsoil. They are better drained than the Wehadkee soils and less gray throughout.

Typical profile of Chewacla silt loam in a cultivated field 1 mile southeast of Marburg:

A_p 0 to 9 inches, dark yellowish-brown (10YR 4/4) silt loam; many mica flakes; moderate, fine, granular structure; friable; pH 6.0; abrupt, smooth lower boundary; 7 to 11 inches thick.

C_1 9 to 26 inches, yellowish-brown (10YR 5/4) silt loam to silty clay loam; many mica flakes; weak, fine, subangular blocky structure; friable when moist, slightly

plastic when wet; pH 5.4; clear, smooth lower boundary; 10 to 20 inches thick.

C_{2g} 26 to 40 inches +, brownish-yellow (10YR 6/6) silty clay loam; common, fine, faint mottles of pale brown (10YR 6/3) and yellowish brown (10YR 5/8); weak, fine and medium, subangular blocky structure; slightly sticky and slightly plastic when wet; pH 5.2; 12 to 25 inches thick.

The surface layer is dark brown to dark yellowish brown, and the C_1 horizon is yellowish brown to dark yellowish brown. The mica content is high where the soil material was derived from schist and relatively low where the soil material was derived from diabase, metabasalt, or phyllite. Mottling ordinarily begins at a depth of about 24 inches, but it may begin at any depth from 12 inches to 30 inches. Locally, there are inclusions of material washed from quartzite, quartz, and aporhyolite. The mapping unit includes small areas of loam and small areas of a local alluvium phase of silt loam that has slopes of as much as 5 percent.

The Chewacla soils are acid and moderately fertile. They have fair to good tilth but, because of their location on narrow bottom lands, are not suitable for cultivation. Areas that are not flooded during the growing season can be drained if outlets are available.

Chewacla silt loam (Ck).—Where the depth to the normal level of the stream is 36 inches or more, this soil is somewhat removed from the streambank. Where the depth to the normal level of the stream is less than 36 inches, this soil may extend to the streambank. All areas are subject to flooding.

In areas where floods occur only in winter and early in spring and in those where floods are infrequent and of short duration, this soil can be drained and used for crops. If suitable outlets are available, tile and open drains are effective. Runoff from adjacent slopes can be controlled by diversion terraces. Where this soil extends to the streambank, deepening of the stream channel is advisable, in addition to other drainage practices.

If it is drained, this soil is suitable for a rotation that consists of corn, a cover crop, a spring-sown small grain, and hay. Many of the areas are so narrow that growing crops is not feasible. These areas are used for pasture. Because the soil remains moist, these pastures provide grazing until midsummer, but they should not be grazed until the ground is firm. (Capability unit IIw–1; woodland group 11.)

Conestoga Series

This series consists of deep, well-drained soils on uplands. The surface layer is dark yellowish-brown silt loam, and the subsoil is yellowish-brown silt loam to silty clay loam. The parent material weathered from calcareous schist. The slope range is from nearly level to moderately steep. Gentle slopes predominate.

These soils are commonly near or adjacent to the Bedford, Murrill, and Chester soils. They are better drained than the Bedford soils and lack mottling in the subsoil. They are less red than the Murrill soils and less fine textured in the lower part of the subsoil. They are somewhat more yellow in the subsoil than the Chester soils and were derived from calcareous rather than acid schist.

Typical profile of Conestoga silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 1 mile north of Hanover:

A_p 0 to 8 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine, granular structure; very friable; pH 6.0; clear, wavy lower boundary; 7 to 10 inches thick.

B_1 8 to 16 inches, yellowish-brown (10YR 5/6) silt loam; weak, fine, granular structure; friable; pH 6.0; clear; wavy lower boundary; 6 to 10 inches thick.

B_{21} 16 to 25 inches, yellowish-brown (10YR 5/4) silty clay loam; weak, medium, subangular blocky structure; friable; pH 5.8; gradual, wavy lower boundary; 12 to 18 inches thick.

B_{22} 25 to 33 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, medium, blocky structure; thin, discontinuous clay films on ped faces; firm; pH 6.0; gradual, wavy lower boundary; 8 to 14 inches thick.

B_3 33 to 40 inches, yellowish-brown (10YR 5/6) fine silt loam; moderate, medium, blocky structure; continuous clay films on ped faces; firm; pH 6.5; gradual, smooth lower boundary; 6 to 12 inches thick.

C_1 40 to 50 inches, light brownish-gray, disintegrated, calciferous schist; weak, fine, granular structure.

D_r 50 inches +, gray calciferous schist interbedded with limestone.

The surface layer is dark brown to yellowish brown, and the subsoil is yellowish brown to light brownish gray. There are a few fragments of quartz on the surface and in the profile. The mapping units include a few small areas of loam. The severely eroded phases include small areas in which the depth to the weathered parent material was originally no more than 25 inches.

The Conestoga soils are slightly acid to nearly neutral. They are permeable and have good tilth. The fertility is high. The available moisture capacity is moderately high in the uneroded and moderately eroded phases and moderate to moderately low in the severely eroded phases. These soils are suited to all the crops commonly grown in the county and are especially well suited to alfalfa. Careful management is required to control erosion.

Conestoga silt loam, 0 to 3 percent slopes (CoA).—The profile of this soil is deeper than the profile described as typical of the series. The depth to the weathered parent material is about 48 inches. Wooded areas have, instead of the A_p horizon described, a 2-inch layer of black mull-like material underlain by about 3 inches of very dark grayish-brown silt loam, and under that, about 8 inches of dark yellowish-brown silt loam.

This soil occurs in small patches, most of which are in woodland of mixed oaks. If cleared and cultivated this soil needs the protection of suitable conservation practices, including contour farming on slopes near the upper limit of the slope range. Hay should be grown at least every third year in the crop rotation. Woodlands should be protected from fire and grazing and should be underplanted with trees of desirable species. (Capability unit I–2; woodland group 2.)

Conestoga silt loam, 0 to 3 percent slopes, moderately eroded (CoA2).—The profile of this soil is deeper than the profile described as typical of the series. The depth to the weathered parent material is about 44 inches. As a result of erosion, the present surface layer is a mixture of subsoil and the remnants of the original surface layer. Slopes of nearly 3 percent predominate.

All of this soil is in crops. Under good management, yields are high. Cultivation should be on the contour,

and hay should be grown for at least 1 year in every 3-year rotation. Cover crops, green manure, and barnyard manure will help to maintain the organic-matter content and to conserve moisture. Alfalfa and red clover do very well as hay crops. (Capability unit IIe–1; woodland group 2.)

Conestoga silt loam, 3 to 8 percent slopes, moderately eroded (CoB2).—The profile of this soil is like the one described as typical of the series. The slopes are moderately long.

This soil is suitable for all the crops commonly grown in the county. High yields can be obtained if crops are grown in proper rotations, erosion is controlled, cover crops are grown, lime and fertilizer are applied according to the results of soil tests, and barnyard manure and green manure are utilized. A row crop should be grown no more than once in a 3-year rotation. The shorter slopes should be farmed on the contour. The longer slopes need stripcropping, cropland terraces, diversion terraces, and grassed waterways to control erosion and to conserve moisture. Alfalfa and red clover do very well as hay crops. Pastures should be seeded to tall grasses and legumes. (Capability unit IIe–1; woodland group, 2.)

Conestoga silt loam, 3 to 8 percent slopes, severely eroded (CoB3).—The profile of this soil is shallower than the profile described as typical of the series, and the soil is more droughty. The depth to the parent material is about 33 inches. Much of the original surface layer has been lost through erosion, and patches of yellowish-brown silt loam or silty clay loam are exposed. In most areas there are a few shallow gullies.

All of this soil has been cleared and cultivated. It is now used mostly for pasture and hay. Cover crops, barnyard manure, and crop residues should be utilized to build up and to maintain the organic-matter content, so as to conserve moisture and improve the soil structure. A row crop should be grown no more often than once in 4 years. Erosion can be controlled by contour farming, contour stripcropping, diversion terraces, and grassed waterways. Tall grasses and legumes, if carefully managed, will provide good pasture. (Capability unit IIIe–1; woodland group 4.)

Conestoga silt loam, 8 to 15 percent slopes, moderately eroded (CoC2).—The profile of this soil is shallower than the profile described as typical of the series. The depth to the weathered parent material is about 36 inches.

All of this soil has been cleared. Most of it is cultivated. A few areas are in pasture. A 4-year crop rotation should include 2 years of hay. Alfalfa and red clover do well as hay crops. Cover crops, crop residues, and barnyard manure should be utilized to supply organic matter. Contour farming, contour stripcropping, diversion terraces, and grassed waterways are also beneficial. Bluegrass does well as a pasture plant in spring and fall, but it becomes dormant in summer. (Capability unit IIIe–1; woodland group 6.)

Conestoga silt loam, 8 to 15 percent slopes, severely eroded (CoC3).—The profile of this soil is shallower than the profile described as typical of the series. The depth to the parent material is about 28 inches. Most of the original surface layer has been lost through erosion, and patches of yellowish-brown silt loam or silty clay loam are exposed. Shallow gullies are common, and a few have cut into the weathered parent material. The available moisture is moderately low.

Most of this soil is idle or is used for pasture. Pasture or long-term hay is the best use. Mixtures of alfalfa and grasses do well. A row crop should not be grown more than once in 5 years. Before a field is reseeded for hay or pasture, a row crop can be grown for 1 year, then a small grain for 1 year. Reseeding should be done in alternate contour strips, and diversion terraces are needed on the longer slopes. Special measures to control gullying are sometimes needed. (Capability unit IVe–1; woodland group 8.)

Conestoga silt loam, 15 to 25 percent slopes, severely eroded (CoD3).—The profile of this soil is shallower than the profile described as typical of the series. The depth to the parent material is about 20 inches. All of the original surface layer has been lost through erosion, and the present surface layer is mostly yellowish-brown silt loam or silty clay loam. Shallow gullies are common, and a few have cut into the parent material. Included are a few small areas that are moderately eroded.

Most of this droughty soil is idle or in low-grade pasture. The best use for it is to plant it to trees. As pasture, it has rather severe limitations. If it is used for pasture, the seedbed should be prepared by disking, and a grass mulch should be left on the surface. Seeding should be done in alternate strips. Mulching, smoothing, heavy seeding, and heavy fertilization are needed to reclaim gullied areas. Pastures must be protected from overgrazing. Areas planted to trees need to be protected from fire and from grazing. (Capability unit VIe–1; woodland group 8.)

Congaree Series

This series consists of deep, well-drained, nearly level soils on flood plains. The surface layer is brown to dark-brown silt loam, and the subsoil is dark yellowish-brown loam, silt loam, or silty clay loam. The soil material washed from soils underlain by schist, phyllite, diabase, and metabasalt.

These soils are on streambanks and are ordinarily 36 inches or more above the normal level of the stream. They commonly occur with the Chewacla and Wehadkee soils. They are better drained than the Chewacla soils and are unmottled in the subsoil. They are much better drained than the Wehadkee soils and lack the grayish color and mottling that are characteristic of the Wehadkee soils.

Typical profile of Congaree silt loam in a cultivated area:

A_p 0 to 9 inches, brown to dark-brown (10YR 4/3) silt loam; many mica flakes; moderate, fine, granular structure; very friable; pH 6.0; abrupt, smooth lower boundary; 8 to 10 inches thick.

C_1 9 to 33 inches, dark yellowish-brown (10YR 4/4) silt loam; many mica flakes; weak, fine, subangular blocky structure; friable when moist, slightly plastic when wet; pH 5.3; clear, wavy lower boundary; 20 to 30 inches thick.

C_2 33 to 45 inches +, light yellowish-brown (10YR 6/4) loam to coarse silt loam; many mica flakes; weak, coarse and medium, blocky structure; friable; pH 5.0; 10 to 30 inches thick.

The surface layer is brown to dark brown, and the subsoil is yellowish brown to dark yellowish brown. The darker colors occur where the soil material was derived from diabase. The mica content is high where the soil material was derived from schist and relatively low where it was derived from diabase, metabasalt, and phyllite.

In some places there are faint mottles at a depth of more than 30 inches. There are local areas where the soil material was derived from quartzite, quartz, and aporhyolite.

The Congaree soils are strongly acid and highly fertile. The available moisture capacity is moderately high. Unless they are flooded during the growing season, these soils are productive, but many of the areas are so narrow that cultivation is not feasible.

Congaree silt loam (Cp).—The profile of this soil is like the profile described as typical of the series. Included in the mapping unit are a few small areas that have a loam surface layer and also a few areas of a local alluvium phase of silt loam. The local alluvium phase has slopes of as much as 5 percent.

This soil is subject to flooding. Areas that are flooded only in winter or early in spring, or that are flooded infrequently or for short periods, are excellent for crops and can be cultivated intensively. Yields are high if enough lime and fertilizer are used and the organic-matter content is maintained. One suitable crop rotation consists of a row crop, a cover crop, and another row crop. Another consists of a row crop, a cover crop, another row crop, a small grain, and hay. A winter cover crop helps to protect the soil during floods in winter and spring. Channels formed by flood scouring should be kept in grass or woodland.

Much of this soil is on narrow bottom lands next to steep hills. Such areas are best left in pasture. If lime and fertilizer are applied, bluegrass grows well in pastures until midsummer. Pastures need to be mowed to control weeds. Wild garlic is especially likely to be a nuisance. (Capability unit I–1; woodland group 1.)

Croton Series

This series consists of deep, nearly level or gently sloping, poorly drained to somewhat poorly drained soils on uplands. The surface layer is very dark grayish-brown silt loam, and the subsoil is mottled gray silt loam or silty clay loam. The parent material weathered mainly from red, gray, and brown Triassic sandstone and shale.

These soils are commonly near or adjacent to the Readington, Penn, Lansdale, and Lehigh soils. They are more poorly drained and more extensively mottled than any of the associated soils. They are deeper than the Penn and Lansdale soils.

Typical profile of Croton silt loam, 0 to 3 percent slopes, in a cultivated field 1 mile southwest of Dover:

A_p 0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; friable; pH 6.8; abrupt, smooth lower boundary; 7 to 9 inches thick.

A_{2g} 8 to 10 inches, gray (10YR 6/1) silt loam; few, fine, distinct, yellowish-brown (10YR 5/4) mottles; very weak, medium, subangular blocky structure breaking to weak, thin, platy structure; friable; pH 6.6; clear, irregular lower boundary; 0 to 3 inches thick.

B_{1g} 10 to 15 inches, gray (10YR 6/1) silt loam; many, medium, prominent, yellowish-brown (10YR 5/8) mottles; weak, fine and medium, blocky structure; thin, discontinuous clay films and slightly darker gray (10YR 5/1) tongues of A_2 horizon extend through this horizon; firm; pH 5.4; gradual, wavy lower boundary; 4 to 7 inches thick.

B_{21g} 15 to 21 inches, gray (10YR 6/1) silty clay loam; many, coarse, yellowish-brown (10YR 5/6) mottles; moderate, medium, prismatic structure breaking to moderate, medium, blocky structure; some prism faces are coated with silt, others with clay; ped faces are slightly darker gray (10YR 5/1); firm when moist, plastic when wet; pH 5.2; gradual, wavy lower boundary; 4 to 8 inches thick.

B_{22g} 21 to 27 inches, yellowish-red (5YR 5/6) fine silty clay loam; many, medium mottles and streaks of reddish gray (5YR 5/2); moderate, medium, prismatic structure breaking to moderate, medium, blocky structure; ped faces thickly coated with dark-gray (5YR 4/1) silt; hard when dry, firm when moist, plastic when wet; pH 5.0; abrupt, wavy lower boundary; 4 to 8 inches thick.

C_{1g} 27 to 34 inches, dark reddish-brown (5YR 3/4) silt loam and loam; few, medium mottles of reddish gray (5YR 5/2); weak, thin and medium, platy structure; thin, discontinuous, gray (5YR 5/1) clay films on ped faces; less firm than the B horizons; pH 5.2; abrupt, wavy lower boundary; 6 to 9 inches thick.

C_2 34 to 44 inches, dark reddish-brown (2.5YR 3/4) light silty clay loam; weak, fine and medium, blocky structure; some clay coatings; firm when moist, slightly plastic when wet; pH 5.0; 5 to 10 inches thick.

D_r 44 inches +, dark reddish-brown and yellowish-brown Triassic sandstone.

The A_p horizon is dark brown to very dark grayish brown, and the B horizon is generally mottled gray or yellowish red. The texture of the surface layer is silt loam or fine silt loam. In the B horizon, the texture ranges from silt loam to silty clay loam or silty clay. The depth to bedrock ranges from 3 to 6 feet but is ordinarily about 4½ feet.

Included in the mapping units are a few small areas that have a loam surface layer, and also a small area of soil that is only 15 inches deep over bedrock.

The Croton soils are strongly acid. Tilth is fair to poor. Permeability is slow in the subsoil. The available moisture capacity is moderate. Hay or pasture is the best use for these soils.

Croton silt loam, 0 to 3 percent slopes (CrA).—This soil is in depressions, generally next to areas of more strongly sloping Croton or Readington soils. The profile is like the one described as typical of the series. The depth to bedrock is about 60 inches. In some areas the surface is covered with a foot or more of silt loam local alluvium washed from adjoining slopes.

This soil is not susceptible to erosion, but it is wet most of the year and is difficult to drain. It is subject to seepage. Because of the slowly permeable subsoil, tile drainage is not effective, except in the areas covered by local alluvium. The local alluvium is more permeable than the residual soil. Open drains help if outlets are available. Bedding is beneficial in some places.

Most of this soil is in pasture or is idle. For drained and fertilized areas, pasture or hay is the best use. Moisture-tolerant grasses and legumes should be seeded. This soil will puddle and compact if worked, driven over, or grazed when wet. Plowing or disking is usually not possible until late in spring or early in summer. If trees are planted, moisture-tolerant species should be selected. (Capability unit IVw–1; woodland group 17.)

Croton silt loam, 0 to 3 percent slopes, moderately eroded (CrA2).—This soil occurs most commonly at the base of slopes on the uplands. Surface water from the adjoining slopes has caused some erosion. The profile is shallower than the one described as typical of the series. The depth to bedrock is about 50 inches.

Wetness is the principal limitation. Tile drainage is not effective, because of the slowly permeable subsoil. Bedding and open drains are feasible in many places.

Diversion terraces should be provided to control runoff from the adjoining hillsides.

If drained and fertilized, this soil is suited to moisture-tolerant grasses and legumes for hay or pasture. It will puddle and compact if worked, driven over, or grazed when wet. Ordinarily, it cannot be disked or plowed until late in spring or early in summer. If trees are planted, moisture-tolerant species should be chosen. (Capability unit IVw–1; woodland group 17.)

Croton silt loam, 3 to 8 percent slopes (CrB).—This soil generally occurs below areas of gently sloping Penn or Lansdale soils. The profile is shallower than the profile described as typical of the series. Runoff from the adjoining slopes has not caused much erosion, but there is some seepage. The soil tends to remain wet until late in spring.

Wetness is the principal limitation. Where outlets exist, diversion terraces should be provided to control runoff from the adjoining slopes. Open drains must be carefully graded; otherwise, they may develop into gullies. Bedding is generally beneficial.

If drained and fertilized, this soil is suited to moisture-tolerant grasses and legumes for hay or pasture. It will puddle and compact if worked, driven over, or grazed when wet. It needs lime and organic matter, as well as fertilizer. If trees are planted, moisture-tolerant species should be chosen. (Capability unit IVw–1; woodland group 17.)

Croton silt loam, 3 to 8 percent slopes, moderately eroded (CrB2).—This soil generally occurs around the head of draws, where there is considerable seepage from adjoining slopes. It remains wet until late in spring. The profile is shallower than the profile described as typical of the series.

Although there has been some erosion, wetness is the principal limitation. Diversion terraces should be provided where there are suitable outlets. Tile drainage is not effective, because of the slowly permeable subsoil. Open drains are likely to develop into gullies. On slopes near the lower limit of the slope range, bedding is beneficial.

If drained and fertilized, this soil is suited to moisture-tolerant legumes and grasses for pasture or hay. It will puddle and compact if worked, driven over, or grazed when wet. It needs lime and organic matter, as well as fertilizer. If trees are planted, moisture-tolerant species should be chosen. (Capability unit IVw–1; woodland group 17.)

Croton very stony silt loam, 0 to 8 percent slopes (CvB).—This soil lacks an A_p horizon like that in the typical profile. Elongated fragments of reddish or grayish rock, more than 10 inches long, cover from 3 to 15 percent of the surface. In the spaces between the stones, the surface is covered with about 2 inches of black mull-like material, under which is a layer of dark-gray very stony silt loam. Except for being stony, the rest of the profile, from the A_{2g} horizon down, is like the profile described as typical of the series.

There is little or no likelihood of erosion, but, because of stoniness and other severe limitations, this soil is suitable only for woodland and for wildlife habitats. It is so stony that pastures could not be mowed, and removing the stones is not practical. Neither is drainage practical, because of the stones and the slowly permeable subsoil. In woodlands, cover trees, including pin oak, beech, and red maple, should be favored. For underplanting, white spruce and white pine are suitable. (Capability unit VIIs–2; woodland group 17.)

638634—63——7

Duffield Series

This series consists of deep, well-drained, nearly level to moderately steep soils on uplands. The surface layer is dark-brown silt loam, and the subsoil is brownish-yellow to strong-brown silt loam or silty clay loam. The parent material weathered from impure limestone. Gentle slopes predominate.

These soils are commonly near or adjacent to the Hagerstown, Edgemont, and Bedford soils. They are less red than the Hagerstown soils and coarser textured in the subsoil. They are less acid than the Edgemont soil and finer textured throughout. They are better drained than the Bedford soils, which are mottled in the lower part of the subsoil.

Typical profile of Duffield silt loam, 3 to 8 percent slopes, in a field 1 mile north of Yorkshire:

- A_p 0 to 8 inches, dark-brown (7.5YR 3/2) silt loam; weak, fine, granular structure; very friable; pH 6.0; clear, smooth lower boundary; 7 to 10 inches thick.
- B_{21} 8 to 15 inches, brownish-yellow (10YR 6/6) silt loam; weak, fine, subangular blocky structure; friable; pH 5.6; gradual, smooth lower boundary; 5 to 9 inches thick.
- B_{22} 15 to 25 inches, yellowish-brown (10YR 5/6) silty clay loam; moderate, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; pH 5.3; gradual, wavy lower boundary; 8 to 15 inches thick.
- B_3 25 to 36 inches, strong-brown (7.5YR 5/6) silty clay loam to silty clay; moderate, medium, subangular blocky structure; distinct, continuous clay films on ped faces; firm when moist, slightly plastic when wet; pH 5.6; gradual, smooth lower boundary; 9 to 14 inches thick.
- C_1 36 to 52 inches, yellowish-brown (10YR 5/8); silt loam splotched with brown; (10YR 5/3); thin layers of soft yellowish shale; moderate, medium, blocky structure; firm; pH 7.0; 10 to 20 inches thick.
- D_r 52 inches +, impure limestone.

The surface soil is dark brown to dark grayish brown. The subsoil is yellowish red in some places, and in places the texture of the lower part of the subsoil is silt loam.

Included in the mapping units are small areas of channery silt loam. In these areas, 20 to 40 percent of the surface layer consists of channery fragments and there are fragments throughout the profile.

The Duffield soils are medium acid to slightly acid and are highly fertile. They are permeable and have good tilth. The severely eroded phase has moderate available moisture capacity, and the rest of the mapping units have high available moisture capacity.

Duffield silt loam, 0 to 3 percent slopes (DuA).—This soil occurs principally in the York Valley, east of the city of York. The areas are mostly small and wooded. The trees are white oak, red oak, black oak, chestnut oak, hickory, and other hardwood species.

The surface is covered with recently fallen hardwood leaves, twigs, and bark fragments. Just beneath is a layer of decomposed organic material that shows evidence of worm and insect activity. The uppermost 2 to 4 inches of mineral soil is very dark-brown silt loam mixed with organic matter. This layer is friable, and it absorbs water readily. Below it is a 7-inch layer of brownish-yellow silt loam. The subsoil is yellowish-brown silty clay loam and extends to a depth of as much as 40 inches.

This is a well-drained and highly fertile soil that has high moisture-holding capacity. If cleared and farmed, it could be kept highly productive with simple manage-

ment practices. Runoff is slow and could be easily controlled. The major problem would be to maintain the supply of organic matter. Excellent yields of corn, tomatoes, alfalfa, and tobacco could be obtained. (Capability unit I–2; woodland group 2.)

Duffield silt loam, 0 to 3 percent slopes, moderately eroded (DuA2).—The surface layer of this soil is finer textured and lighter colored than that of Duffield silt loam, 0 to 3 percent slopes, and absorbs water less rapidly. Some subsoil has been mixed with the original surface layer. On the longer slopes a few shallow gullies have formed.

This is a very productive soil. It is good for pasture or hay and for some of the common rotation crops, but it is not good for potatoes or other root crops. The main management requirements are controlling erosion and maintaining the organic-matter content. If plenty of water were available, irrigation in dry years would be worth while.

This soil commonly occurs with other Duffield soils that are eroded and more strongly sloping and is generally managed in the same way as these associated soils. (Capability unit IIe–1; woodland group 2.)

Duffield silt loam, 3 to 8 percent slopes (DuB).—At present, this soil has a good protective cover consisting of hickory, various kinds of oak, and other hardwoods. If cleared and farmed, it would need to be protected against erosion and managed so as to maintain the organic-matter content and the fertility. Contour strips, diversion terraces, and grassed waterways would be needed to control erosion. In some places the slopes face in several directions, and in some the topography is karstlike. In these places contour stripcropping would be impractical. One hay crop in every 3-year rotation would maintain the organic-matter content. Though the reaction is nearly neutral, lime would be needed occasionally, especially if alfalfa were grown. Fertilizer should be applied for all crops. Under careful management, pastures of high carrying capacity could be established. (Capability unit IIe–1; woodland group 2.)

Duffield silt loam, 3 to 8 percent slopes, moderately eroded (DuB2).—This is the most extensive Duffield soil in York County. The profile is like the one described as typical of the series. Part of the subsoil has been plowed up and mixed with the remnants of the original surface layer. Consequently, the present surface layer is a a little finer textured, slightly less absorptive of water, and a little harder to till than the uneroded forested soils of this series. Runoff is medium, and the risk of further erosion is moderate.

This soil is intensively farmed. Much of it is tilled, and a small acreage is in pasture. Only simple management practices are needed. Erosion can be controlled by contour strips, diversion terraces, and grassed waterways. In some fields the slopes face in several different directions, and in some the topography is karstlike. In such areas, contour stripcropping is impractical. One hay crop in every 3-year rotation helps to maintain the organic-matter content. Lime and fertilizer are needed. Yields are excellent. Pastures of tall grasses and deep-rooted legumes, if intensively managed, have high carrying capacity (Capability unit IIe–1; woodland group 2.)

Duffield silt loam, 8 to 15 percent slopes, moderately eroded (DuC2).—The profile of this soil is shallower than the profile described as typical of the series. The depth to the C_1 horizon is about 32 inches. Erosion has removed as much as three-fourths of the original surface layer, and the present plow layer is yellowish-brown heavy silt loam. There are some shallow gullies.

Because of the slope and the hazard of further erosion, this soil needs intensive management if cultivated. Good yields can be obtained if erosion is controlled, organic matter is supplied, and lime and fertilizer are applied. Contour strips, diversion terraces, and grassed waterways will help to control erosion. In some fields the slopes face in several directions, and in some the topography is karst-like. In these places contour stripcropping is impractical. Growing green-manure crops, applying barnyard manure, and including 2 years of hay in every 4-year rotation will provide organic matter and make the soil easier to work. Tall grasses and deep-rooted legumes are suitable pasture plants. (Capability unit IIIe–1; woodland group 6.)

Duffield silt loam, 15 to 25 percent slopes, moderately eroded (DuD2).—Because of the serious hazard of further erosion, this soil should be protected by sod crops most of the time. If limed and fertilized, it produces excellent yields of hay and pasture. Mixtures of alfalfa and grasses do well. Cutting the hay at the right time and controlling grazing will prolong the life of the hay and pasture stands and afford good protection to the soil. On long slopes erosion can be controlled by seeding hay and pasture in alternate contour strips. When such seeding is practiced, the whole field is not exposed to erosion at one time.

Diversion terraces may be needed to control runoff. A row crop can be grown occasionally in a long rotation such as the following: a row crop, a small grain, and hay for 4 or 5 years. (Capability unit IVe–1; woodland group 6.)

Duffield silty clay, 8 to 15 percent slopes, severely eroded (DyC3).—This soil is so hard to till that it is best used for long-term hay or pasture. Water is absorbed slowly, and much is lost as runoff. There are some clay spots. These should have heavy applications of barnyard manure, which will help to improve the tilth and the water-absorbing capacity. Little lime is required, as the reaction is nearly neutral, but fertilizer is needed for vigorous growth of forage. Row crops should be grown infrequently, if ever. A small grain should be grown just before hay or pasture is reseeded. Disking is better than plowing for the preparation of a seedbed. Long slopes should be reseeded in alternate contour strips, as in this way the whole field is not exposed to erosion at one time. Diversion terraces on long slopes will help to control runoff and to stabilize gullies. (Capability unit IVe–1; woodland group 8.)

Edgemont Series

This series consists of moderately deep to deep, well-drained, gently sloping to very steep soils on uplands (fig. 5). The surface layer is very dark-brown channery loam or silt loam, and the subsoil is yellowish-brown to strong-brown channery sandy loam, clay loam, or sandy clay loam. The parent material weathered mostly from quartzite. Moderate and moderately steep slopes predominate.

These soils are associated with soils of several other series, including the Murrill, Penn, and Catoctin. They are less red than the Murrill soils and less fine textured in the subsoil. They are deeper than the Penn soils and

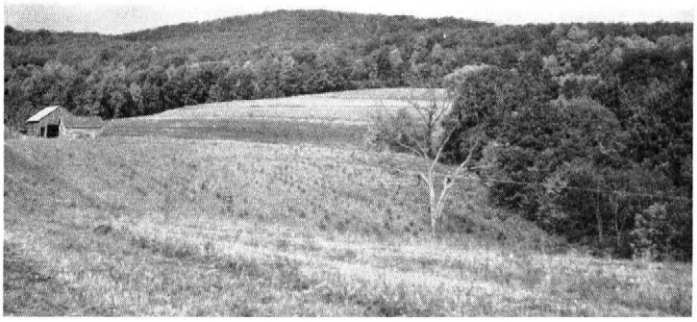

Figure 5.—**Typical landscape of Edgemont channery loam.**

less red in the subsoil. They are deeper than the Catoctin soils and finer textured in the subsoil.

Typical profile of Edgemont channery loam, 3 to 8 percent slopes, moderately eroded, in a wooded area 2 miles east of Codorus Furnace:

- A_1 0 to 4 inches, very dark-brown (10YR 2/2) channery loam; weak, fine, granular structure; very friable; pH 4.8; abrupt, smooth lower boundary; 3 to 5 inches thick.
- A_2 4 to 8 inches, very dark grayish-brown (10YR 3/2) channery loam; weak, fine, granular structure; friable; pH 4.8; abrupt, wavy lower boundary; 3 to 5 inches thick.
- B_1 8 to 15 inches, yellowish-brown (10YR 5/4) channery sandy loam; weak, coarse, blocky structure breaking to fine and medium, subangular blocky structure; friable; pH 5.0; clear, wavy lower boundary; 5 to 8 inches thick.
- B_{21} 15 to 21 inches, yellowish-brown (10YR 5/6) channery sandy clay loam; weak, coarse, blocky structure breaking to fine and medium, subangular blocky structure; thin, discontinuous clay films on ped faces; firm; pH 5.0; clear, wavy lower boundary; 4 to 8 inches thick.
- B_{22} 21 to 27 inches, strong-brown (7.5YR 5/6) channery clay loam; moderate, medium and fine, subangular blocky structure; thin, discontinuous clay films on ped faces; firm; pH 4.8; gradual, wavy lower boundary; 4 to 8 inches thick.
- B_3 27 to 32 inches, strong-brown to brown (7.5YR 5/6–4/4) channery clay loam; moderate, medium, subangular blocky structure; thin, discontinuous clay films on ped faces; firm; pH 4.8; gradual, wavy lower boundary; 4 to 8 inches thick.
- C_1 32 to 35 inches, very pale brown (10YR 7/3) channery sandy loam; splotched with light gray (7.5YR 6/2); structureless to weak, medium, granular structure; friable; pH 4.8; gradual, wavy lower boundary; 9 to 15 inches thick.
- C_2 35 to 45 inches, white quartzite fragments, surrounded by very pale brown and light-gray sandy loam.
- D_r 45 inches +, quartzite.

The surface layer is very dark grayish brown to dark yellowish brown, and the subsoil is light yellowish brown to strong brown. In the channery loams, 20 to 40 percent of the surface layer and 30 to 70 percent of the subsoil consist of channery fragments. Small areas of non-channery loam are included. The silt loam mapping units include small areas that are channery.

The Edgemont soils are strongly acid. They are permeable and have good tilth. The fertility is moderate to low. The available moisture capacity is moderately low in the channery loams and moderate in the silt loams.

Edgemont channery loam, 3 to 8 percent slopes, moderately eroded (EcB2).—This soil occurs on ridgetops and hillsides, mostly in the Hellam Hills and the Pigeon Hills. The profile is like the one described as typical of the series. On the surface and throughout the profile are quartzite fragments as much as 6 inches in length. They interfere only slightly with tillage. As much as three-fourths of the original surface layer has been removed by erosion, and the plow layer is partly subsoil. The depth to the weathered quartzite is about 34 inches.

Water is absorbed fairly rapidly and moves through the profile easily. Organic matter must be supplied periodically to check the loss of plant nutrients through leaching and to improve the moisture-holding capacity.

This soil is suitable for the common rotation crops and for tree fruits, strawberries, and raspberries. Management requirements include erosion control, fertilization, and incorporation of organic matter. Contour strips, diversion terraces, and grassed waterways help to control erosion. Green-manure crops and a suitable crop rotation help to maintain the organic-matter content. A 4-year rotation should include at least 2 years of hay. Lime and fertilizer should be applied as needed. Pastures should be seeded to drought-resistant plants. (Capability unit IIe–3; woodland group 1.)

Edgemont channery loam, 8 to 15 percent slopes, moderately eroded (EcC2).—The profile of this soil is a little shallower than the profile described as typical of the series. The depth to the weathered quartzite is about 30 inches. As much as three-fourths of the original surface layer has been removed by erosion, and the present plow layer is partly subsoil. Coarse quartzite fragments, as much as 6 inches long, occur on the surface and throughout the profile. They interfere only slightly with cultivation.

This soil is permeable to air, water, and roots. It is easy to till and can be worked within a wide range of moisture content. Organic matter is needed to check leaching and to improve the moisture-holding capacity.

Practically all of this soil is cleared, and most of it is used for crops or pasture. It is suitable for the crops commonly grown in the county and for tree fruits, strawberries, and raspberries. Contour strips, diversion terraces, and grassed waterways are needed to control erosion. A 4-year rotation should include at least 2 years of hay. Lime and fertilizer are needed. (Capability unit IIIe–3; woodland group 5.)

Edgemont channery loam, 8 to 15 percent slopes, severely eroded (EcC3).—The profile of this soil is like the profile described as typical of the series, except for severe erosion damage. Much of the present plow layer is subsoil. Shallow gullies are common, and some gullies have cut down to the parent material.

This soil needs intensive management to prevent further erosion and to conserve moisture. It should be kept in permanent vegetation—pasture, hay, or trees. Row crops should be grown only infrequently. Pasture and hay require large amounts of fertilizer. Pastures on long slopes should be seeded in alternate contour strips, and drought-resistant plants should be selected. Disking is better than plowing for preparation of a seedbed. Diversion terraces are needed on long slopes and above gullied areas, to control runoff. Special measures are required to stabilize deep gullies. Grazing should be regulated so the plant cover will not be destroyed. (Capability unit IVe–3; woodland group 7.)

Edgemont channery loam, 15 to 25 percent slopes, moderately eroded (EcD2).—Most of this soil is in the Hellam Hills and the Pigeon Hills. All of it has been cleared and farmed in the past. Some is still farmed, but most of it is idle or in low-grade pasture. The fertility is low.

This soil is not suited to tilled crops, because it is eroded and because some slopes are too steep for safe operation of farm machinery. A permanent cover of vegetation should be maintained. Pasture or hay can be established if lime and fertilizer are applied, drought-resistant plants are seeded, and erosion is controlled. Grazing should be regulated so that the plant cover will not be damaged.

If it is not necessary to use this soil for hay or pasture, it can be planted to trees of suitable species and managed for the production of forest crops. Woodland would need protection from fire and grazing. For some areas, planting shrubs that provide food and cover for wildlife could be considered. (Capability unit IVe–3; woodland group 5.)

Edgemont channery loam, 15 to 25 percent slopes, severely eroded (EcD3).—This soil is so severely eroded that the subsoil is exposed in many places. Shallow gullies are common, and a few gullies have cut into the parent material.

Woodland and carefully controlled pasture are the only suitable uses for this soil. Large amounts of fertilizer are needed to establish pastures. Only drought-resistant plants can be used. Overgrazing should be prevented. Seeding and reseeding in alternate contour strips help to control erosion and to conserve moisture. Diversion terraces may be needed to control runoff on some of the long slopes and above gullied areas.

If this soil is not needed for pasture, it can be planted to trees of suitable species and managed for the production of forest crops. (Capability unit VIe–2; woodland group 7.)

Edgemont silt loam, 3 to 8 percent slopes (EdB).—The parent material of this soil was derived from rocks that included some phyllite. The surface layer and subsoil are finer textured and more slowly permeable than those of the channery loams. Runoff is moderately slow. The fertility is moderately low, and the available moisture capacity is moderate.

This soil is mostly in woodland, but it is suitable for the crops commonly grown in the county. If farmed, it requires simple conservation measures, including contour strips, cropland terraces, diversion terraces, and grassed waterways. Yields are good if lime and fertilizer are applied and organic matter is supplied. A 3-year rotation should include at least 1 year of hay. (Capability unit IIe–2; woodland group 1.)

Edgemont silt loam, 3 to 8 percent slopes, moderately eroded (EdB2).—Most of this soil is in the Hellam Hills. Some of the original surface layer has been removed by erosion, and in places subsoil is brought to the surface in plowing. The depth to decomposed quartzite is 24 to 34 inches.

Much of this soil is farmed. Simple conservation measures are required to control erosion and to conserve moisture. Contour strips, diversion terraces, cropland terraces, and grassed waterways may be needed. Lime and fertilizer are needed for good yields. Organic matter can be supplied by growing green-manure crops, applying barnyard manure, and including at least one hay crop in a 3-year rotation. (Capability unit IIe–2; woodland group 1.)

Edgemont silt loam, 3 to 8 percent slopes, severely eroded (EdB3).—This soil has lost practically all of its original surface layer. The plow layer now consists mostly of subsoil, which is finer textured and harder to work than the original surface layer and less well suited to crops. Small fragments of rock are scattered on the surface. Shallow gullies are common, and there are a few gullies too deep to be crossed with tillage equipment.

The common crops can be grown on this soil, but intensive management is necessary. Lime and fertilizer are needed. Organic matter can be supplied by growing green-manure crops, applying barnyard manure, and including hay in the crop rotation. A close-growing crop should be on the soil at least half the time. Contour strips, diversion terraces, and grassed waterways provide protection against further erosion. In pastures, tall grasses and deep-rooted legumes should be seeded. Lime and fertilizer should be applied, and grazing controlled. (Capability unit IIIe–3; woodland group 3.)

Edgemont silt loam, 8 to 15 percent slopes (EdC).—All of this soil is wooded. The surface is covered with hardwood leaves in various stages of decomposition, some twigs, and fragments of bark. Next is a layer, about half an inch thick, of well-decomposed organic matter mixed with a little mineral soil material. Below this is a 4-inch layer of very dark brown silt loam that has fine granular structure. The depth to the parent material is about 32 inches.

If cleared, this soil would be suitable for row crops. It would need to be protected from erosion by contour strips, diversion terraces, and grassed waterways. Its low organic-matter content could be supplemented by growing green-manure crops, applying barnyard manure, and including hay in the crop rotation. Half of the rotation on such a soil should consist of close-growing crops.

Woodland needs protection from fire and from grazing. A forester should be consulted for advice on harvesting trees and otherwise managing woodland for sustained yields. (Capability unit IIIe–3; woodland group 5.)

Edgemont silt loam, 8 to 15 percent slopes, moderately eroded (EdC2).—This soil occupies rolling ridgetops and slopes adjacent to the headwaters of streams. Erosion has removed as much as three-fourths of the original surface layer in some places. In cultivated fields the yellowish-brown subsoil has been plowed up. There are a few shallow gullies, but these are easily obliterated in tillage.

This soil is acid and low in fertility, but yields are fairly good if lime and fertilizer are applied and erosion is checked by means of contour strips, diversion terraces, and grassed waterways. To maintain the organic-matter content, hay must be grown at least half the time. (Capability unit IIIe–3; woodland group 5.)

Edgemont silt loam, 8 to 15 percent slopes, severely eroded (EdC3).—Much of the original surface layer of this soil has been washed away. The present plow layer is yellowish brown and is finer textured than the original surface layer.

This is a droughty and unproductive soil. It is generally unsuitable for cultivated crops. Intensive management is needed to increase the organic-matter content and to control runoff. Hay or pasture of drought-resistant tall grasses and deep-rooted legumes is the best use. Yields of forage crops are fairly good if enough lime and fertilizer are applied. Seeding and reseeding should be done in alternate contour strips. Diversion terraces and grassed waterways may be needed on the long slopes. Runoff can be diverted from active gullies by means of terraces. Deep gullies should be filled in, limed and

fertilized, seeded to grasses, and mulched. Careful control of grazing will prolong the life of the pasture plants and protect the soil. (Capability unit IVe–3; woodland group 7.)

Edgemont silt loam, 15 to 25 percent slopes, moderately eroded (EdD2).—Steep slopes and susceptibility to further erosion practically limit the use of this soil to hay or pasture consisting of tall grasses and deep-rooted legumes. Operating farm machinery on the steeper slopes is unsafe. On the gentler slopes, a row crop can be grown occasionally but not more than once in 6 years, Long slopes should be contour stripped. Seeding and reseeding in alternate strips is advisable. Long slopes need the extra protection of diversion terraces that will intercept runoff and carry it away safely. To get a vigorous plant cover, lime and fertilizer are needed. (Capability unit IVe–3; woodland group 5.)

Edgemont silt loam, 15 to 25 percent slopes, severely eroded (EdD3).—This soil has lost all or nearly all of its original surface layer. Many shallow gullies and some deep gullies have formed. The fertility and the moisture-supplying capacity are low.

Hay or pasture is the best use for this soil. Row crops should be grown seldom, if ever. The more severely eroded areas can be reforested. Seeding and reseeding of hay and pasture are best done in contour strips. Disking is better than plowing for preparation of a seedbed. Lime and fertilizer must be used to get a good stand of grasses and legumes. Diversion terraces help to control runoff on long slopes and above gullied areas. Deep gullies require special treatment. (Capability unit VIe–2; woodland group 7.)

Edgemont soils, 25 to 35 percent slopes, moderately eroded (EgE2).—This unit consists of Edgemont channery loam, Edgemont silt loam, and Edgemont stony loam. The slopes are steep and runoff is fairly rapid. Operating farm machinery on the steeper slopes is unsafe.

On the gentler slopes, pastures of drought-resistant plants can be established. Most of the open areas, however, should be reforested and managed for the production of forest crops. When trees are harvested, care is needed to prevent gullying in skid trails and logging roads. In some areas shrubs that supply food and shelter for wildlife could be planted. (Capability unit VIe–2; woodland group 9.)

Edgemont very stony loam, 0 to 8 percent slopes (EhB).—Stones and boulders up to 10 inches in diameter cover about 15 to 50 percent of the surface of this soil. The soil between the stones is porous and permeable to water, roots, and air. Runoff is low, and erosion is slight.

Because of stoniness, droughtiness, and low natural fertility, tilling this soil is impractical and pastures require special management. If possible, the surface stones should be removed. Much of the acreage is wooded and should be kept so and managed for sustained yield of forest products. A forester should be consulted for advice on selecting trees for harvesting. (Capability unit VIs–1; woodland group 1.)

Edgemont very stony loam, 8 to 25 percent slopes (EhD).—This soil is a little shallower than Edgemont very stony loam, 0 to 8 percent slopes. Most of it is wooded. Because of stoniness, droughtiness, and moderately low fertility, this soil is not suitable for tilled crops or for hay, but some areas can be used for pasture. Thin spots in the woodland should be planted to suitable trees or to shrubs that provide food and cover for wildlife. (Capability unit VIs–1; woodland group 5.)

Edgemont very stony loam, 25 to 60 percent slopes (EhF).—This soil occurs along streams in the Hellam Hills. The profile is shallower than that of Edgemont very stony loam, 8 to 25 percent slopes. The depth to bedrock is 8 to 14 inches.

Almost all of this soil is wooded and should remain so. When trees are harvested, extreme care is needed to prevent gullying in skid trails and logging roads. (Capability unit VIIs–1; woodland group 9.)

Elioak Series

This series consists of deep, well-drained, nearly level to moderately sloping soils on uplands. The surface layer is dark grayish-brown silt loam, and the subsoil is yellowish-red to red silty clay loam. The parent material weathered from schist and phyllite. Gentle slopes predominate.

These soils are commonly near or adjacent to the Chester, Manor, and Glenelg soils. They are finer textured than the Chester soils and redder in the subsoil. They are deeper and less channery than the Manor and Glenelg soils, finer textured throughout, and redder in the subsoil.

Typical profile of Elioak silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 1½ miles south of Cross Roads:

- A_p 0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; pH 6.6 (limed); abrupt, smooth lower boundary; 7 to 10 inches thick.
- A_2 8 to 12 inches, yellowish-red (5YR 5/6) fine silt loam; weak, fine and medium, subangular blocky structure; distinct clay films in pores; friable when moist, slightly sticky when wet; pH 6.4; clear, wavy lower boundary; 3 to 6 inches thick.
- B_1 12 to 15 inches, yellowish-red (5YR 5/6) silty clay loam; moderate, medium, subangular blocky structure; friable when moist, moderately sticky when wet; pH 6.2; clear, wavy lower boundary; 1 to 4 inches thick.
- B_{21} 15 to 23 inches, yellowish-red (5YR 5/6) silty clay loam to silty clay; moderate, fine and medium, subangular blocky structure; distinct clay films on peds; earthworm casts to bottom of this horizon; friable when moist, sticky when wet; pH 6.0; gradual, wavy lower boundary; 6 to 11 inches thick.
- B_{22} 23 to 32 inches, red (2.5R 4/8) silty clay loam; weak, medium, subangular blocky structure breaking to weak, thin, platy structure; distinct clay films on peds; slightly firm in place; pH 4.8; clear, wavy lower boundary; 6 to 12 inches thick.
- B_{31} 32 to 38 inches, red (2.5YR 5/8) silt loam; distinctly micaceous appearance and feel; weak, fine, granular structure and weak, thin, platy structure; distinct clay films; slightly firm in place, nonsticky when wet; pH 4.8; clear, wavy lower boundary; 4 to 9 inches thick.
- B_{32} 38 to 44 inches, red (2.5YR 5/8) micaceous fine silt loam; weak, thin and medium, platy structure; friable when moist, slightly sticky when wet; pH 4.5; clear, wavy lower boundary; 4 to 9 inches thick.
- C_1 44 to 50 inches, yellowish-red (5YR 5/8) micaceous silt loam; weak, thin and medium, platy structure; friable; pH 4.2; 4 to 10 inches thick.
- D_r 50 to 56 inches, very micaceous schist.

The surface soil is dark grayish brown to dark brown, and the subsoil is yellowish red to red. Quartz fragments are common on the surface and throughout the profile. The mica content is greater where the parent material was derived from schist and less where the parent material was

derived from phyllite. Included in the mapping units are small areas of loam and channery loam.

The Elioak soils are highly fertile and strongly acid. Tilth and permeability are good. The available moisture capacity is moderately high. Except where severely eroded, these soils produce excellent yields of all the crops commonly grown in the county.

Elioak silt loam, 0 to 3 percent slopes (EkA).—Trees, principally oaks, cover most of this soil. Instead of an A_p horizon like that in the typical profile, there is a layer of mull-like material about 2 inches thick over about 7 inches of very dark grayish-brown silt loam. The profile is deeper than the typical profile. The depth to the weathered parent material is about 55 inches.

If cleared and cultivated, this soil would be productive. Management requirements are simple. The erosion hazard is slight. Green manure, barnyard manure, cover crops, and crop residues could be utilized to supply organic matter. A hay crop should be grown at least once every 4 years.

Woodland management requirements include selective cutting, protection from fire and grazing, and underplanting with trees of desirable species. (Capability unit I–3; woodland group 1.)

Elioak silt loam, 3 to 8 percent slopes (EkB).—Trees, mostly oaks, cover most of this soil. Instead of an A_p horizon like the one in the typical profile, there is a layer of black mull-like material about 1 inch thick over about 6 inches of dark grayish-brown silt loam. The depth to the weathered parent material is a little greater than in the profile described as typical of the series.

If cleared and cultivated, this soil would be productive. It is suitable for all crops commonly grown in the county. Erosion could be controlled by contour farming, stripcropping, cropland terraces, diversion terraces, and grassed waterways. Hay should be grown for at least 1 year in a 3-year rotation. Excellent pastures of tall grasses and legumes could be established.

Woodland management requirements include selective cutting, culling, and protection from fire and grazing. (Capability unit IIe–2; woodland group 1.)

Elioak silt loam, 3 to 8 percent slopes, moderately eroded (EkB2).—This soil is on broad ridgetops, generally adjacent to the nearly level and the moderately sloping Elioak soils. The profile is like the one described as typical of the series.

This soil is suitable for the crops commonly grown in the county. The shorter slopes should be farmed on the contour. The longer slopes need contour strips, cropland terraces, and diversion terraces. All natural drainageways should be sodded. High yields can be obtained if crops are grown in a proper rotation, barnyard manure and green manure are used, and lime and fertilizer are applied as needed. A 3-year rotation should include at least 1 year of hay. (Capability unit IIe–2; woodland group 1.)

Elioak silt loam, 8 to 15 percent slopes (EkC).—Trees, mostly oaks, cover most of this soil. Instead of an A_p horizon like the one in the typical profile, there is a layer of black mull-like material about 1 inch thick over about 6 inches of dark grayish-brown silt loam. The depth to the weathered parent material is a little greater than in the profile described as typical of the series.

If cleared and cultivated, this soil should be protected by contour farming, contour stripcropping, diversion terraces, and grassed waterways. Cover crops, green-manure crops, barnyard manure, and crop residues should be utilized to provide organic matter and to preserve the soil structure. Row crops should not be grown more often than once every 4 years.

Woodland management requirements include selective cutting, underplanting, and protection from fire and grazing. (Capability unit IIIe–2; woodland group 5.)

Elioak silt loam, 8 to 15 percent slopes, moderately eroded (EkC2).—This soil commonly occurs between areas of the gently sloping Elioak soils and areas of the moderately steep Manor soils. The profile is shallower than the profile described as typical of the series. The depth to the weathered parent material is about 38 inches.

This soil is suitable for all crops commonly grown in the county. Erosion can be controlled by contour stripcropping, diversion terraces, grassed waterways, and suitable crop rotations. Row crops should not be grown more often than once in 4 years. Lime and fertilizer are required for high yields. (Capability unit IIIe–2; woodland group 5.)

Elioak silt loam, 8 to15 percent slopes, severely eroded (EkC3).—This soil is eroded to the extent that most of the original surface layer has been lost. Patches of yellowish-red silty clay loam are exposed. Shallow gullies are common, and a few deep gullies have cut into the parent material.

All of this soil has been cultivated, but most of it is now in hay or pasture. Cultivated crops should be grown only to reestablish hay or pasture, and not more than once in every 6 years. Reseeding should be done in contour strips. The shorter slopes should be farmed on the contour. The longer slopes need contour strips, diversion terraces, and grassed waterways. Gullied areas need to be smoothed, mulched, heavily seeded, and limed and fertilized. (Capability unit IVe–2; woodland group 7.)

Elk Series

This series consists of deep, well-drained, nearly level to moderately sloping soils on stream terraces. The parent material was old alluvium, most of which washed from soils underlain by limestone. Gentle slopes predominate.

These soils are commonly near or adjacent to the Penn and Hagerstown soils, which are on uplands, and to soils of the Huntington catena, which are on bottom lands. They are deeper to bedrock than the Penn soils and have a finer textured subsoil. They have a slightly coarser textured subsoil than the Hagerstown soils, and they contain a little water-laid gravel. They have a more completely developed profile than the soils of the Huntington catena.

The Elk soils in York County are of limited extent. They occur in the central part of the county along Codorus Creek and in the northern part along Yellow Breeches Creek.

Typical profile of Elk silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 2½ miles northwest of Bunches, along Yellow Breeches Creek:

A_p 0 to 8 inches, brown to dark-brown (7.5YR 4/4) silt loam; moderate, fine, granular structure; friable; pH 6.0; clear, smooth lower boundary; 6 to 14 inches thick.

B_1 8 to 15 inches, reddish-brown (5YR 4/4) silt loam; moderate, fine and medium, subangular blocky structure; slightly plastic; pH 5.8; clear, smooth boundary; 5 to 12 inches thick.

B_2 15 to 36 inches, red (2.5YR 4/6) silty clay loam; moderate,

medium, blocky structure; faint, continuous clay films on ped faces; firm when moist, plastic and slightly sticky when wet; pH 5.6; gradual, smooth boundary; 12 to 18 inches thick.

C_1 36 to 42 inches +, dark reddish-brown (2.5YR 3/6) silty clay loam; strong, coarse, blocky structure; continuous clay films on ped faces; firm when moist, sticky and plastic when wet; pH 6.1; 8 to 20 inches thick.

The surface layer is brown to dark brown, and the subsoil is reddish brown to red. From 5 to 15 percent of the surface layer consists of gravel. Most of the gravel is quartzite, but a little of it is sandstone. The texture of the subsoil ranges from silt loam to silty clay. The depth to bedrock ranges from 3 to 7 feet but is most commonly about 5 feet. There are small areas in which the alluvial deposit does not extend to bedrock but is underlain at a depth of 15 inches or more by residuum.

The Elk soils are medium acid to nearly neutral. The fertility is high. Tilth and permeability are good. The available moisture capacity is high.

Elk silt loam, 0 to 3 percent slopes (ElA).—This soil is on the higher parts of the terraces. The profile is deeper than the profile described as typical of the series. Runoff is slow, but internal drainage is good. There is little or no erosion problem.

All of this soil is cultivated. It is excellent for alfalfa and is suitable for all other crops commonly grown in the county. It is well suited to irrigation, and plenty of water is available from nearby streams. Excellent yields can be obtained with simple management practices. Intensive use is possible if organic matter is supplied and the soil structure is preserved. The following are examples of suitable rotations: a row crop, a small grain, and hay; or, a row crop, a cover crop, another row crop, and a small grain or hay. (Capability unit I–2; woodland group 2.)

Elk silt loam, 3 to 8 percent slopes, moderately eroded (ElB2).—This soil occurs on the gently sloping parts of the terraces, generally adjacent to the nearly level and the moderately sloping Elk soils. The profile is like the one described as typical of the series. The depth to bedrock is about 60 inches. The plow layer is a mixture of the original surface layer and the subsoil. Included are a few small areas that are only slightly eroded.

All the common crops can be grown. Cultivation should be on the contour, and the longer slopes need contour strips, diversion terraces, and sodded waterways. High yields can be obtained if organic matter is supplied. A 3-year rotation should include at least 1 year of hay.

This soil is well suited to irrigation, and plenty of water is available from nearby streams. (Capability unit IIe–1; woodland group 2.)

Elk silt loam, 8 to 15 percent slopes, moderately eroded (ElC2).—This soil occurs as rather narrow bands along tributaries that flow from the uplands across the terraces to the main streams. The profile is a little shallower than the profile described as typical of the series.

All of this soil is used for crops. It is erodible and consequently should not be used for row crops more than once in 4 years. Barnyard manure, cover crops, and crop residues supply organic matter, which helps to preserve soil structure. Yields of alfalfa are excellent. Pastures produce good stands of bluegrass in spring and fall. (Capability unit IIIe–1; woodland group 6.)

Glenelg Series

This series consists of moderately deep, well-drained, gently sloping to moderately steep soils on uplands. The surface layer is dark-brown silt loam, and the subsoil is yellowish-brown to yellowish-red silt loam to silty clay loam. The parent material weathered from schist and phyllite. Moderate slopes predominate.

These soils are commonly near or adjacent to the Chester, Manor, and Elioak soils. They are shallower and more channery than the Chester and Elioak soils. The subsoil is less fine textured than that of either the Chester or Elioak soils and is less red than that of the Elioak. The solum is thicker and less channery than that of the Manor soils, and the subsoil is somewhat finer textured. The Worsham and Glenville soils, with which the Glenelg soils are associated in some places, are deeper and less well drained.

Typical profile of Glenelg channery silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 1 mile southeast of Brogue:

A_p 0 to 8 inches, dark-brown (7.5YR 4/4) channery silt loam; moderate, fine, granular structure; friable; pH 6.1; abrupt, smooth boundary; 6 to 10 inches thick.

B_1 8 to 12 inches, dark yellowish-brown (10YR 4/4) channery fine silt loam; weak, medium and thin, platy structure breaking to weak, very fine, subangular blocky structure; friable; pH 6.0; clear, wavy lower boundary; 2 to 5 inches thick.

B_{21} 12 to 16 inches, yellowish-brown (10YR 5/6) channery fine silt loam; weak, fine and very fine, subangular blocky structure; thin, discontinuous clay films; friable; pH 5.8; clear, wavy lower boundary; 3 to 5 inches thick.

B_{22} 16 to 22 inches, yellowish-brown (10YR 5/8) channery fine silt loam to silty clay loam; many mica flakes; moderate, medium and fine, subangular blocky structure; thin, discontinuous clay films; firin; pH 5.6; gradual, wavy lower boundary; 5 to 8 inches thick.

B_3 22 to 25 inches, strong-brown (7.5YR 5/8) channery silt loam; weak, medium, subangular blocky structure; thin, discontinuous clay films; very firm in place; pH 4.8; clear, wavy lower boundary; 3 to 5 inches thick.

C_1 25 to 29 inches, yellowish-red (5YR 4/8) channery loam or silt loam; weak, thick, platy structure breaking to weak, coarse, subangular blocky structure; thin, discontinuous clay films; firm in place; pH 4.8; gradual, wavy lower boundary; 3 to 6 inches thick.

C_2 29 to 36 inches, yellowish-red (5 YR 4/6) or red (2.5 YR 5/6) and light reddish-brown (5YR 6/3) loam from highly decomposed schist; 30 percent partly weathered schist and quartz fragments up to 8 inches in length; pH 4.5; 5 to 10 inches thick.

D_r 36 inches +, Wissahickon schist.

The surface layer is dark brown to brown, and the subsoil is yellowish brown to yellowish red. In some places the texture of the subsoil is silty clay loam. From 20 to 50 percent of the surface layer consists of channery fragments, and from 30 to 70 percent of the subsoil. Quartz fragments occur on the surface and throughout the profile.

The Glenelg soils are moderately high in fertility and are strongly acid. They are permeable and have good tilth. The severely eroded soils are droughty, but the others have a moderately high available moisture capacity.

Glenelg channery silt loam, 3 to 8 percent slopes (GcB).—Most of this soil is wooded. Instead of an A_p horizon like the one in the typical profile, there is a layer of black mull-like material about 1 inch thick over a layer of dark grayish-brown silt loam. The profile is somewhat deeper

than the profile described as typical of the series. The depth to the weathered parent material is about 33 inches. Included are a few areas that have slopes of less than 3 percent.

If cleared and used for crops, this soil would be productive. Good management would be required to preserve the soil structure and to maintain the fertility. Woodland management requirements include selective cutting and underplanting. (Capability unit IIe–2; woodland group 1.)

Glenelg channery silt loam, 3 to 8 percent slopes, moderately eroded (GcB2).—This soil occurs on ridgetops, generally next to areas of the steeper Glenelg soils. The profile is like the one described as typical of the series. Included are a few areas that have slopes of less than 3 percent.

Almost all of this soil is in crops. All the common crops of the county are suitable. Cultivation should be on the contour. Long slopes need stripcropping, cropland terraces, diversion terraces, and sodded waterways. Green-manure crops and barnyard manure are needed to supply organic matter and to improve the moisture-supplying capacity. Hay should be grown for 2 years in a 4-year rotation or for a minimum of 1 year in a 3-year rotation. If lime and fertilizer are used as needed, yields are fairly high. (Capability unit IIe–2; woodland group 1.)

Glenelg channery silt loam, 3 to 8 percent slopes, severely eroded (GcB3).—This soil is eroded to the extent that much of the original surface layer has been lost and patches of yellowish-brown to strong-brown silt loam are exposed. The depth to the weathered parent material is about 20 inches. Shallow gullies are common. The available moisture capacity is moderately low.

If this soil is used for crops, it should be protected from further erosion by contour farming, contour stripcropping, diversion terraces, and grassed waterways. Organic matter should be supplied by utilizing cover crops and crop residues and by including hay in the crop rotation. A 4-year rotation should include at least 2 years of hay. Lime and fertilizer are needed. Special measures are required to stabilize gullied areas.

In pastures, deep-rooted grasses and legumes produce more forage than shallow-rooted species. Pastures should be limed and fertilized, mowed to control weeds, and protected from overgrazing. (Capability unit IIIe–2; woodland group 3.)

Glenelg channery silt loam, 8 to 15 percent slopes (GcC).—Trees, mostly oaks, cover practically all of this soil. Instead of a dark-brown A_p horizon like that in the typical profile, there is a layer of black mull-like material about 1 inch thick over a layer of dark grayish-brown silt loam. The profile is deeper to the weathered parent material than the profile described as typical of the series.

If cleared and used for crops, this soil would require good conservation practices to maintain fertility and to preserve the soil structure. Good management of woodland includes selective cutting and underplanting. (Capability unit IIIe–2; woodland group 5.)

Glenelg channery silt loam, 8 to 15 percent slopes, moderately eroded (GcC2).—The profile of this soil is shallower than the profile described as typical of the series. The depth to the parent material is about 20 inches. A few gullies have cut down to the underlying schist.

Most of this soil is cleared and cropped. Intensive conservation practices are required to check erosion and to improve productivity. Diversion terraces and contour strips are needed. Well-fertilized hay and forage crops should be included in the rotation. (Capability unit IIIe–2; woodland group 5.)

Glenelg channery silt loam, 8 to 15 percent slopes, severely eroded (GcC3).—The profile of this soil is shallower than the profile described as typical of the series. The depth to the weathered parent material is about 15 inches. Gullies are common, and many have cut down to the underlying schist. This soil is more droughty and lower in organic matter than the more gently sloping and less severely eroded Glenelg soils.

Nearly all of this soil has been cleared and farmed, but some has now reverted to woodland. Intensive conservation practices are required to stabilize the soil and to restore its productivity. Management requirements include diversion of water from the eroded areas, contour stripcropping, and applying lime, fertilizer, and manure. In a 5-year rotation, hay should be grown at least 3 years and cultivated crops not more than 1 year. Many areas need special practices designed to control gullying. (Capability unit IVe–2; woodland group 7.)

Glenelg channery silt loam, 15 to 25 percent slopes (GcD).—All of this soil is wooded, mostly with oaks. Instead of a dark-brown A_p horizon like the one in the typical profile, there is about 1 inch of black mull-like material over a layer of dark grayish-brown silt loam. The profile is shallower than the one described as typical of the series. The depth to the weathered parent material is about 20 inches.

If cleared, this soil is best suited to hay or pasture. Row crops should not be grown more often than once in 6 years. Woodland management requirements include selective cutting and underplanting. (Capability unit IVe–2; woodland group 5.)

Glenelg channery silt loam, 15 to 25 percent slopes, moderately eroded (GcD2).—The profile of this soil is shallower than the one described as typical of the series. The depth to the weathered parent material is about 16 inches. A few patches of subsoil are exposed.

This soil is best suited to long-term hay, orchards, or pasture. A cultivated crop should be grown only for the purpose of reestablishing a hay or pasture stand, and no more often than once in 6 years. Disking is better than plowing for the preparation of seedbeds. Diversion terraces and sodded waterways are needed on long slopes. Orchard trees should be planted on the contour. (Capability unit IVe–2; woodland group 5.)

Glenelg channery silt loam, 15 to 25 percent slopes, severely eroded (GcD3).—The profile of this soil is much shallower than the profile described as typical of the series. The depth to the parent material is about 10 inches. Practically all of the original surface layer has been lost, and the present surface layer is mostly yellowish brown or strong brown in color. Gullies are common, and a few have cut down to the parent material. The available moisture capacity is moderately low to low.

The best use for this soil is pasture or woodland. Pastures should be seeded to drought-resistant plants.

Diversion terraces with suitable outlets may be needed before sod can be established. Smoothing, heavy seeding, liming, and fertilizing may be required to stabilize gullies. Areas not used for pasture can be planted to trees of suitable species. (Capability unit VIe–3; woodland group 7.)

Glenville Series

This series consists of deep, moderately well drained, nearly level or gently sloping soils on uplands and toe slopes. The surface layer is dark-brown silt loam. The upper part of the subsoil is yellowish-brown silt loam, and the lower part is yellowish-brown, distinctly mottled silty clay loam. The parent material of the soils on the uplands was residuum weathered from schist and phyllite; that of the soils on the toe slopes was colluvium, also derived from schist and phyllite.

On the uplands the Glenville soils are associated with the Chester soils, which are better drained and unmottled. On the toe slopes they are associated with the Glenelg and Manor soils, which are higher on the slopes, and in a few places with the Worsham soils, which are lower. The Glenelg and Manor soils are deeper and better drained than the Glenville and are unmottled. The Worsham soils are less well drained, are grayer throughout, and are distinctly mottled in the upper part of the subsoil.

Typical profile of Glenville silt loam, 3 to 8 percent slopes, in a cultivated field 1 mile southwest of Woodbine:

- A_p 0 to 10 inches, dark-brown (10YR 4/3) silt loam; moderate, very fine, granular structure; very friable; pH 5.8; clear, smooth lower boundary; 8 to 12 inches thick.
- A_2 10 to 15 inches, dark yellowish-brown (10Y 4/4) silt loam; weak, fine, subangular blocky structure; friable; pH 5.4; clear, smooth lower boundary; 3 to 7 inches thick.
- B_1 15 to 20 inches, yellowish-brown (10YR 5/8) fine silt loam; moderate, fine, subangular blocky structure; friable; pH 5.2; gradual, smooth lower boundary; 3 to 7 inches thick.
- B_{21} 20 to 27 inches, yellowish-brown (10YR 5/6) silty clay loam; few, fine, distinct, reddish-brown (5YR 5/3) mottles; moderate, medium, subangular blocky structure; friable; pH 5.2; gradual, smooth lower boundary; 5 to 9 inches thick.
- B_{22g} 27 to 35 inches, yellowish-brown (10YR 5/6) silty clay loam; common, medium, distinct, very pale brown (10YR 7/3) and yellowish-red (5YR 4/6) mottles; moderate, medium, subangular blocky structure; firm; pH 5.2; gradual, wavy lower boundary; 6 to 10 inches thick.
- B_{3g} 35 to 44 inches, dominantly yellowish-brown (10YR 5/4) silty clay loam; many, medium, prominent, strong-brown (7.5YR 5/6) and light-gray (2.5Y 7/2) mottles; moderate to strong, medium, subangular blocky structure; firm in place; hard when dry; thin, continuous clay films on ped faces; pH 5.0; 7 to 15 inches thick.
- C 44 to 60 inches +, yellowish-brown and grayish-brown micaceous loam; weak, thin, platy structure; friable; medium acid.

The surface layer is dark brown to dark grayish brown. In places the subsoil is strong brown to very pale brown instead of yellowish brown. Mottling ordinarily begins at a depth of 18 to 26 inches but may begin at any depth between 15 and 30 inches. In many places the upper layers formed partly from colluvium and the lower layers formed from residuum. Mica is more abundant where the parent material was derived from schist and less abundant where the parent material was derived from phyllite. Locally, the parent material included some material weathered from quartzite, quartz, and aporhyolite.

The Glenville soils are moderately fertile and strongly acid. Tilth is fair to good. The lower part of the subsoil is slowly permeable, and consequently the water table is high in winter and in the early part of spring.

Glenville silt loam, 0 to 3 percent slopes (GnA).—Some of this soil is on broad ridgetops, but most of it is around the head of drainageways, generally below areas of the more strongly sloping Glenville soils and above areas of the nearly level Worsham soils. It is a little less well drained than Glenville silt loam, 3 to 8 percent slopes. Mottling begins at a depth of about 18 inches. Runoff is slow. Included are a few areas on which a foot or more of silt loam local alluvium has been deposited.

Drainage is the primary management problem. Tile drains do not work well, because of the slowly permeable subsoil. They are more effective where the surface is covered with the recent local alluvium. Bedding and open drains are feasible in some places. Drainage terraces, graded strips, and graded rows can be used on slopes near the upper limit of the slope range.

If drained, limed, and fertilized, this soil is fairly well suited to corn, spring-sown grain, and moisture-tolerant grasses and legumes. (Capability unit IIw–2; woodland group 11.)

Glenville silt loam, 3 to 8 percent slopes (GnB).—This soil occurs on the lower part of toe slopes, usually at the head of drainageways and below areas of gently or moderately sloping Chester or Glenelg soils. The profile is like the one described as typical of the series.

This soil is not suitable for alfalfa or potatoes, because of the seasonally high water table, but corn, spring-sown grain, and moisture-tolerant grasses and legumes grow fairly well. Crop rotations should be no more intensive than the following: corn, a cover crop, a spring-sown small grain, and 2 years of hay. To divert surface water and prevent erosion, diversion terraces are needed upslope from this soil. Graded strips, graded rows, and drainage terraces are also advisable. Compaction and damage to the soil structure are likely if this soil is worked, driven over, or grazed when wet. (Capability unit IIe–7; woodland group 11.)

Glenville silt loam, 3 to 8 percent slopes, moderately eroded (GnB2).—This soil occurs at the head of drainageways, below areas of the moderately sloping Manor or Glenelg soils. The profile is a little shallower than the one described as typical of the series. A few shallow gullies have formed.

This soil is used mostly for pasture. It is not suitable for potatoes or alfalfa, because of the seasonally high water table. Runoff from the adjacent slopes should be intercepted by diversion terraces, if suitable outlets are available. Graded strips, graded rows, and drainage terraces are beneficial. Lime, fertilizer, and organic matter are needed. Crop rotations should be no more intensive than the following: corn, a cover crop, a small grain, and 2 years of hay. (Capability unit IIe–7; woodland group 11.)

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Guthrie Series

This series consists of poorly drained, nearly level or slightly depressed soils on uplands. The surface layer is dark olive-gray silt loam, and the subsoil is mottled olive-gray to gray silty clay loam. The parent material weathered from limestone or calcareous schist.

These soils are commonly near or adjacent to the Lawrence, Bedford, and Conestoga soils. They are more poorly drained than any of the associated soils and are mottled throughout. The upper part of the subsoil is finer textured than the corresponding layer in the Lawrence soils.

Typical profile of Guthrie silt loam (0 to 3 percent slopes) in an idle field half a mile west of Hanover:

A_p 0 to 10 inches, dark olive-gray (5Y 3/2) silt loam; few, fine, distinct, brownish-yellow (10YR 6/4) and strong-brown (7.5YR 5/6) mottles; moderate, fine, granular structure; friable; pH 5.3; clear, smooth lower boundary; 8 to 12 inches thick.

B_{21g} 10 to 40 inches, olive-gray (5Y 4/2) silty clay loam; common, medium, distinct, brownish-yellow (10YR 6/6) and strong-brown (7.5YR 5/8) mottles; moderate, medium, angular blocky structure; thin, continuous clay films on ped faces; firm when moist, slightly sticky and slightly plastic when wet; pH 5.0; gradual, smooth lower boundary; 15 to 35 inches thick.

B_{3g} 40 to 50 inches +, dominantly gray (N 7/0) silty clay loam to silty clay; many, medium, prominent, olive-yellow (2.5Y 6/6), reddish-yellow (5YR 4/6), and yellowish-brown (10YR 5/6) mottles; moderate to strong, medium, angular blocky structure; distinct, continuous clay films on ped faces; firm when moist, sticky and plastic when wet, hard when dry; pH 5.4; 10 to 20 inches thick.

These soils are ordinarily mottled to the surface, but mottling may begin anywhere between the surface and a depth of 7 inches. The surface layer is dark olive gray to very dark gray, and the subsoil is olive gray to light gray. The texture of the subsoil ranges from silty clay loam to silty clay. In depressions, the upper part of the profile formed from colluvium and the lower part from residuum.

The Guthrie soils are medium acid to strongly acid. Tilth is poor. The subsoil is slowly permeable, and there is a seasonal high water table that often lasts well into the growing season. Because of this water table, these soils are not suitable for alfalfa or root crops. Even if artificially drained, they are suitable only for hay or pasture.

Guthrie silt loam (Gu).—The profile of this soil is like the one described as typical of the series. The depth to bedrock is generally more than 6 feet. Runoff is slow. There is little erosion hazard. The subsoil is slowly permeable, and the water table is high in winter and spring.

Most of this soil is in pasture or hay or is idle. It is not productive unless drained artificially, and, even if it is drained, a wet growing season may cause a crop failure. Open drains with suitable outlets are the most effective means of drainage. Bedding, graded rows, graded strips, and drainage terraces are also beneficial. Tile are not ordinarily recommended. The best use is hay or pasture of moisture-tolerant grasses and legumes. Compaction and damage to the soil structure are likely to result if this soil is worked or grazed when wet. (Capability unit IVw–1; woodland group 18.)

Hagerstown Series

This series consists of deep, well-drained soils on uplands. The surface layer is dark-brown silt loam, and the subsoil is yellowish-red to red silty clay loam to clay. The parent material weathered from relatively pure limestone.

These soils are commonly near or adjacent to the Duffield, Conestoga, and Penn soils. They have a redder and finer textured subsoil than the Duffield and Conestoga soils. They are generally deeper than the Penn soils, and they have a finer textured subsoil.

Typical profile of Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 1 mile west of Wrightsville:

A_p 0 to 8 inches, dark-brown (10YR 3/3) silt loam; moderate, fine, granular structure; friable; pH 6.0; clear, smooth lower boundary; 7 to 10 inches thick.

B_1 8 to 15 inches, reddish-brown (5YR 4/4) fine silt loam; moderate, fine, subangular blocky structure; friable; pH 6.4; clear, smooth lower boundary; 5 to 9 inches thick.

B_{21} 15 to 28 inches, yellowish-red (5YR 5/6) silty clay loam; moderate, medium, blocky structure; friable when moist, slightly sticky and slightly plastic when wet; pH 6.4; gradual, smooth lower boundary; 10 to 15 inches thick.

B_{22} 28 to 40 inches, red (2.5YR 4/6) silty clay loam; strong, medium, blocky structure; thin, discontinous. clay films and black coatings on ped faces; firm when moist, sticky and plastic when wet; pH 6.8; gradual, smooth lower boundary; 10 to 14 inches thick.

B_3 40 to 50 inches, red (5YR 5/8) silty clay; strong, coarse and medium, blocky structure; thick, continous clay films and black coatings on ped faces; firm when moist, sticky and plastic when wet; pH 7.0; 8 to 12 inches thick.

D_r 50 inches +, relatively pure limestone.

The surface layer is brown to dark reddish brown, and the subsoil is reddish brown, yellowish red, or red. The texture of the subsoil ranges from silty clay loam to clay. Included in the mapping units are small areas that are stony or ledgy; these areas are shown on the soil map by outcrop symbols.

The Hagerstown soils are slightly acid to nearly neutral in reaction. They are permeable and have good to fair tilth. In the severely eroded soils, the available moisture capacity is moderate to moderately low; in the other soils of the series, it is high.

Hagerstown silt loam, 0 to 3 percent slopes (HaA).—This is one of the most productive soils in the county, but it is limited in extent. The natural fertility and the available moisture capacity are high. Runoff is slow. Water ponds in small depressions for short periods but does little or no harm to crops. In the depressions, the surface layer is very dark brown silt loam and the subsoil is yellowish-red silty clay loam or reddish clay. The limestone bedrock crops out in some places but is generally 40 to 60 inches below the surface.

This soil produces high yields of most general farm crops and excellent yields of alfalfa. It is not well suited to potatoes or other root crops. Only simple management practices are needed. Supplying organic matter to maintain good tilth is the most important. Lime and fertilizer requirements should be determined by soil tests. Row crops can be grown every year if winter cover crops are included in the rotation. (Capability unit I–2; woodland group 2.)

Hagerstown silt loam, 0 to 3 percent slopes, moderately eroded (HaA2).—This soil has lost from one-fourth to three-fourths of its original surface layer through erosion. In places the subsoil is exposed. The slopes, though nearly level, are long, and there is enough runoff to cause moderate erosion.

This soil produces high yields of corn, small grain, and hay. Yields of alfalfa and clover are excellent. Only simple conservation practices are needed. Contour farming and contour stripcropping are needed to control erosion on slopes near the upper limit of the slope range. Diversion terraces may be needed to intercept runoff from adjoining areas. Organic matter should be supplied to maintain good tilth. (Capability unit IIe–1; woodland group 2.)

Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded (HaB2).—This is the most extensive Hagerstown soil in York County. The profile is like the one described as typical of the series. As much as three-fourths of the original surface layer has been lost through erosion, and the present plow layer is a mixture of subsoil and the remnants of the original surface layer. Runoff is medium, and the erosion hazard is moderate. Included are a few areas in which the surface layer is heavy silt loam or silty clay loam.

This soil has moderate limitations that can be overcome by simple management practices. Additional organic matter will improve tilth and increase the capacity to absorb water. Organic matter can be supplied by growing a hay crop in the rotation, by plowing down green-manure crops, and by applying barnyard manure. Contour strips, diversion terraces, and grassed waterways help to control erosion. Where the slopes are undulating and contour strips are not practical, field strips of even width should be used and more protective crops should be included in the rotation. Some areas have a karstlike topography. In these, neither field strips nor contour strips are feasible, but protection against erosion can be provided by an extra year of hay in the rotation.

Yields of corn, small grain, and hay are good. Mixtures of alfalfa and grass or of clover and grass do exceptionally well. (Capability unit IIe–1; woodland group 2.)

Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded (HaC2).—The profile of this soil is somewhat shallower than the profile described as typical of the series. The depth to bedrock is generally 40 to 50 inches, but in some places it is much less.

This soil produces good yields of the commonly grown crops, but it requires more intensive management than the more gently sloping and uneroded Hagerstown soils. Organic matter should be supplied by plowing down green-manure crops, applying barnyard manure, and growing hay in the crop rotation. A 4-year rotation should include 2 years of hay. Contour strips, diversion terraces, and grassed waterways will help to control erosion. Where contour strips are not practical, field strips of even width may have to be used. In some places neither contour strips nor field strips are feasible, and in these protection must be provided by extra hay crops in the rotation. Lime and fertilizer requirements should be determined by soil tests.

Pastures of tall grasses and deep-rooted legumes have very good carrying capacity if well managed and protected from overgrazing. (Capability unit IIIe–1; woodland group 6.)

Hagerstown silt loam, 15 to 25 percent slopes, moderately eroded (HaD2).—This soil is eroded to the extent that in many places the plow layer is now silty clay loam. Runoff is fairly rapid. In cultivated fields the surface tends to seal over when rainwater strikes it. This reduces the capacity of the soil to absorb water.

A sod cover is needed most of the time to prevent further erosion, to supply organic matter, and to increase the water-absorbing capacity. Good yields of forage crops can be obtained if lime and fertilizer are applied. Long slopes should be seeded in alternate contour strips or field strips. Large fields should not be plowed up all at one time for reseeding. Diversion terraces may be needed. Tall grasses and deep-rooted legumes are suitable forage plants. Control of grazing is necessary to get the highest carrying capacity and to preserve the pasture stand. (Capability unit IVe–1; woodland group 6.)

Hagerstown silty clay, 3 to 8 percent slopes, severely eroded (HcB3).—This soil is hard to work. It puddles when wet, and it erodes easily. If it is worked when too wet or too dry, the structure breaks down. Most of the original surface layer has been lost. Gullies are common, particularly in pastures.

Hay or pasture is the best use for this soil. Row crops can be grown occasionally, if precautions are taken to control erosion and plenty of organic matter is added. Growing hay, turning under green-manure crops, returning all crop residues, and applying barnyard manure will supply organic matter, which is needed to improve the structure of the soil and to increase the water-absorbing capacity. Lime and fertilizer requirements should be determined by soil tests.

Contour strips, field strips, diversion terraces, and grassed waterways can be used to help control erosion where the topography permits. Special measures are needed to stabilize gullied areas.

Tall grasses and legumes provide good forage if pastures are fertilized and grazing is controlled. The surface will pack and puddle if pastures are grazed too early in spring, before the soil is firm. (Capability unit IVe–1; woodland group 4.)

Hagerstown silty clay, 8 to 15 percent slopes, severely eroded (HcC3).—This soil is hard to till and hard to protect from erosion. All of the original surface layer has been washed away, and the silty clay subsoil is exposed. Gullies are common, and some gullies in pastures are deep. Runoff is rather high, and the hazard of further erosion is serious.

This soil should have a good cover of grasses and legumes that will check erosion. Row crops should be grown only infrequently. In the larger fields and where the topography is suitable, erosion can be controlled by means of contour strips, field strips, diversion terraces, and grassed waterways. Special measures are needed to stabilize gullied areas. Pastures and hayfields should be seeded in alternate contour or field strips. Disking is better than plowing for the preparation of a seedbed. Lime and fertilizer requirements should be determined by soil tests. Pastures should not be grazed when wet, because the surface will pack and puddle. (Capability unit IVe–1; woodland group 8.)

Hagerstown and Duffield silty clay loams, 15 to 25 percent slopes, severely eroded (HdD3).—These two soils are mapped together because they are much alike in soil characteristics, use suitability, and management needs.

The Duffield profile is described under the heading "Duffield Series."

Practically all of the original surface layer has been eroded, and the silty clay loam subsoil is exposed. Shallow gullies are common, and there are some deep ones that have cut down to bedrock. Runoff is high.

The only way to prevent further erosion is to maintain a permanent cover of grasses and legumes or of trees. Special measures are needed to stabilize the active gullies. Lime and fertilizer are needed to maintain a vigorous growth of grasses and legumes. Grazing should be controlled to protect the pasture stand. Slopes near the upper limit of the slope range are too steep for the safe operation of machinery. These areas, and any others not needed for hay or pasture, should be reforested and managed for the production of woodland crops. (Capability unit VIe–1; woodland group 8.)

Highfield Series

This series consists of moderately deep to deep, well-drained, gently sloping to moderately steep soils on uplands. The surface layer is dark-brown channery silt loam, and the subsoil is dark yellowish-brown silty clay loam. The parent material weathered from aporhyolite or metabasalt. Moderate slopes predominate.

These soils are commonly near or adjacent to the Catoctin and Edgemont soils. They are deeper than the Catoctin soils, have a finer textured subsoil, and are somewhat less channery. They are finer textured than the Edgemont soils.

The Highfield soils in York County are inextensive and are of little importance in agriculture. They are in the vicinity of the Pigeon Hills and west of Chestnut Hill.

Typical profile of Highfield channery silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 2¾ miles west of Clear Spring:

- A_p 0 to 8 inches, dark-brown (10YR 3/3) channery silt loam; weak, fine, granular structure; very friable; pH 6.0; abrupt, wavy lower boundary; 7 to 10 inches thick.
- A_3 8 to 11 inches, brown (10YR 4/3) channery silty clay loam; up to 20 percent coarse fragments, mostly less than 2 inches in length; weak, fine, subangular blocky structure breaking to weak, medium, granular structure; very friable; pH 6.0; clear, wavy lower boundary; 1 to 3 inches thick.
- B_1 11 to 14 inches, dark yellowish-brown (10YR 4/4) channery silty clay loam; 25 percent coarse fragments, mostly less than 1 inch in length; weak, medium, subangular blocky and platy structure; friable; pH 5.8; clear, wavy lower boundary; 2 to 4 inches thick.
- B_2 14 to 19 inches, brown to dark yellowish-brown (7.5YR 4/4) channery silty clay loam or clay loam; 15 percent coarse fragments less than 1 inch in length; moderate, medium and fine, subangular blocky structure; thin, mostly continuous clay films; friable; pH 5.8; gradual, wavy lower boundary; 4 to 7 inches thick.
- B_3 19 to 24 inches, yellowish-brown (10YR 5/4) channery fine silt loam or silty clay loam; moderate, medium, platy structure; thin, discontinuous clay films; firm; pH 5.6; gradual, wavy lower boundary; 4 to 7 inches thick.
- C_1 24 to 30 inches, brown to dark yellowish-brown (10YR 4/4–7.5YR 4/4) channery silty clay loam; some black iron and manganese coatings; moderate, coarse, subangular blocky and platy structure breaking to medium, subangular blocky structure; firm; pH 5.4; abrupt, wavy lower boundary; 5 to 7 inches thick.
- D_r 30 inches +, aporhyolite.

The surface layer is brown to dark grayish brown, and the subsoil is brown to yellowish brown. The texture of the lower part of the subsoil ranges from silt loam to silty clay loam. From 20 to 40 percent of the surface layer, by volume, is composed of channery fragments.

The Highfield soils are especially well suited to orchards. They are permeable, moderately fertile, and strongly acid. Tilth is fair, and permeability is good. The available moisture capacity moderate.

Highfield channery silt loam, 3 to 8 percent slopes, moderately eroded (HfB2).—This soil occurs next to more strongly sloping Highfield and Catoctin soils. The profile is like the one described as typical of the series.

This soil is suitable for all the crops commonly grown in the county and is a good soil for orchards. Yields are moderately high if lime and fertilizer are applied as needed and the necessary conservation measures are taken. The shorter slopes should be farmed on the contour. The longer slopes need contour strips, cropland terraces, sodded waterways, and diversion terraces. A 3-year rotation should include at least 1 year of hay. Barnyard manure, green-manure crops, and cover crops will supply the organic matter needed to overcome a slight tendency toward droughtiness. (Capability unit IIe–2; woodland group 1.)

Highfield channery silt loam 8 to 15 percent slopes, moderately eroded (HfC2).—This soil commonly occurs next to the gently sloping Highfield soil and the moderately sloping Edgemont soil. The profile is shallower than the profile described as typical of the series. The depth to bedrock is about 26 inches.

Most of this soil is used for cultivated crops or for orchards. The shorter slopes should be farmed on the contour. On the longer slopes, contour strips, diversion terraces, and sodded waterways are effective. Row crops should not be grown more than once in 4 years. Green-manure crops, barnyard manure, and cover crops will supply the needed organic matter. For high yields, lime and fertilizer are needed.

In orchards, the trees should be planted on the contour and lined up and down the hill to facilitate air drainage. Diversion terraces are needed in some places. (Capability unit IIIe–2; woodland group 5.)

Highfield very stony silt loam, 0 to 8 percent slopes (HgB).—From 3 to 15 percent of the surface of this soil is covered with stones 10 or more inches in diameter. Between the stones, the surface is covered with leaf litter and about 1 inch of black mull-like material. Beneath this, instead of an A_p horizon like that in the typical profile, there is a 6-inch layer of dark grayish-brown stony silt loam. From the A_3 horizon down, the profile is like the one described as typical of the series, except that it is stony throughout.

This soil is too stony for cultivation. Much of it is wooded. Areas where light machinery can be used are good for orchard and fair for pasture. Seedbeds should be disked, where possible. Mowing is difficult. In orchards, trees should be planted on the contour and lined up and down the slope to facilitate air drainage. Woodland management requirements include underplanting and protection from fire and grazing. (Capability unit VIs–1; woodland group 1.)

Highfield and Catoctin very stony silt loams, 8 to 25 percent slopes (HhD).—The two soils in this unit are so intricately associated that they cannot be shown separately on the soil map. The Catoctin soil is described under the heading "Catoctin Series."

Stones more than 10 inches in diameter cover from 3 to 15 percent of the surface, and there are stones throughout the profile.

All of this unit is wooded. It should remain so, unless its use for agricultural purposes is absolutely necessary. It is too stony for cultivation and would be difficult to mow if used for pasture. Areas where light machinery can be used are fair for orchard. The trees should be planted on the contour and lined up and down the hill to facilitate air drainage. Woodland management requirements include underplanting, protection from fire and grazing, selective cutting, and removal of cull trees. (Capability unit VIs–1; woodland group 5.)

Huntington Series

This series consists of deep, well-drained, nearly level and gently sloping soils. Some are on flood plains, and some are on toe slopes or at the base of toe slopes. The surface layer is very dark grayish-brown silt loam, and the subsoil is brown to dark yellowish-brown silty clay loam. The parent material was recent alluvium. Most of it was washed from the Hagerstown and Duffield soils and other soils derived from limestone and calciferous schist.

These soils are commonly near or adjacent to the Lindside and Melvin soils. The Lindside soils are less well drained and are mottled in the lower part of the subsoil. The Melvin soils are much less well drained, are mottled throughout, and have a coarser textured subsoil.

Typical profile of Huntington silt loam in a cultivated field 1 mile east of Hellam Station:

A_p 0 to 12 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable; pH 6.5; clear, smooth lower boundary; 8 to 12 inches thick.

C_1 12 to 30 inches, brown to dark-brown (10YR 4/3) silt loam; weak, fine, subangular blocky structure; friable; pH 6.2; gradual, smooth lower boundary; 15 to 25 inches thick.

C_2 30 to 45 inches +, dark yellowish-brown (10YR 4/4) silty clay loam; weak, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; pH 6.4; 12 to 30 inches thick.

The surface layer is very dark grayish brown to brown, and the subsoil is dark yellowish brown to brown. A few areas of gravelly loam are included in the mapping units. The local alluvium phases are in sinkholes, on toe slopes, and around the head of intermittent drainageways. They formed from recent alluvium, in some places underlain by residuum weathered from limestone. In some places there is a little mottling at a depth of more than 30 inches.

The Huntington soils are highly fertile. The reaction is slightly acid to neutral. Tilth is good. Areas that are not flooded frequently are excellent for crops. Bluegrass does very well in pastures.

Huntington silt loam (Hn).—This soil is on the bottom lands, close to the streams. For most of the year it is more than 36 inches above the level of the streams, but it is subject to flooding.

Areas that are flooded only in winter and the early part of spring and those that are flooded infrequently and for only short periods are excellent for crops. They are suitable for intensive cultivation. High yields can be obtained if the supply of organic matter is maintained by plowing under cover crops and if adequate amounts of fertilizer are used. The following are examples of suitable rotations: a row crop, a cover crop, and a row crop; or, a row crop, a cover crop, a row crop, small grain, and hay. Channels caused by scouring should be planted to grass or trees. A winter cover crop will provide protection against floods in winter and early in spring.

Areas that are flooded so frequently that cultivation is impractical are excellent for pasture. Bluegrass does very well. Mowing is necessary to control weeds. Wild garlic is especially apt to be a nuisance. (Capability unit I–1; woodland group 2.)

Huntington silt loam, local alluvium, 0 to 3 percent slopes (HuA).—This soil generally occurs in depressions or nearly level spots below areas of Huntington silt loam, local alluvium, 3 to 8 percent slopes. It is not ordinarily subject to flooding. The profile is like the one described as typical of the series.

This soil is suitable for intensive cultivation. The following are examples of suitable rotations: a row crop, a cover crop, a row crop, a cover crop, a row crop, small grain, and hay; or, a row crop, a cover crop, and another row crop. High yields can be obtained if enough fertilizer is used and organic matter is supplied by plowing under the cover crops. In pastures, bluegrass does well. Control of weeds is necessary. (Capability unit I–1; woodland group 2.)

Huntington silt loam, local alluvium, 3 to 8 percent slopes (HuB).—This soil occurs on gentle toe slopes. The depth to bedrock is about 5 feet.

This soil should be farmed on the contour. Where possible, diversion terraces should be placed above it to intercept runoff. The slopes are generally too short for stripcropping. Excellent yields can be obtained if fertilizer is used liberally and either green manure or barnyard manure is incorporated. A 3-year rotation should include at least 1 year of hay. In pastures, bluegrass does well. (Capability unit IIe–1; woodland group 2.)

Lamington Series

This series consists of deep, nearly level, somewhat poorly drained to poorly drained soils on stream terraces. The surface layer is dark-brown silt loam, and the subsoil is mottled dark yellowish-brown to reddish-brown silty clay loam or clay loam. The parent material was old alluvium, most of which washed from uplands where the soils are underlain by red Triassic sandstone and shale.

The Lamington soils are near or adjacent to the Birdsboro and Raritan soils. The Birdsboro soils are much better drained, redder, and unmottled. The Raritan soils are better drained and are unmottled in the upper part of the subsoil.

The Lamington soils in York County are inextensive and are of little importance in agriculture. They occur principally on low terraces along Conewago Creek and its tributaries.

Typical profile of Lamington silt loam (0 to 3 percent slopes) in a pasture three-fourths of a mile west of Krall-town:

A_p 0 to 8 inches, dark-brown (7.5YR 4/2) fine silt loam; weak, fine, granular structure; very friable; pH 5.8; abrupt, wavy lower boundary; 6 to 9 inches thick.

A_3 8 to 10 inches, dark-brown (7.5YR 4/2) silt loam; common, fine, faint, brown (7.5YR 5/4) mottles; weak, fine,

granular structure; friable; clear, wavy lower boundary; 0 to 3 inches thick.

B_1 10 to 13 inches, dark yellowish-brown (10YR 4/4) silty clay loam; common, fine, faint and distinct, brown (10YR 5/3) and strong-brown (7.5YR 5/6) mottles; weak, thin and very thin, platy structure breaking to very fine, subangular blocky structure; thin, partial clay films on ped faces; friable; pH 5.2; clear, wavy lower boundary; 2 to 5 inches thick.

B_{21g} 13 to 18 inches, dark-brown (7.5YR 5/4 to 4/4) clay loam or coarse silty clay loam; many, medium, prominent, strong-brown (7.5YR 5/8), pinkish-gray (5YR 6/2), and gray (5YR 6/1) mottles; moderate, medium, platy structure breaking to very fine, angular blocky structure; thin, discontinuous clay films on ped faces; firm; pH 5.2; clear, wavy lower boundary; 4 to 6 inches thick.

B_{22g} 18 to 22 inches, reddish-brown (5YR 5/4) clay loam; common, medium and coarse, distinct, strong-brown (7.5YR 5/8), yellowish-red (5YR 5/8), and dark reddish-gray (5YR 4/2) mottles; weak, coarse, subangular blocky structure breaking to medium, subangular blocky and platy structure; thin, partial clay films; black iron and manganese coatings on ped faces; very firm; pH 5.0; clear, wavy lower boundary; 4 to 6 inches thick.

B_{3g} 22 to 34 inches +, reddish-brown (5YR 4/3) loam or clay loam; silty clay between peds; common, coarse, distinct, strong-brown (7.5YR 3/6) and brown (7.5YR-5/2) mottles; coarse, prismatic structure breaking to coarse, subangular blocky structure; very firm; pH 4.8; clear, wavy lower boundary.

The surface layer is dark brown to dark grayish brown, and the subsoil is mottled yellowish brown to mottled reddish brown. Mottling ordinarily begins at a depth of about 10 inches but may begin anywhere from the surface to a depth of about 15 inches. From 5 to 10 percent of the material in the upper layers is quartz and sandstone gravel, as is 15 to 25 percent of the material in the lower part of the subsoil.

The Lamington soils are moderately low in fertility and are strongly acid. Because of a slowly permeable subsoil, they have a high water table in winter and spring. Tilth is poor. The available moisture capacity is moderately high. In wet seasons some crops fail, even if the soils are artificially drained. Hay or pasture is the best use. Alfalfa and root crops are not suitable.

Lamington silt loam (La).—This soil occurs on low terraces, generally adjacent to the moderately well drained Raritan soils. The profile is like the one described as typical of the series. The depth to bedrock is more than 5 feet. Runoff is slow, and there is a seasonally high water table that persists till late in spring. The erosion hazard is slight.

This soil is fairly well suited to corn and spring-sown small grain, but these crops fail in seasons when rainfall is above normal. Most of the acreage is in pasture or hay or is idle. Even for pasture or hay, artificial drainage is needed. Open drains and, in a few places, tile are effective. Graded rows, graded strips, drainage terraces, and bedding all help to improve drainage. Pasture should be seeded to moisture-tolerant grasses and legumes. Lime is needed. Working this soil when it is wet, or permitting it to be grazed when wet, is likely to damage the soil structure. (Capability unit IIIw–2; woodland group 17.)

Lansdale Series

This series consists of shallow to moderately deep, nearly level to moderately steep, well-drained soils on uplands. The surface layer is dark-brown loam. The upper part of the subsoil is yellowish-brown loam, and the lower part is brownish-yellow to light-brown sandy clay loam or sandy loam. The parent material weathered from gray to brownish Triassic sandstone and shale. Gentle slopes predominate.

These soils are commonly near or adjacent to the Penn, Readington, and Lewisberry soils. They lack the reddish colors that are characteristic of the Penn soils. They are shallower to bedrock than the Readington soils and are unmottled in the lower part of the subsoil. They are redder, finer textured, and much shallower than the Lewisberry soils.

Typical profile of Lansdale loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field a mile west of Manchester:

A_p 0 to 8 inches, dark-brown (10YR 3/3) loam; weak, fine, granular structure; very friable; pH 5.8; clear, smooth lower boundary; 7 to 10 inches thick.

B_{21} 8 to 20 inches, yellowish-brown (10YR 5/8) loam; weak, medium, subangular blocky structure; friable; pH 5.4; clear, smooth lower boundary; 10 to 18 inches thick.

B_{22} 20 to 26 inches, brownish-yellow (10YR 6/6) sandy clay loam; moderate, medium, subangular blocky structure; friable; pH 5.4; gradual, wavy lower boundary; 6 to 12 inches thick.

C_1 26 to 32 inches, light-brown (7.5 YR 6/4) loam; about 25 percent weathered shale fragments; weak, coarse, subangular blocky structure; friable; pH 5.0; 5 to 10 inches thick.

D_r 32 inches +, yellowish-gray Triassic sandstone.

The surface layer is dark brown to very dark grayish brown, and the subsoil is yellowish brown to light brown. The texture of the subsoil ranges from sandy loam to sandy clay loam. In the channery loams, the surface layer is 20 to 35 percent channery fragments, by volume, and the subsoil 30 to 65 percent. The channery loam mapping units include small areas of channery sandy loam. In the northeastern part of the county there are some included areas of a gently sloping uneroded soil, 30 to 36 inches deep to the C horizon, that was derived from partly metamorphosed graywacke.

The Lansdale soils are strongly acid. They are permeable and have good tilth. The fertility is moderate to low. The available moisture capacity is moderate to low.

Lansdale loam, 0 to 3 percent slopes, moderately eroded (LdA2).—This soil is on broad divides. The profile is a little deeper than the one described as typical of the series. The depth to bedrock is generally about 36 inches. Runoff is slow, and permeability is fairly rapid. The erosion hazard is moderate to slight. Tilth is good, but droughtiness is a limitation.

This soil is suited to the crops commonly grown in the area. It is well suited to strawberries, raspberries, and other small fruit. The organic-matter content should be kept fairly high to prevent the leaching of mineral nutrients. Organic matter can be supplied by plowing down green-manure crops and crop residues, applying barnyard manure, and growing hay crops in the rotation. In large fields where the slope is more than 2 percent, contour strips and cropland terraces are needed to check erosion and to conserve moisture. The response to lime and fertilizer is good. Soil tests should be made to determine how much lime and fertilizer are needed. (Capability unit IIs–1; woodland group 1.)

Lansdale loam, 3 to 8 percent slopes, moderately eroded (LdB2).—This soil is on broad divides and gentle slopes. The profile is like the one described as typical of the series. Erosion has removed some of the original surface layer. In cultivated fields the plow layer now consists partly of the original subsoil.

This soil has good tilth and is easy to work. It can be tilled over a broad range of moisture content. The available moisture capacity is moderately low to low, and the fertility is generally low.

Fairly good yields of the commonly grown crops can be obtained under good management. Lime and fertilizer are needed, and organic matter should be added to combat the tendency toward droughtiness. Erosion can be controlled by means of contour strips, diversion terraces, and grassed waterways. In pastures, deep-rooted grasses and legumes will provide more forage than bluegrass. (Capability unit IIe–4; woodland group 1.)

Lansdale loam, 3 to 8 percent slopes, severely eroded (LdB3).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is only about 22 inches, and the plow layer is now largely subsoil. Shallow gullies are common, and there are some deep gullies.

The common crops of the area can be grown, but intensive management is needed to control erosion, increase fertility, and combat droughtiness. Contour strips, diversion terraces, and grassed waterways help to control erosion and to conserve moisture. Special practices are needed to stabilize some of the gullied areas. Organic matter can be supplied by plowing down green-manure crops and crop residues, applying barnyard manure, and including several years of hay in the crop rotation. Lime and fertilizer should be applied as indicated by soil tests. (Capability unit IIIe–4; woodland group 3.)

Lansdale loam, 8 to 15 percent slopes, severely eroded (LdC3).—The profile of this soil is similar to the profile described as typical of the series. Runoff is fairly rapid.

This soil needs the protection of long-term hay, pasture, or trees. A row crop should be grown no more often than once in 6 years, if at all. Controlling erosion, maintaining the organic-matter content, and preserving the fertility would be difficult under cultivation. Hayfields and pastures should be reseeded in alternate contour strips. Disking is better than plowing for the preparation of a seedbed. Lime and fertilizer are needed. Diversion terraces, with grassed waterways for outlets, help to control erosion on the long slopes. Gullied areas require special attention. Pastures should be seeded to deep-rooted grasses and legumes and should be protected from overgrazing. (Capability unit IVe–4; woodland group 7.)

Lansdale channery loam, 3 to 8 percent slopes, moderately eroded (LcB2).—This soil ordinarily occurs on wide slopes, but some of it is on narrow ridgetops. It is eroded to the extent that subsoil is plowed up and mixed with the remnants of the original surface layer. The profile is a little shallower than the profile described as typical of the series. The depth to bedrock is about 30 inches. There are platy fragments of sandstone, up to 6 inches long, in the surface layer and subsoil, but these interfere very little with farming operations. The topography is gently rolling. Included are some areas that have slopes of less than 3 percent.

This soil is easy to work and is permeable to water and roots, but it is acid, droughty, and low in fertility. Runoff is moderately slow, internal drainage is fairly rapid, and the available moisture capacity is moderately low.

The common crops of the area, including strawberries and raspberries, can be grown on this soil. Lime and fertilizer are needed. Organic matter can be supplied by plowing down green-manure crops and crop residues, applying barnyard manure, and growing hay crops. A 4-year rotation should include at least 2 years of hay. Contour strips, diversion terraces, and grassed waterways may be needed in some places to control erosion and conserve moisture. (Capability unit IIe–4; woodland group 1.)

Lansdale channery loam, 8 to 15 percent slopes, moderately eroded (LcC2).—The profile of this soil is a little shallower than that of Lansdale channery loam, 3 to 8 percent slopes, moderately eroded. The depth to bedrock is 20 to 24 inches. Included are some small areas that have a sandy loam surface layer and some that have slopes of less than 8 percent. Workability and tilth are good. Moisture is absorbed readily, but the available moisture capacity is moderately low. The hazard of further erosion is moderate.

In a season of normal rainfall, and if well managed, this soil will produce fairly good yields of the commonly grown crops and of strawberries and raspberries. Large amounts of fertilizer are required. Organic matter, which is needed to combat droughtiness, can be supplied by plowing down green-manure crops and crop residues, applying barnyard manure, and growing hay crops. A 5-year rotation should include at least 3 years of hay. Pastures should be seeded to deep-rooted grasses and legumes. Grazing should not be permitted until the plants are well established, and it should be controlled so as to prolong the life of the stand. (Capability unit IIIe–4; woodland group 5.)

Lansdale channery loam, 8 to 15 percent slopes, severely eroded (LcC3).—This soil is so severely eroded that it is no longer suitable for cultivation. It is droughty, acid, and low in fertility. Shallow gullies and a few deep ones have formed. There are platy fragments of sandstone, up to 6 inches long, on the surface and, in greater numbers, within the profile.

This soil needs the protection of permanent vegetation—hay, pasture, or trees. A row crop should be grown no more often than once in 6 years, if at all. Pastures and hayfields should be seeded to drought-resistant plants. Seeding and reseeding should be done in alternate contour strips. Disking is better than plowing for the preparation of a seedbed. On long slopes and above gullied areas, diversion terraces are needed to control runoff. Pastures should not be overgrazed. (Capability unit IVe–4; woodland group 7.)

Lansdale channery loam, 15 to 25 percent slopes, moderately eroded (LcD2).—The profile of this soil is a little shallower than that of Lansdale channery loam, 3 to 8 percent slopes, moderately eroded. The depth to bedrock is about 14 inches.

This soil should not be used for tilled crops. Slopes near the upper limit of the slope range are unsafe for the use of farm equipment, and yields are not very good, even under the best of management. Permanent vegetation—hay, pasture, or trees—should be maintained.

Drought-resistant hay and pasture plants should be seeded. Disking is better than plowing for the preparation of a seedbed. Diversion terraces may be beneficial on slopes near the lower limit of the slope range. Overgrazing should be prevented. (Capability unit IVe–4; woodland group 5.)

Lawrence Series

This series consists of somewhat poorly drained soils that occur on nearly level uplands and in slight depressions. The surface layer is very dark grayish-brown silt loam, and the upper part of the subsoil is light yellowish-brown silty clay loam. The lower part of the subsoil is mottled. The parent material was residuum and colluvium weathered from limestone and calcareous schist.

These soils are commonly near or adjacent to the Guthrie, Bedford, and Conestoga soils. The Guthrie soils are more poorly drained and are mottled to the surface. The Bedford soils are better drained and are unmottled in the upper part of the subsoil. The Conestoga soils are well drained and are unmottled throughout.

Typical profile of Lawrence silt loam (0 to 3 percent slopes) in an idle field half a mile west of Hanover:

- A_1 0 to 4 inches, very dark grayish-brown (10YR 3/3) silt loam; moderate, medium, granular structure; friable; pH 6.0; clear, smooth lower boundary; 3 to 6 inches thick.
- A_2 4 to 10 inches, dark yellowish-brown (10YR 4/4) silt loam; weak to moderate, fine, granular structure; friable; pH 5.8; clear, smooth lower boundary; 4 to 8 inches thick.
- B_1 10 to 15 inches, light yellowish-brown (10YR 6/4) silty clay loam; few, fine, faint, light brownish-gray (10YR 6/2) mottles; weak, medium, subangular blocky structure; pH 5.6; gradual, smooth lower boundary; 4 to 7 inches thick.
- B_{2g} 15 to 22 inches, light brownish-yellow (10YR 6/4) silty clay loam; common, fine and medium, faint, very pale brown (10YR 7/3) mottles; strong, fine and medium, angular blocky structure; few, soft, brown concretions of irregular shape; pH 5.6; abrupt, smooth lower boundary; 5 to 9 inches thick.
- B_{3g} 22 to 40 inches, silty clay loam; many, medium, distinct mottles of light yellowish brown (10YR 6/4), yellowish brown (10YR 5/6), and light gray (10YR 7/1); very firm; moderate, coarse, angular blocky structure; thin, continuous clay films on ped faces; slightly plastic when wet, compact in place, friable when crushed; pH 5.8; 15 to 25 inches thick.
- C 40 to 50 inches +, mottled brown and gray silty clay loam; firm in place; neutral to moderately alkaline in lower part.

The surface layer is very dark grayish brown to dark gray, and the subsoil is light brownish yellow to light gray. Mottling ordinarily begins at a depth of about 10 inches, but it may begin at any depth between 7 and 15 inches. The texture of the subsoil ranges from silty clay loam to silty clay. In depressions, the upper part of the profile developed from colluvium and the lower part from residuum.

The Lawrence soils are medium acid to strongly acid. Tilth is fair to poor. The subsoil is slowly permeable; consequently, the water table is high in winter and spring. The available moisture capacity is moderately high. Hay or pasture is the best use. Crops will fail in wet years, even if the soil is artificially drained.

Lawrence silt loam (Le).—The profile of this soil is like the one described as typical of the series. The depth to bedrock is generally more than 6 feet. Runoff is slow, and there is little or no erosion hazard. The water table tends to remain high till late in spring.

This soil is not productive, unless artificially drained. Even if it is drained, crop failures are likely in wet years. Open drains, with suitable outlets, are the most effective means of drainage. In a few places tile may be effective. Bedding, graded rows, graded strips, and drainage terraces are also beneficial.

Pasture or hay of moisture-tolerant grasses and legumes is the best use for this soil. No crop rotation more intensive than the following should ever be used: a row crop, a cover crop, a spring-sown small grain, and 2 years of hay. Working this soil, or permitting it to be grazed, when it is wet is likely to cause compaction and damage to the soil structure. (Capability unit IIIw–2; woodland group 16.)

Legore Series

This series consists of shallow to moderately deep, gently sloping to moderately steep, well-drained soils on uplands. The surface layer is dark-brown silt loam, and the subsoil is yellowish-red clay loam to sandy loam. The parent material weathered from diabase. Moderate slopes predominate.

These soils are generally near or adjacent to the Montalto, Mount Lucas, and Brecknock soils. They are shallower than the Montalto soils, less red, and coarser textured. They are shallower and better drained than the Mount Lucas soils, and they have a redder and unmottled subsoil. They are shallower and coarser textured than the Brecknock soils and have a redder subsoil.

Typical profile of Legore silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 1 mile south of Rossville:

- A_p 0 to 8 inches, dark-brown (7.5YR 4/4) gritty silt loam; moderate, very fine, granular structure; very friable; pH 6.2; abrupt, smooth lower boundary; 6 to 10 inches thick.
- B_1 8 to 12 inches, yellowish-red (5YR 4/6) silt loam; weak, fine, subangular blocky structure breaking to moderate, medium and fine, granular structure; pH 5.6; clear, wavy lower boundary; 3 to 6 inches thick.
- B_{21} 12 to 15 inches, yellowish-red (5YR 4/8) clay loam; moderate, medium, subangular blocky structure breaking to fine and very fine, subangular blocky structure; thin, partial clay films on ped faces; friable; pH 6.2; clear, wavy lower boundary; 3 to 7 inches thick.
- B_{22} 15 to 19 inches, yellowish-red (5YR 4/6) clay loam; moderate, coarse, subangular blocky structure; thin, partial clay films on ped faces; friable; pH 6.2; clear, smooth lower boundary; 2 to 6 inches thick.
- B_3 19 to 22 inches, yellowish-red (5YR 5/6), reddish-brown (5YR 4/3), and very dark gray (5YR 3/1) sandy loam; weak, very coarse to medium, platy structure breaking to medium, subangular blocky structure; firm in place; pH 6.5; clear, wavy lower boundary; 3 to 7 inches thick.
- C_1 22 to 26 inches, yellowish-red (5YR 5/6) and dark reddish-gray (5YR 4/2) sandy loam; weak, coarse, subangular blocky structure; firm in place; pH 6.5; gradual, wavy lower boundary; 3 to 7 inches thick.
- C_2 26 to 36 inches +, yellowish-red to dark reddish-gray and very dark gray to black, gritty, disintegrated, weathered diabase; firm in place; pH 6.5; 10 to 18 inches thick.

The surface layer is dark brown to dark brownish gray, and the subsoil is yellowish red to reddish brown. The texture of the subsoil ranges from clay loam to sandy loam. In uneroded soils, the B horizon ranges from a few inches to 16 inches in thickness. The C horizon may be 3 or 4

feet thick. Fragments of diabase are scattered through the profile.

The Legore soils are slightly acid to nearly neutral. They are permeable to very permeable. Tilth is good. In the severely eroded phases, the available moisture capacity is moderately low to low; in the other soils of the series, it is moderate.

Legore silt loam, 3 to 8 percent slopes, moderately eroded (LgB2).—This soil is on rather narrow ridgetops, next to areas of the more strongly sloping Legore soils. It has been eroded to the extent that the plow layer is now a mixture of the original surface layer and subsoil. It is somewhat droughty. The profile is like the one described as typical of the series.

This soil is used, in about equal proportions, for crops and pasture. It is fairly well suited to the common crops. Management requirements include controlling erosion, adding organic matter, and maintaining fertility. Contour farming, contour stripcropping, diversion terraces, and grassed waterways are needed. A 5-year rotation should include 3 years of hay. Pastures should be seeded to deep-rooted grasses and legumes and should be protected from overgrazing. (Capability unit IIIe-4; woodland group 20.)

Legore silt loam, 3 to 8 percent slopes, severely eroded (LgB3).—The profile of this soil is shallower than the profile described as typical of the series. The depth to the weathered parent material is about 15 inches. Most of the original surface layer has been lost through erosion, and patches of yellowish-red silt loam are exposed. Shallow gullies are common, and a few deep gullies have cut down to the parent material.

Most of this soil is in pasture or is idle. It erodes readily and has very severe limitations if cultivated. Hay or pasture is the best use. Reseeding should be done in contour strips, and a small grain should be seeded to protect the new grass until it is well established. Disking is better than plowing for the preparation of seedbeds. Diversion terraces and sodded waterways may be needed in some fields. Gullied areas should be smoothed, mulched, and seeded heavily to grasses and legumes. (Capability unit IVe–5; woodland group 20.)

Legore silt loam, 15 to 25 percent slopes, moderately eroded (LgD2).—The profile of this soil is shallower than the profile described as typical of the series. The depth to the parent material is about 10 inches. Shallow gullies are common. The present plow layer is a mixture of the original surface layer and subsoil.

This soil is droughty and has other very severe limitations that make it generally unsuitable for cultivation. Almost all of it is in pasture or brush. Pasture or woodland is the best use. Pastures should be seeded to deep-rooted grasses and legumes. Seeding should be done in alternate contour strips. Diversion terraces can be built on the gentler slopes and may be needed to help stabilize gullies. Careful regulation of grazing is necessary. Areas planted to trees should be protected from fire and grazing. White pine is a suitable species for this soil. (Capability unit VIe–3; woodland group 23.)

Legore clay loam, 8 to 15 percent slopes, severely eroded (LfC3).—Except for the texture of the surface layer, the profile of this soil is like the profile described as typical of the series. Most of the original surface layer has been removed by erosion, and patches of yellowish-red clay loam are exposed. Shallow gullies are common, and a few gullies have cut down to the parent material.

Most of this soil is in pasture or is idle. Hay or pasture is the best use. Reseeding should be done in contour strips, and a small grain should be grown to protect the soil until the new stand of grass is established. Disking is better than plowing for the preparation of a seedbed. Some fields need diversion terraces and grassed waterways. Gullied areas should be smoothed, mulched, heavily seeded, and fertilized. Pastures should not be grazed until late in spring, after the roots are well established. (Capability unit IVe–5; woodland group 25.)

Legore clay loam, 15 to 25 percent slopes, severely eroded (LfD3).—The profile of this soil is shallower than the profile described as typical of the series. The depth to the weathered parent material is about 10 inches. All of the original surface layer has been removed by erosion, and the present surface layer consists predominantly of yellowish-red clay loam. Shallow gullies are common, and a few deep gullies have cut down to the parent material.

Most of this soil is idle or in low-grade pasture. As pasture, it has severe limitations. The gullied areas have to be smoothed, mulched, fertilized, and heavily seeded to deep-rooted grasses and legumes. Diversion terraces to intercept runoff from higher areas would make it easier to establish pasture stands.

Woodland is a better use for this soil than pasture. White pine is a suitable species for reforesting. (Capability unit VIIe–1; woodland group 25.)

Legore clay loam, 25 to 35 percent slopes, severely eroded (LfE3).—The profile of this soil is shallower than the profile described as typical of the series. The depth to the weathered parent material is about 7 inches. All of the original surface layer has been lost through erosion, and the present surface layer is mostly yellowish-red clay loam. Shallow gullies are common, and a few deep gullies have cut down to the parent material.

This soil is mostly idle or in brushy pasture. Woodland is the best use for it. It is too steep to be mowed, and hand tools have to be used for seeding and for controlling brush. White pine is a suitable species for reforesting. (Capability unit VIIe–2; woodland group 29.)

Lehigh Series

This series consists of moderately deep, nearly level to strongly sloping, somewhat poorly drained to moderately well drained soils on uplands. The surface layer is grayish channery silt loam, and the subsoil is mottled olive-gray silt loam. The parent material weathered from baked gray sandstone and shale. Gentle slopes predominate.

These soils are commonly near or adjacent to the Penn, Brecknock, Montalto, and Croton soils. The Penn soils are better drained and have a reddish and unmottled subsoil. The Brecknock soils are shallower and have an unmottled subsoil. The Montalto soils have a brownish surface layer and a reddish subsoil. The Croton soils are poorly drained and are mottled in the lower part of the surface layer.

Typical profile of Lehigh channery silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 1 mile southwest of Wellsville:

A_p 0 to 8 inches, very dark grayish-brown (10YR 3/2) channery silt loam; weak, very fine, granular structure;

very friable when moist, nonsticky when wet; pH 5.5; abrupt, smooth lower boundary; 7 to 9 inches thick.

A_3 8 to 11 inches, olive-gray (5Y 5/2) silt loam; weak, fine, subangular blocky structure; thin, discontinuous clay films on peds; friable when moist, nonsticky when wet; pH 5.8; clear, wavy lower boundary; 2 to 4 inches thick.

B_{21g} 11 to 14 inches, olive-gray (5Y 5/2) silt loam; common, fine, faint, olive (5Y 5/4) and olive-gray (5Y 5/2) mottles; moderate, thin, platy and blocky structure; thin clay films on peds; friable when moist, nonsticky when wet; pH 5.4; clear, wavy lower boundary; 2 to 5 inches thick.

B_{22g} 14 to 28 inches, gray (5Y 5/1) fine silt loam; common, medium, faint, dark-gray (5Y 4/1) and olive (5Y 5/6) mottles; strong, medium, prismatic structure breaking to strong, medium to coarse, blocky structure; thick, continuous clay films on peds; firm when moist, slightly sticky when wet; pH 5.2; gradual, wavy lower boundary; 6 to 16 inches thick.

C_1 28 to 36 inches, dark olive-gray (5Y 3/2) gritty heavy silt loam; about 80 percent gray porcelanite fragments; moderate, medium, blocky structure in spaces between coarse fragments; firm when moist, nonsticky when wet; pH 5.2; gradual, irregular lower boundary, 7 to 12 inches thick.

D_r 36 inches +, porcelanite.

The surface layer is dark gray to very dark grayish brown, and the subsoil is gray to olive gray and mottled. The depth to mottling is ordinarily 18 to 26 inches but ranges from 11 to 30 inches. The bedrock ranges in color from light gray to nearly black. From 15 to 30 percent of the surface layer is channery fragments, and from 20 to 50 percent of the subsoil. A few small areas of loam are included in the channery silt loam mapping units.

The Lehigh soils are strongly acid and are moderately low in fertility. Tilth is fair to poor. The subsoil is slowly permeable; consequently, the water table is high in winter and spring. Except in the severely eroded phases, the available moisture capacity is moderately high. Some crop failures are likely in wet years.

Lehigh channery silt loam, 0 to 3 percent slopes (LhA).—Most of this soil is on broad ridges. The profile is deeper than that of Lehigh channery silt loam, 3 to 8 percent slopes, moderately eroded, and drainage is somewhat poorer. The depth to bedrock is about 42 inches. There is little or no erosion hazard. The principal limitation is a high water table during the early part of the growing season.

This soil is mostly in hay or pasture; some of it is cultivated, and some is idle. It is best suited to moisture-tolerant grasses and legumes. If drained, it is fairly well suited to corn and small grain. A row crop should not be grown more often than once in 4 years. Large amounts of lime and fertilizer are needed. Graded rows, graded strips, drainage terraces, and open drains with suitable outlets are effective means of drainage. Random tiling may be effective in seepage spots.

This soil remains wet until late in spring. It should not be worked when wet, and it should not be grazed until the surface is firm. (Capability unit IIIw–2; woodland group 15.)

Lehigh channery silt loam, 3 to 8 percent slopes (LhB).—Trees, mostly pin oak, beech, red maple, and hickory, cover most of this soil. Instead of an A_p horizon like that in the typical profile, there is a layer of black mull-like material, about 1 inch thick, over an 8-inch layer of olive-gray channery silt loam. The profile is a little deeper than the one described as typical of the series. The depth to bedrock is about 40 inches..

If this soil remains as woodland, it should be underplanted with white pine or other suitable species. If cleared and cultivated, it needs to be drained and protected from erosion. Graded rows, graded strips, drainage terraces, and grassed waterways would be needed to control runoff and check erosion. Random tiling may be effective for draining seepage spots. A row crop should be grown no more often than once in 4 years. (Capability unit IIIw–2; woodland group 11.)

Lehigh channery silt loam, 3 to 8 percent slopes, moderately eroded (LhB2).—This soil occurs on moderately broad ridgetops, generally above areas of the more strongly sloping Lehigh soils. The profile is like the one described as typical of the series.

This soil needs to be drained and protected from erosion. If it is worked or grazed when wet, the structure will break down. Graded rows, graded strips, drainage terraces, and grassed waterways will control runoff and check erosion. The crop rotation should be no more intensive than the following: corn, a cover crop, a spring-sown small grain, and 3 years of hay. In pastures, moisture-tolerant grasses and legumes should be seeded. Barnyard manure and green-manure crops are needed to supply organic matter. Lime and fertilizer should be applied according to the results of soil tests. If any areas are reforested, only moisture-tolerant species of trees should be planted. (Capability unit IIIw–2; woodland group 11.)

Lehigh channery silt loam, 3 to 8 percent slopes, severely eroded (LhB3).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is about 28 inches. Most of the original surface layer has been lost through erosion, and patches of olive-gray silt loam are exposed. A few gullies have formed, and some have cut down to bedrock. The available moisture capacity is moderately low.

Most of this soil is idle, in brush, or in low-grade pasture. It is poorly suited to row crops. Hay or pasture of moisture-tolerant grasses and legumes is the best use. Disking is better than plowing for the preparation of seedbeds. Large fields should be reseeded in graded strips. Large amounts of fertilizer are required. Diversion terraces are needed to intercept runoff from higher areas; gullied areas especially need this protection. Gullies should be smoothed and mulched. Pastures should not be grazed when wet, because the soil will compact and puddle. (Capability unit IVe–7; woodland group 11.)

Lehigh channery silt loam, 8 to 15 percent slopes (LhC).—Trees, chiefly pin oak, red maple, and hickory, cover most of this soil. Instead of an A_p horizon like the one in the typical profile, there is a layer of black mull-like material, about 1 inch thick, over a 6-inch layer of olive-gray channery silt loam. The profile is a little deeper than the one described as typical of the series.

If this soil remains as woodland, it should be protected from grazing and fire and should be underplanted with white pine or other suitable species. If cleared and cultivated, it should be kept in moisture-tolerant grasses and legumes 2 years out of 4. Conservation practices would be necessary, and large amounts of lime and fertilizer would be needed. (Capability unit IIIe–6; woodland group 13.)

Lehigh channery silt loam, 8 to 15 percent slopes, moderately eroded (LhC2).—This soil occurs on fairly long hillsides, generally below areas of the gently sloping Lehigh soils. The profile is deeper than the one described as typical of the series. The depth to bedrock is about 30 inches. A few shallow gullies have formed.

This soil is mostly in hay or pasture, but some areas are cultivated. It is not suited to intensive use. A row crop should be grown no more often than once in 4 years. Hayfields should be seeded to moisture-tolerant grasses and legumes. Large amounts of lime and fertilizer are necessary. When hayfields are reseeded, a small grain should be grown to protect the new grass until it is well established. Diversion terraces may be helpful if suitable outlets are available. Careful control of grazing is necessary because the soil will puddle and compact if grazed when wet. (Capability unit IIIe–6; woodland group 13.)

Lehigh channery silt loam, 8 to 15 percent slopes, severely eroded (LhC3).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is about 20 inches. Most of the original surface layer has been lost through erosion, and the present surface layer is mostly olive-gray silt loam. Gullies are common, and a few have cut down to bedrock. The available moisture capacity is low.

Most of this soil is idle, in brush, or in low-grade pasture. It should be cultivated only for the purpose of reseeding moisture-tolerant grasses and legumes for hay or pasture. Reseeding should be done in contour strips. Large amounts of lime and fertilizer are required to establish and maintain good pasture stands. Grazing when the soil is wet is harmful; so is overgrazing. Diversion terraces may be needed on long slopes and above gullied areas. Gullies should be smoothed and mulched. Any areas that are reforested should be protected from grazing. (Capability unit IVe–7; woodland group 14.)

Lehigh channery silt loam, 15 to 25 percent slopes, moderately eroded (LhD2).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is about 18 inches. A few shallow gullies have formed. The present surface layer is a mixture of subsoil and the remnants of the original surface layer. The available moisture capacity is moderately low.

Most of this soil is in pasture or brush or is idle. It is best suited to hay or pasture and should be cultivated only for the purpose of reseeding moisture-tolerant grasses and legumes for hay or pasture. If suitable outlets are available, diversion terraces to intercept runoff from higher areas will help to get pasture stands established. Large amounts of lime and fertilizer are required. Careful control of grazing is important. Grazing when the soil is wet is harmful. Areas not used for pasture can be reforested. White pine, Austrian pine, and larch are suitable species of trees. (Capability unit IVe–7; woodland group 13.)

Lehigh channery silt loam, 15 to 25 percent slopes, severely eroded (LhE3).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is about 12 inches. Erosion has removed all of the original surface layer, and the present surface layer is mostly olive-gray to gray silt loam or fine silt loam. Gullies are common, and a few have cut down to the bedrock. The available moisture capacity is low.

Most of this soil is idle or in brush; some of it is in low-grade pasture. It is suited to woodland and wildlife. It can be used for pasture but has severe limitations. Erosion is a serious hazard, and seepage spots remain wet until late in spring. Large amounts of lime and fertilizer are required to establish and maintain pasture stands. Seeding and mulching are necessary to control gullies. Wherever possible, diversion terraces should be constructed to control runoff from higher areas. Grazing should be restricted until pasture plants are 8 to 10 inches high. Areas not used for pasture can be planted to white pine or Austrian pine or to vegetation that will provide food and cover for wildlife. Reforested areas need protection from grazing. (Capability unit VIe–4; woodland group 14.)

Lehigh very stony silt loam, 0 to 8 percent slopes (LlB).—Porcelanite fragments more than 10 inches across cover from 3 to 15 percent of the surface of this soil, and there are fragments throughout the profile. Between the fragments, the surface is covered with twigs, leaves, and bark, which overlie a thick mat of leaf mold. Beneath the leaf mold is a layer of black, granular silt loam that is 1 to 3 inches thick. This is underlain by olive-gray very stony silt loam that has weak, fine, platy structure and extends to a depth of 8 inches. Below this, the profile is similar to the one described as typical of the series, except that it is very stony.

Most of this soil is wooded, and it should remain so unless its use for pasture is absolutely necessary. It is too stony to be cultivated, but areas in which light machinery can be used will provide fair pasture. Removing some of the stones will help. Disking is the best way to prepare seedbeds. Only moisture-tolerant grasses and legumes are suitable. Large amounts of lime and fertilizer are needed.

If this soil is left in woodland, it should be managed so as to encourage the native pin oak, red maple, and Virginia pine. White pine, larch, and Norway spruce are suitable for underplanting. (Capability unit VIs–2; woodland group 11.)

Lehigh very stony silt loam, 8 to 25 percent slopes (LlD).—Porcelanite fragments more than 10 inches across cover from 3 to 15 percent of the surface of this soil, and there are fragments throughout the profile. Between the fragments the surface is covered with about an inch of black mull-like material, under which is a layer of olive-gray very stony silt loam.

Most of this soil is wooded and should remain so. It is too stony to be cultivated, and mowing would be difficult. If it were cleared and used for pasture, very intensive conservation practices would be required. Woodland management requirements include protection from grazing, selective cutting, and underplanting with trees of suitable species. (Capability unit VIs–2; woodland group 13.)

Lewisberry Series

This series consists of deep, well-drained, gently sloping to steep soils on uplands. The surface layer is dark reddish-brown sandy loam, and the subsoil is reddish-brown to weak-red sandy clay loam. The parent material weathered from Triassic quartz conglomerate and sandstone. Moderate slopes predominate.

These soils are commonly near or adjacent to the Penn and Athol soils. They are deeper and coarser textured than the Penn soils, and they are coarser textured and more acid than the Athol soils.

Typical profile of Lewisberry sandy loam, 8 to 15 percent slopes, in a wooded area one-eighth of a mile northeast of Mount Zion Elementary School:

- A_{00} 1½ inches to ½ inch, oak, beech, and pine leaf litter; 0 to 3 inches thick.
- A_0 ½ inch to 0, dark reddish-brown (5YR 3/2), partly decomposed leaf litter; pH 4.6; clear, wavy lower boundary; 0 to 1 inch thick.
- A_1 0 to 2 inches, dark reddish-brown (5YR 3/2) sandy loam; weak, fine, granular structure; loose when dry, friable when moist; pH 4.6; clear, wavy lower boundary; 1 to 3 inches thick.
- A_{21} 2 to 6 inches, dark reddish-brown (5YR 3/4) sandy loam; weak, very fine, granular structure; loose when dry, friable when moist; pH 4.8; clear, irregular lower boundary; 2 to 8 inches thick.
- A_{22} 6 to 12 inches, reddish-brown (5YR 5/3) heavy sandy loam; very weak, very fine, platy structure and fine, subangular blocky structure; friable; pH 4.8; clear, irregular lower boundary; 2 to 8 inches thick.
- B_1 12 to 20 inches, reddish-brown (5YR 5/4) sandy clay loam; very weak, subangular blocky structure; thin, discontinuous clay films on peds; friable; pH 4.8; clear, irregular lower boundary; 5 to 11 inches thick.
- B_{21} 20 to 24 inches, reddish-brown (2.5YR 4/4) sandy clay loam; weak, fine to medium, blocky and subangular blocky structure; thin, discontinuous clay films; a few tongues of A_{22} and B_1 material; firm; pH 5.0; clear, wavy lower boundary; 3 to 5 inches thick.
- B_{22} 24 to 31 inches, weak-red (10R 4/3) sandy clay loam; more clay than B_{21} horizon; weak, fine to medium, blocky structure; thin, discontinuous clay films; firm; pH 5.0; gradual, wavy lower boundary; 5 to 9 inches thick.
- B_3 31 to 39 inches, weak-red (10R 4/3) sandy clay loam; weak, subangular blocky structure; some iron and manganese coatings on peds; firm; pH 5.0; clear, irregular lower boundary; 4 to 13 inches thick.
- C 39 to 45 inches, weak-red stony sandy clay loam; about 80 percent coarse rock fragments; structure determined by rock fragments; pH 5.0.
- D_r 45 inches +, Triassic sandstone and quartz conglomerate.

Both the surface layer and the subsoil range from dark reddish brown to dusky red. The subsoil is sandy loam to sandy clay loam. In texture, the B horizon is not clearly differentiated from the A horizon. About 5 percent of the surface layer consists of quartzite and sandstone gravel, and from 10 to 25 percent of the subsoil consists of gravel. Included in the sandy loam mapping units are a few small areas of gravelly sandy loam.

The Lewisberry soils are strongly acid and are low in fertility. Tilth is good, and permeability is rapid or moderately rapid. The available moisture capacity is low.

Lewisberry sandy loam, 3 to 8 percent slopes (LmB).—This soil occurs on ridgetops of irregular shape. The profile is deeper than the one described as typical of the series. The depth to bedrock is about 50 inches. Included are a few areas that have slopes of less than 3 percent.

Most of this soil is wooded. Woodland management requirements include protection from fire and grazing, selective cutting, and underplanting with desirable species. If cleared and cropped, this soil would require intensive conservation practices, particularly practices that help to maintain the organic-matter content. (Capability unit IIs–2; woodland group 1.)

Lewisberry sandy loam, 3 to 8 percent slopes, moderately eroded (LmB2).—This soil occurs on rather narrow ridgetops of irregular shape. The profile is deeper than the one described as typical of the series, and the A_{00} and A_0 horizons of leaf litter are lacking. The depth to bedrock is about 50 inches. Included are a few small areas of slightly eroded and severely eroded soil.

About half of this soil is cultivated, and the rest is idle or is being used as pasture or woodland. The principal management problem is to maintain the supply of organic matter. Green-manure crops and crop residues should be utilized. A 5-year rotation should include 3 years of deep-rooted grasses and legumes for hay. Split applications of lime and fertilizer are better than a single heavy application, because the soil is readily leached. Contour farming is advisable, and also, where practical, contour strips, diversion terraces, and grassed waterways. (Capability unit IIs–2; woodland group 3.)

Lewisberry sandy loam, 8 to 15 percent slopes (LmC).—The profile of this soil is like the profile described as typical of the series. The topography is rolling. Trees, mostly oak, pine, and beech, cover most of the acreage.

If cleared, this soil could not be used intensively. It would need organic matter, which could be supplied by plowing down cover crops and crop residues, and should be protected against erosion by contour strips, diversion terraces, and grassed waterways. (Capability unit IIIe–3; woodland group 5.)

Lewisberry sandy loam, 8 to 15 percent slopes, moderately eroded (LmC2).—The profile of this soil is a little shallower than the profile described as typical of the series, and the A_{00} and A_0 horizons of leaf litter are lacking. The topography is rolling. The reddish-brown plow layer is a mixture of subsoil and the remnants of the original surface layer. A few shallow gullies have formed. Included are a few small areas of slightly eroded and severely eroded soil.

This soil can be farmed but is suitable only for rotations of low intensity. It requires lime, organic matter, and large amounts of fertilizer. Cover crops and crop residues will supply the necessary organic matter. Split applications of fertilizer are advisable because plant nutrients leach out rapidly. Contour strips, diversion terraces, and grassed waterways may be needed. A considerable acreage is idle or brushy. (Capability unit IIIe–3; woodland group 7.)

Lewisberry sandy loam, 15 to 25 percent slopes, moderately eroded (LmD2).—The profile of this soil is shallower than the one described as typical of the series, and the A_{00} and A_0 horizons of leaf litter are lacking. The depth to bedrock is about 40 inches. The topography is hilly. A few shallow gullies have formed. The plow layer is reddish brown.

This soil is mostly idle or in pasture. It is suited to long-term hay or pasture. Cultivated crops should be grown only when it is necessary to reestablish hay or pasture stands. Reseeding should be done in alternate contour strips. Diversion terraces may be needed on the gentler slopes. Smoothing, mulching, heavy seeding, and heavy liming and fertilizing are required to stabilize gullies. Alfalfa and other deep-rooted grasses and legumes do well if enough lime and fertilizer are used. Bluegrass does only fairly well and needs very careful management.

Sodded orchards can be established where the slope is not too steep. Orchard trees should be planted on the contour. (Capability unit IVe–2; woodland group 5.)

Lewisberry sandy loam, 25 to 45 percent slopes, moderately eroded (LmE2).—The profile of this soil is shallower than the profile described as typical of the series, and it lacks the A_{00} and A_0 horizons of leaf litter. The depth to bedrock is about 30 inches. A few shallow gullies have formed. Included are a few areas of slightly eroded and severely eroded Lewisberry soils.

Most of this soil was clear cut of timber, became low-grade pasture, and is now in brush or second-growth timber or is idle. It is too steep to be cultivated. If it is used for pasture, hand tools would be needed for seeding and for removing brush. The best use for this soil is to plant it to trees of suitable species or to allow it to revert to the natural vegetation. It is a good wildlife habitat. (Capability unit VIIe–1; woodland group 26.)

Lewisberry and Lansdale very stony loams, 8 to 25 percent slopes (LnD).—The two soils in this undifferentiated unit are similar and are associated geographically. They could not be separated on a map of the scale used in this report. Stones more than 10 inches in diameter cover from 3 to 15 percent of the surface, and there are stones throughout the profile.

This unit is all wooded, and it should remain so unless its use for agriculture is absolutely necessary. It is too stony to be cultivated, but areas where light machinery can be used are fair for pasture and orchard. Woodland management practices include selective cutting, removing cull trees, and underplanting with trees of desirable species. (Capability unit VIs–1; woodland group 5.)

Lewisberry and Lansdale very stony sandy loams, 26 to 60 percent slopes (LrF).—The two soils in this undifferentiated unit are similar and are associated geographically. They could not be separated on a map of the scale used in this report. Stones more than 10 inches in diameter cover from 3 to 15 percent of the surface, and there are stones throughout the profile.

The soils in this unit are too steep and too stony for cultivated crops or pasture. The entire acreage is wooded and should remain so. It is an excellent wildlife habitat. Woodland management requirements include selective cutting and underplanting with trees of desirable species. (Capability unit VIIs–1; woodland group 9.)

Lindside Series

This series consists of deep, moderately well drained, nearly level soils on flood plains. The surface layer is dark-brown silt loam, the upper part of the subsoil is brown to dark yellowish-brown silt loam, and the lower part of the subsoil is mottled brown silty clay loam. The parent material was recent alluvium washed mainly from Hagerstown soils, Duffield soils, and other soils underlain by limestone or calciferous schist.

These soils are commonly near or adjacent to the Melvin and Huntington soils. The Melvin soils are less well drained and are mottled to the surface. The Huntington soils are better drained and unmottled.

Typical profile of Lindside silt loam in a cultivated field 1 mile east of Hellam Station:

A_p 0 to 10 inches, dark-brown (10YR 3/3) silt loam; weak, fine, granular structure; friable; pH 6.0; clear, smooth lower boundary; 8 to 12 inches thick.

C_1 10 to 24 inches, brown (10YR 4/3) to dark yellowish-brown (10YR 4/4) silt loam; weak, fine, granular structure; friable; pH 5.8; gradual, smooth lower boundary; 12 to 16 inches thick.

C_2 24 to 40 inches +, yellowish-brown (10YR 4/4) silty clay loam; many, fine and medium, distinct mottles of light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6); weak, fine, subangular blocky structure; firm when moist, slightly sticky and slightly plastic when wet; pH 6.0; 15 to 40 inches thick.

The surface layer is brown to dark grayish brown. The depth to mottling ranges from 12 to 30 inches but is ordinarily about 24 inches. In a few places the lower part of the subsoil is silty clay. Some areas have a thin covering of recently deposited local alluvium.

The Lindside soils are medium acid to slightly acid. They have fair to good tilth and are highly fertile. If drained, they are productive.

Lindside silt loam (Ls).—Where the depth to the normal level of the stream is 36 inches or more, this soil is somewhat removed from the streambank. Where the depth to the normal level of the stream is less than 36 inches, this soil may extend to the streambank.

Areas that are flooded only in winter or in the early part of spring and those that are flooded infrequently and for short periods are good for crops if adequately drained. An example of a suitable rotation for drained areas is the following: corn, a cover crop, a spring-sown small grain, and hay. Tile and open ditches are effective means of drainage where suitable outlets are available and floods are infrequent. Well-managed pastures on this soil have a high carrying capacity. Since the moisture supply is ample, bluegrass grows well until midsummer. Livestock should be kept out of the pastures until the ground is firm. (Capability unit IIw–1; woodland group 12.)

Made Land

These miscellaneous land types consist of areas in which, in the course of urban or industrial development, soils have been so altered by moving or covering that their normal soil characteristics have been destroyed.

Made land, Duffield and Conestoga materials (Ma).—This miscellaneous land type is a mixture of light yellowish-brown to brown silt loam that was formerly surface soil and yellowish-brown silt or silty clay that was formerly subsoil. Workability is good, and grass and trees can be established without much trouble if lime, fertilizer, and mulch are used. (Woodland group 2.)

Made land, Penn and Lansdale materials, gently sloping (MdB).—This land type is a mixture of reddish-brown or dark-brown silt loam that was formerly surface soil and reddish to light-brown silt loam or silty clay loam that was formerly subsoil. Where the original surface layer was saved for topsoil, establishing vegetation is not difficult if lime and fertilizer are used. Areas that consist mostly of the original subsoil are gravelly, droughty, and erodible. Establishing vegetation on such areas requires heavy seeding, the addition of organic matter, and the use of lime and fertilizer. (Woodland group 1.)

Made land, Penn and Lansdale materials, strongly sloping (MdD).—This land type is a mixture of reddish-brown or dark-brown silt loam that was originally surface soil and reddish to light-brown silt loam or silty clay loam that was originally subsoil. These areas are droughty. The original subsoil was gravelly, and where it is exposed it is difficult to protect from rill erosion and gullying. To establish and maintain vegetation, heavy seeding is necessary and lime and fertilizer are required. (Woodland group 5.)

Made land, Wheeling and Sciotoville materials (Me).—This land type is a mixture of brown silt loam that was formerly surface soil and yellowish-brown to brownish-yellow silt loam and yellowish-red silty clay that was formerly subsoil. Where the original subsoil of the Sciotoville soil is exposed, establishing and maintaining vegetation is difficult. (Woodland group 1.)

Manor Series

This series consists of shallow, well-drained to excessively drained, gently sloping to steep soils on uplands. The surface layer is brown to dark-brown channery silt loam, and the subsoil is yellowish-brown channery silty clay loam. The parent material weathered from schist and phyllite. Moderately steep slopes predominate.

These soils are generally near or adjacent to the Glenelg, Elioak, and Chester soils. They are shallower than the Glenelg soils and less fine textured in the subsoil. They are much shallower than the Elioak and Chester soils, less fine textured in the subsoil, and more channery throughout. They are much shallower and much better drained than the Glenville and Worsham soils, which are colluvial soils that occur downslope from the Manor soils in a few places.

Typical profile of Manor channery loam, 8 to 15 percent slopes, moderately eroded, in a cultivated field 2 miles north of Delta:

- A_p 0 to 10 inches, brown to dark-brown (10YR 4/3) channery silt loam; weak, medium, granular structure; friable; pH 6.2; abrupt, irregular lower boundary; 7 to 11 inches thick.
- B_2 10 to 17 inches, yellowish-brown (10YR 5/4) channery silty clay loam; weak to moderate, fine, subangular blocky structure; thin, discontinuous clay films; friable; pH 6.4; clear, irregular lower boundary; 5 to 8 inches thick.
- C_1 17 to 23 inches, yellowish-brown (10YR 5/4) very channery micaceous silt loam; structureless; thin, discontinuous clay films on schist fragments; friable; pH 6.4; 4 to 7 inches thick.
- D_r 23 inches +, slightly weathered, dark-colored micaceous schist.

The surface layer is very dark grayish brown to brown, and the subsoil is yellowish brown to olive brown. The texture of the subsoil ranges from silt loam to silty clay loam. The mica content is higher where the parent material was derived from schist than where it was derived from phyllite. Channery fragments make up 20 to 60 percent of the surface soil and 30 to 80 percent of the subsoil. Quartz fragments are scattered on the surface and throughout the profile.

The Manor soils are moderately fertile and strongly acid. They are permeable and have good tilth. In the severely eroded soils, the available moisture capacity is low. In the rest of the soils of the series, it is moderate to moderately low.

Manor channery loam, 3 to 8 percent slopes (MfB).—Trees, mostly oaks, cover most of this soil. Instead of a plow layer like that in the typical profile, there is a 1½-inch layer of black mull-like material underlain by about 10 inches of predominantly dark grayish-brown channery loam. The profile is deeper than the one described as typical of the series. The depth to the weathered parent material is about 26 inches.

If cleared and cultivated, this soil needs careful management that will maintain the organic-matter content and preserve the soil structure. A 4-year rotation should include at least 2 years of hay. Woodland management requirements include selective cutting, protection from fire and grazing, and underplanting. (Capability unit IIIe–4; woodland group 19.)

Manor channery loam, 3 to 8 percent slopes, moderately eroded (MfB2).—This soil is eroded to the extent that the present plow layer is a mixture of the original surface layer and subsoil. The profile is deeper than the one described as typical of the series. The depth to the weathered parent material is about 22 inches.

This soil has good tilth, but it tends to be droughty. The available moisture capacity is moderately low. Maintaining the organic-matter content and conserving moisture are major management requirements. Barnyard manure and green manure should be used, lime and fertilizer should be applied according to the results of soil tests, and crops should be grown in a suitable rotation. A row crop should be grown no more often than once in 4 years. The shorter slopes should be farmed on the contour. The longer slopes need contour strips, grassed waterways, and, if outlets are available, diversion terraces.

Pastures should be seeded to deep-rooted grasses and legumes, and grazing should be carefully controlled. (Capability unit IIIe–4; woodland group 19.)

Manor channery loam, 3 to 8 percent slopes, severely eroded (MfB3).—This soil is eroded to the extent that most of the original surface layer has been lost and patches of subsoil are exposed. It is more channery and more droughty than Manor channery loam, 8 to 15 percent slopes, moderately eroded, and the profile is shallower. The depth to the weathered parent material is only about 14 inches. Gullies are common, and a few have cut down to the parent material. The available moisture capacity is moderately low.

All of this soil has been cultivated, but a large part of it is now in pasture. Hay or pasture is the best use. A row crop should not be grown more than once in 5 years. Increasing and maintaining the organic-matter content are major management requirements. Growing green-manure crops, applying barnyard manure, liming, fertilizing, and rotating crops will help to do this. Short slopes should be farmed on the contour. Longer slopes need contour strips, diversion terraces, and grassed waterways. Pastures should be seeded to deep-rooted grasses and legumes. They should be protected from overgrazing and should not be used until late in spring, after the plant roots are well established. (Capability unit IVe–4; woodland group 21.)

Manor channery loam, 8 to 15 percent slopes (MfC).—Trees, mostly oaks, cover most of this soil. Instead of a plow layer like that in the typical profile, there is about an inch of dark-colored mull-like material over a dark grayish-brown layer. The profile is a little deeper than the one described as typical of the series. The depth to the weathered parent material is about 20 inches.

If cleared, this soil would need careful management that would maintain fertility and preserve soil structure. It could be used for hay or pasture. A row crop should not be grown more than once in 5 years. Woodland management requirements include selective cutting, culling, and underplanting. (Capability unit IVe–4; woodland group 22.)

Manor channery loam, 8 to 15 percent slopes, moderately eroded (MfC2).—This is an extensive soil that

occurs on hillsides. The profile is like the one described as typical of the series.

This soil is well suited to hay or pasture. Increasing the organic-matter content and conserving moisture are important management requirements. Growing green-manure crops, utilizing crop residues, and including hay crops in the rotation will help to do this. A row crop should be grown no more often than once in 5 years. Erosion can be controlled by contour farming, contour stripcropping, diversion terraces, and grassed waterways. Deep-rooted tall grasses and legumes are suitable for pastures. Grazing should be delayed until late in spring, so that plant roots can become well established. (Capability unit IVe–4; woodland group 22.)

Manor channery loam, 8 to 15 percent slopes, severely eroded (MfC3).—This soil is eroded to the extent that most of the original surface layer has been lost and patches of subsoil are exposed. It is more droughty and more channery than Manor channery loam, 8 to 15 percent slopes, moderately eroded, and the profile is shallower. The depth to the weathered parent material is 7 to 12 inches. Gullies are common, and a few have cut into the parent material. The available moisture capacity is moderately low.

This soil has all been cultivated, but much of it is now in pasture. It is fairly well suited to pasture of deep-rooted grasses and legumes, and it can be used for orchard. Increasing the organic-matter content and conserving moisture are the major management requirements. Special practices may be needed to control gullying. Orchard trees should be planted on the contour. Lining the trees up and down the hill will improve air drainage and reduce the likelihood of frost damage. (Capability unit VIe–3; woodland group 24.)

Manor channery loam, 15 to 25 percent slopes (MfD).—All of this soil is wooded. Instead of a plow layer like the one in the typical profile, there is about an inch of mull-like material over a dark brownish-gray layer about 5 inches thick. The profile is a little deeper than the one described as typical of the series.

If cleared, this soil would be best suited to hay or pasture. A row crop should not be grown more than once in 5 years. Woodland management requirements include selective cutting, culling, and protection from fire and grazing. (Capability unit VIe–3; woodland group 22.)

Manor channery loam, 15 to 25 percent slopes, moderately eroded (MfD2).—The profile of this soil is shallower than the profile described as typical of the series. The depth to the weathered parent material is about 13 inches. A few shallow gullies have formed.

This soil is mostly in pasture. Some areas are in hay or in cultivated crops or are idle. Pasture or orchard is the best use. Maintaining the fertility and increasing the organic-matter content are important management requirements. Orchard trees should be planted on the contour and lined up and down the slope to facilitate air drainage. Pastures should be seeded to deep-rooted grasses and legumes and protected from overgrazing. (Capability unit VIe–3; woodland group 22.)

Manor channery loam, 15 to 25 percent slopes, severely eroded (MfD3).—This soil is so severely eroded that practically all of the original surface layer is gone. The present surface layer consists mostly of yellowish-brown channery silty clay loam but includes patches of micaceous silt loam. This soil is much more droughty than Manor channery loam, 8 to 15 percent slopes, moderately eroded, and the profile is shallower. The depth to the weathered parent material is about 9 inches. Gullies are common, and a few have cut into the parent material. The available moisture capacity is low.

This soil is mostly idle or in low-grade pasture. It can be used for woodland or for pasture. As pasture, it has very severe limitations. Smoothing, mulching, heavy seeding, liming, and fertilizing are generally necessary to stabilize gullies. Diversion channels with suitable outlets are needed to intercept runoff from higher areas. Disking, in such a way as to leave a sod mulch, is the best way to prepare seedbeds. Drought-resistant grasses and legumes should be used, and grazing should be carefully controlled. If trees are planted, drought-resistant species should be selected. Measures to control gullies may be needed and also, in some places, diversion terraces. (Capability unit VIIe–1; woodland group 24.)

Manor channery loam, 25 to 45 percent slopes (MfE).—All of this soil is wooded. Instead of a plow layer like that in the typical profile, there is about an inch of black mull-like material underlain by a 9-inch layer of predominantly light yellowish-brown channery loam. The profile is shallower than the one described as typical of the series. The depth to the weathered parent material is about 13 inches.

This soil is too steep to be cultivated and has such severe limitations that its use as pasture is not practical. Machinery could not be used, and all seeding and brush control would have to be done by hand. Woodland management requirements include protection from fire and grazing, selective cutting, and underplanting. Excellent wildlife habitats could be developed. (Capability unit VIIe–1; woodland group 26.)

Manor channery loam, 25 to 45 percent slopes, moderately eroded (MfE2).—The profile of this soil is shallower than the profile described as typical of the series. The depth to the weathered parent material is only about 9 inches. Most of the original surface layer has been lost, and the present surface layer consists predominantly of yellowish-brown channery silt loam. Shallow gullies have formed. The available moisture capacity is low.

Most of this soil was clear cut of timber and was then used as pasture. Now most of it is idle, in brush, or in second-growth hardwoods. It is unsuitable for crops or pasture. Only hand tools could be used. Diversion terraces above areas where trees are planted are advisable, if suitable outlets are available. Drought-resistant species should be selected for reforesting, and plants that provide food and cover for wildlife should be included in forest plantings. (Capability unit VIIe–2; woodland group 26.)

Manor channery loam, 25 to 45 percent slopes, severely eroded (MfE3).—This soil is so severely eroded that all of the original surface layer has been lost. The present surface layer consists of very channery micaceous silt loam and patches of yellowish-brown channery silty clay loam. The profile is shallower than the one described as typical of the series. The depth to the weathered parent material is only about 4 inches. Gullies that have cut into the parent material are common. The available moisture capacity is very low.

This soil is unsuitable for crops or pasture, and most of it is now idle. If trees are planted, diversion terraces to intercept runoff from higher areas are generally necessary. Mulching and smoothing also help seedlings to get established. Only drought-resistant species are suitable. Plants that provide food and cover for wildlife should be included. No grazing should be permitted. (Capability unit VIIe–2; woodland group 28.)

Manor channery loam, 45 to 60 percent slopes (MfF).—All of this soil is wooded. Instead of a plow layer like that in the typical profile, there is a half-inch layer of black mull-like material underlain by 4 inches of light yellowish-brown channery loam. The profile is shallower than the profile described as typical of the series. The depth to the weathered parent material is about 9 inches.

This soil is too steep for crops or pasture, and it should remain as woodland. Management requirements include protection from fire and grazing, selective cutting, and underplanting. Logging trails should be on the contour. Unless protected, the trails are likely to become gullies. (Capability unit VIIe-2; woodland group 26.)

Manor very stony loam, 0 to 8 percent slopes (MgB).—Stones cover from 3 to 15 percent of the surface of this soil, and there are stones throughout the profile. The profile is shallower than the one described as typical of the series. The depth to bedrock is 8 to 15 inches.

Most of this soil was clear cut of timber and became low-grade pasture. Now it is in brush or second-growth hardwoods or is idle. It is too steep to be cultivated but can be used to a limited extent as pasture. However, it is shallow and droughty, and yields of bluegrass are very low. If it is not needed for pasture, it can be cleared of brush and undesirable hardwoods and reforested with suitable conifers. (Capability unit VIs–3; woodland group 19.)

Manor very stony loam, 8 to 25 percent slopes, moderately eroded (MgD2).—Stones cover 3 to 15 percent of the surface of this soil, and there are stones throughout the profile.

Most of this soil was clear cut of timber and became low-grade pasture. Now it is mostly in brush or second-growth hardwoods or is idle. It can be used to a limited extent as pasture, but it is difficult to mow because of the stones on the surface. Removing the loose stones would make it easier to use machinery. Any areas not needed for pasture should be reforested with conifers. Good wildlife habitats could be developed. (Capability unit VIs–3; woodland group 22.)

Manor very stony loam, 25 to 75 percent slopes, moderately eroded (MgF2).—Stones more than 10 inches in diameter cover from 3 to 15 percent of the surface of this soil. The profile is shallower than the one described as typical of the series. The depth to bedrock is 6 to 12 inches.

Most of this soil was clear cut of timber, became low-grade pasture, and is now in second-growth hardwoods, mostly oaks. It is too steep and stony to be cultivated and has such severe limitations that using it as pasture is not practical. Mowing it is impossible. It should be allowed to revert to natural vegetation or, where possible, should be underplanted with desirable conifers. Woodland management requirements include protection from fire and grazing, culling, and selective cutting. (Capability unit VIIs–1; woodland group 26.)

Melvin Series

This series consists of deep, poorly drained soils on flood plains. The surface layer is grayish-brown to dark grayish-brown, slightly mottled silt loam, and the subsoil is olive-gray to gray, mottled silty clay loam.

These soils are commonly near or adjacent to the Huntington and Lindside soils. Both the Huntington and the Lindside soils are better drained than the Melvin soils. The Lindside soils are free of mottling in the surface soil, and the Huntington soils are unmottled throughout.

Typical profile of Melvin silt loam in a pasture 1 mile northeast of Kreutz Creek:

A_p 0 to 10 inches, grayish-brown (10YR 5/2) to dark grayish-brown (10YR 4/2) silt loam; few, fine, distinct mottles of gray (5YR 5/1); moderate, medium, granular structure; friable; pH 6.0; abrupt, smooth lower boundary; 8 to 11 inches thick.

C_{g1} 10 to 36 inches, olive-gray (5Y 4/2) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) and gray (5YR 5/1) mottles; weak, fine, subangular blocky structure; friable when moist, slightly plastic when wet; pH 5.6; gradual, wavy lower boundary; 15 to 30 inches thick.

C_{g2} 36 to 48 inches +, dominantly gray to light-gray (N 6/0) fine silty clay loam; many, medium, distinct, yellowish-red (5YR 4/6) and strong-brown (7.5YR 5/8) mottles; weak, fine, subangular blocky structure to structureless; firm when moist, sticky and slightly plastic when wet; pH 5.6; 10 to 30 inches thick.

The surface layer is dark grayish brown to brownish gray, and the subsoil is olive gray to gray. Mottling ordinarily begins at a depth of about 7 inches, but it may begin anywhere between the surface and a depth of 12 inches. In places the lower part of the subsoil is silty clay. A thin layer of recently deposited local alluvium covers the surface in some areas.

The Melvin soils are medium acid to slightly acid. They are moderately high in fertility and fair to poor in tilth. Unless artificially drained, they have a high water table during much of the growing season. They can be drained successfully if the depth of the stream channels is adequate and suitable outlets are available. Flooding is the principal hazard.

Melvin silt loam (Mm).—Where the depth to the normal level of the stream is 25 inches or more, this soil is somewhat removed from the streambank. Where the depth to the normal level of the stream is less than 25 inches, this soil may extend to the streambank. All areas are subject to flooding. Included are a few small areas of local alluvial soils in upland depressions.

Drainage is the principal management problem. Deepening and straightening the stream channels lowers the water table and reduces the risk of floods. Open drains are effective where there are suitable outlets. In a few places, tiling is beneficial. Areas that are adequately drained and not likely to be flooded during the growing season are fairly well suited to late-planted corn and small grain. A suitable rotation consists of corn, a cover crop, a spring-sown small grain, and 2 years of hay. Pastures should not be grazed when wet. (Capability unit IIIw–1; woodland group 18.)

Montalto Series

This series consists of deep, well-drained, gently sloping to very steep soils on uplands. The surface layer is dark reddish-brown channery silt loam, and the subsoil is yellowish-red to red silty clay loam. The parent material weathered from diabase. Moderately steep slopes predominate.

These soils are near or adjacent to the Legore, Mount Lucas, and Watchung soils. They have a much thicker solum than the Legore soils and are more red throughout. They are better drained than the Mount Lucas soils, which are yellowish instead of reddish and are mottled in the lower part of the subsoil. They are better drained than the Watchung soils, which are grayish and mottled.

Typical profile of Montalto channery silt loam, 3 to 8 percent slopes, moderately eroded, in an idle field 2 miles east of Dillsburg:

- A_p 0 to 8 inches, dark reddish-brown (5YR 3/4) channery silt loam; weak, fine, granular structure; friable; pH 6.0; abrupt, smooth lower boundary; 7 to 10 inches thick.
- A_2 8 to 12 inches, yellowish-red (5YR 4/8) channery silt loam; weak, fine, subangular blocky structure; friable; pH 6.0; gradual, smooth lower boundary; 3 to 6 inches thick.
- B_1 12 to 17 inches, red (2.5YR 4/6) channery silty clay loam; moderate, medium, subangular blocky structure; friable when moist, slightly sticky when wet; pH 5.8; gradual, wavy lower boundary; 4 to 8 inches thick.
- B_{21} 17 to 28 inches, red (2.5YR 4/6) channery silty clay loam; moderate to strong, medium, blocky structure; distinct, discontinuous clay films on ped faces; firm in place, sticky and slightly plastic when wet; pH 5.8; clear, smooth lower boundary; 8 to 14 inches thick.
- B_{22} 28 to 40 inches, red (2.5YR 4/6) channery clay loam; moderate, fine, blocky structure; distinct, continuous clay films and a few black coatings on ped faces; friable when moist, slightly sticky when wet; pH 5.6; clear, smooth lower boundary; 8 to 16 inches thick.
- B_3 40 to 46 inches, yellowish-red (5YR 5/6) channery clay loam; weak, moderate, blocky structure; 10 to 20 percent gritty remnants of weathered diabase; friable when moist, slightly sticky when wet; pH 5.8; gradual, smooth lower boundary; 4 to 8 inches thick.
- C_1 46 to 53 inches, yellowish-red (5YR 5/6) gritty channery sandy clay loam splotched with dark red (2.5YR 3/6); structureless; friable when moist, slightly plastic when wet; about 20 percent hard diabase fragments 5 to 10 inches in diameter; pH 6.0; 5 to 9 inches thick.
- D 53 inches +, unweathered diabase.

The surface layer is dark reddish brown to dark brown, and the subsoil is yellowish red to red. The B horizon ranges from clay loam to silty clay loam, and the C horizon, from gritty silt loam to gritty sandy clay loam. In the channery phases, from 15 to 30 percent of the surface soil consists of channery fragments, and from 20 to 50 percent of the subsoil. On the surface and in the profile are a few boulders 3 to 8 feet in diameter. Included in the very stony mapping units are a few small areas of stony soil.

The Montalto soils are slightly acid to nearly neutral. They are moderately high to high in natural fertility. They are permeable and have fair to good tilth. The available moisture capacity is moderate in the severely eroded soils and moderately high to high in the other soils of this series.

Montalto channery silt loam 3 to 8 percent slopes, moderately eroded (MnB2).—This soil occurs on rather low, moderately broad, gently sloping ridgetops. The profile is like the one described as typical of the series.

This soil is suitable for all crops commonly grown in the county except potatoes and other root crops. Good to excellent yields can be obtained under management that includes the use of fertilizer, the control of erosion, the incorporation of either barnyard manure or green manure, and the use of a crop rotation that provides at least 1 year of hay every 3 years. Contour farming, stripcropping, cropland terraces, diversion terraces, and grassed waterways are needed to control erosion and to conserve moisture. Pastures of tall grasses and legumes are productive if well managed. Red clover and alfalfa-grass mixtures do well as hay crops. (Capability unit IIe–1; woodland group 2.)

Montalto channery silt loam, 8 to 15 percent slopes, moderately eroded (MnC2).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is about 45 inches. Included are a few small areas of slightly eroded soil of the same slope range.

Most of this soil is in cultivation. The rotation should not include more than one row crop every 4 years. The organic-matter content should be maintained by growing cover crops, applying barnyard manure, and turning under crop residues. Fertilizer and lime should be applied according to the results of soil tests. Contour strips, diversion terraces, and sodded waterways are needed to control erosion. Red clover and alfalfa-grass mixtures do well as hay crops. In pastures, bluegrass and legumes do well through the spring and fall but become dormant during the hot summer months. (Capability unit IIIe–1; woodland group 6.)

Montalto channery silt loam, 15 to 25 percent slopes, moderately eroded (MnD2).—This soil is eroded to the extent that the present surface layer is a mixture of the original surface soil and subsoil. The profile is shallower than the one described as typical of the series. The depth to the parent material is about 35 inches. A few shallow gullies have formed. Included are a few areas that are only slightly eroded.

This soil is best suited to hay or pasture. Nearly all of it is now used for pasture. A row crop should not be grown more than once in 5 years, and then only as part of a stripcropping rotation. On long slopes, reseeding should be done in alternate contour strips. Diversion terraces should be constructed where possible, and all waterways should be sodded. Deep-rooted grasses and legumes provide more pasturage than bluegrass. (Capability unit IVe–1; woodland group 6.)

Montalto channery silty clay loam, 8 to 15 percent slopes, severely eroded (MoC3).—The profile of this soil is shallower than the profile described as typical of the series. The depth to the parent rock is about 30 inches. Erosion has removed the original surface layer, and the present surface layer consists of red or yellowish-red channery silty clay loam. Shallow gullies are common, and a few deep gullies have cut down to the bedrock. The available moisture capacity is moderately low.

This soil is mostly idle or in scrub pasture. Its best use is pasture, hay, or woodland. If it is used for hay or pasture, diversion terraces are needed above the most

severely eroded areas to intercept runoff. Gullied areas need to be smoothed, mulched, seeded heavily to deep-rooted grasses and legumes, and treated with twice the amount of fertilizer normally required. Reseeding should be done in alternate contour strips. A row crop should be grown no more than once in 5 years, and then as part of a contour strip rotation. (Capability unit IVe–1; woodland group 8.)

Montalto extremely stony silt loam, 8 to 25 percent slopes (MsD).—Boulders that average more than 3 feet in diameter cover 15 to 90 percent of the surface of this soil, and there are stones throughout the profile. Between the stones on the surface there is about 2 inches of mull-like material over about 3 inches of dark reddish-brown silt loam that in turn is underlain by about 8 inches of reddish-brown silt loam. From the A_2 horizon down, the profile is like the one described as typical of the series, except for being extremely stony.

Woodland, wildlife, or recreation is the best use for this soil. It is now all in woodland, mostly of poplar and oak. Woodland management requirements include selective cutting, culling of undesirable trees, and protection from fire and grazing. Any use of machinery is impractical. (Capability unit VIIs–1; woodland group 6.)

Montalto extremely stony silt loam, 25 to 60 percent slopes (MsF).—Rounded boulders that average more than 3 feet in diameter cover 15 to 90 percent of the surface of this soil, and there are stones throughout the profile. Between the surface stones there is about 1 inch of mull-like organic material over about 2 inches of dark reddish-brown silt loam that in turn is underlain by about 6 inches of reddish-brown silt loam. From the A_2 horizon down, the profile is like the one described as typical of the series, except for being extremely stony.

This soil is not suitable for crops or pasture. Woodland, wildlife, or recreation is its best use. It is now all in woodland. Woodland management requirements include selective cutting, underplanting, and protection from fire and grazing. (Capability unit VIIs–1; woodland group 10.)

Montalto very stony silt loam, 3 to 8 percent slopes (MtB).—Rounded diabase boulders cover 3 to 15 percent of the surface of this soil. Between the stones, in wooded areas, there is about 2 inches of black mull-like material. Under this there is about 4 inches of dark reddish-brown silt loam, and this in turn is underlain by about 9 inches of reddish-brown silt loam. From the A_2 horizon down, the profile is like the one described as typical of the series.

This soil is mostly wooded. It is not suitable for cultivation, but areas where light machinery can be used make fair pasture if disked and seeded to deep-rooted grasses and legumes. Woodland management requirements include selective cutting, culling of undesirable trees, and protection from fire and grazing. (Capability unit VIs–1; woodland group 2.)

Montalto very stony silt loam, 8 to 25 percent slopes (MtD).—Rounded diabase boulders that average 3 feet in diameter cover 3 to 15 percent of the surface of this soil. Between the stones there is about 1 inch of black mull-like material over about 3 inches of dark reddish-brown silt loam that in turn is underlain by about 8 inches of reddish-brown silt loam. The profile is shallower than the one described as typical of the series. The depth to bedrock is ordinarily about 35 inches.

Most of this soil is wooded, and woodland is its best use. It is too stony to be cultivated, and it has very severe limitations if used for pasture or orchard. Orchards should be sodded, and the trees should be set on the contour. Pastures should be disked, if light machinery can be used, and then seeded. Woodland management requirements include protection from fire and grazing, culling of undesirable trees, and underplanting. (Capability unit VIs–1; woodland group 6.)

Montalto very stony silt loam, 25 to 60 percent slopes (MtF).—Rounded diabase boulders that average 3 feet in diameter cover 3 to 15 percent of the surface of this soil, and there are stones throughout the profile. Between the surface stones there is about 1 inch of mull-like material underlain by about 6 inches of reddish-brown silt loam. From the A_2 layer down, the profile is like the one described as typical of the series, except that the depth to bedrock is only about 20 inches.

This soil is not suitable for cultivated crops or pasture. Woodland, wildlife, or recreation is the best use for it. It is now all in woodland. Management requirements include protection from fire and grazing, selective cutting, and underplanting. (Capability unit VIIs–1; woodland group 10.)

Mount Lucas Series

This series consists of deep, moderately well drained, nearly level to gently sloping soils on uplands. The surface soil is dark yellowish-brown silt loam; the upper part of the subsoil is yellowish-brown silt loam; and the lower part of the subsoil is dark-brown to brown, mottled silty clay loam. The parent material was residuum or colluvium weathered from diabase. Gentle slopes predominate.

These soils are generally near or adjacent to the Montalto, Watchung, and Lehigh soils. The Montalto soils are better drained than the Mount Lucas and have a red and unmottled subsoil. The Watchung soils are less well drained and are mottled in the upper part of the subsoil.

Typical profile of Mount Lucas silt loam, 0 to 3 percent slopes, in a cultivated field 1 mile east of Wellsville:

- A_p 0 to 10 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine, granular structure; very friable; pH 6.0; clear, smooth lower boundary; 7 to 11 inches thick.
- B_1 10 to 15 inches, yellowish-brown (10YR 5/6) silt loam; weak, fine, subangular blocky structure; friable; pH 5.4; gradual, smooth lower boundary; 4 to 7 inches thick.
- B_2 15 to 20 inches, yellowish-brown (10YR 5/4) silt loam; few, fine, faint, light brownish-gray (10YR 6/2) mottles; moderate, medium, subangular blocky structure; friable; pH 5.4; gradual, wavy lower boundary; 4 to 7 inches thick.
- B_{2g} 20 to 26 inches, brown to dark-brown (7.5YR 4/4) silty clay loam; common, medium, distinct, light-gray (10YR 7/2) and strong-brown (7.5YR 5/8) mottles; moderate, medium, subangular blocky structure; discontinuous clay films on ped faces; firm when moist, slightly sticky and plastic when wet; pH 5.4; gradual, wavy lower boundary; 4 to 8 inches thick.
- B_{3g} 26 to 36 inches, brown (7.5YR 5/4) silty clay loam; common, medium, distinct, pale-brown (10YR 6/3) mottles; moderate, medium, blocky structure; discontinuous clay films on ped faces; slightly sticky and slightly plastic when wet; pH 5.6; gradual, wavy lower boundary; 8 to 12 inches thick.
- C_1 36 to 45 inches, brown to dark grayish-brown gritty silt

loam; weak, coarse, blocky structure; pH 5.6; 7 to 12 inches thick.
D_r 45 inches +, diabase rock.

The surface layer is dark yellowish brown to dark grayish brown, and the upper part of the subsoil is yellowish brown to brownish yellow. The depth to mottling is ordinarily between 18 and 26 inches but ranges from 15 to 30 inches. The subsoil ranges in texture from silt loam to silty clay loam. Some areas of these soils are in depressions on the uplands. In these places, the upper part of the profile formed from colluvium and the lower part from residuum.

The Mount Lucas soils are medium acid. The fertility is moderately high, and tilth is fair to good. The lower part of the subsoil is slowly permeable, and the water table is seasonally high; consequently, the soils of this series cannot be worked until late in spring and are not suited to potatoes or other root crops.

Mount Lucas silt loam, 0 to 3 percent slopes (MuA).—This soil occurs on the uplands and in depressions on the uplands. It is commonly adjacent to more strongly sloping soils of the Mount Lucas and Lehigh series. The profile is like the one described as typical of the series. Runoff is slow. There is little or no erosion hazard. Because of impeded drainage in the lower part of the subsoil, the water table is high in winter and spring. There are a few areas in which a foot or more of recent alluvium has been deposited over the original surface layer.

Most of this soil is used as pasture. Some is cultivated. Drainage is the principal management problem. On slopes near the upper limit of the slope range, drainage can be provided by means of graded rows, graded strips, and drainage terraces. Bedding and open drains are feasible in some places. Tile are not generally effective, but they work fairly well in the areas that are covered with local alluvium.

This soil should not be worked or grazed when wet. It cannot be worked until rather late in spring. Only moisture-tolerant plants are suitable. An example of a suitable rotation is the following: a row crop, a small grain, and 2 years of hay. In pastures, bluegrass grows well in spring and fall but not during the hot summer. (Capability unit IIw–3; woodland group 16.)

Mount Lucas silt loam, 3 to 8 percent slopes (MuB).—This soil occurs at the head of drainageways, below areas of Montalto soils and above areas of the nearly level Mount Lucas soil. Slopes of little more than 3 percent predominate. There has been little erosion. Because of impeded drainage in the lower part of the subsoil, the water table is high in winter and in the early part of spring.

Most of this soil is used as pasture. Small areas are used for hay or crops. Erosion control and water control are the principal management requirements. Where there are suitable outlets, diversion terraces just above this soil will help to control surface water. Graded rows, graded strips, and drainage terraces may be needed. Corn, spring-sown grain, and moisture-tolerant hay and pasture plants grow fairly well. Alfalfa will grow fairly well for about 3 years. Potatoes are not suitable. The rotation should be no more intensive than the following: corn, a cover crop, a spring-sown small grain, and 2 years of hay. Ladino clover and a moisture-tolerant grass make a good pasture mixture. If worked, grazed, or driven over when wet, this soil will puddle and the structure will break down. (Capability unit IIe–6: woodland group 12.)

Mount Lucas silt loam, 3 to 8 percent slopes, moderately eroded (MuB2).—Runoff from higher and more strongly sloping adjoining soils has caused this soil to erode. A few shallow gullies have formed. Impeded drainage in the lower part of the subsoil results in a high water table in winter and in the early part of spring. Seepage spots may appear when the water table is high. Slopes of 8 percent or nearly 8 percent predominate.

Most of this soil is used as pasture. Erosion control and water control are the principal management requirements. Diversion terraces are needed to intercept runoff from the adjoining slopes. Outlets should be located before terraces are constructed. Graded rows, graded strips, and drainage terraces may be needed. Corn, spring-sown grain, and moisture-tolerant hay and pasture plants do fairly well, but alfalfa does not, and neither do potatoes. The rotation should be no more intensive than the following: corn, a cover crop, a spring-sown small grain, and 2 years of hay. Ladino clover and a moisture-tolerant grass make a good pasture mixture. Pastures should not be grazed till the ground is firm. (Capability unit IIe–6; woodland group 12.)

Mount Lucas very stony silt loam, 0 to 8 percent slopes (MvB).—Rounded boulders of diabase that average 3 feet in diameter cover 3 to 15 percent of the surface of this soil. Between the boulders, in wooded areas, is a 2-inch layer of black mull-like material over about 3 inches of very dark grayish-brown silt loam that in turn is underlain by about 8 inches of very dark yellowish-brown silt loam. From the B_1 horizon down, the profile is like the one described as typical of the series, except for being stony.

Most of this soil is wooded, and it should be left as woodland. As pasture, it would have very limited use, because the stones would make seeding and mowing difficult. Woodland management requirements include selective cutting, protection from fire and grazing, and underplanting. Moisture-tolerant species should be selected for planting, because the water table is seasonally high. Among the native species that do well are pin oak, poplar, and black oak. (Capability unit VIs–2; woodland group 12.)

Murrill Series

This series consists of deep, well-drained, nearly level to moderately steep soils. The surface layer is dark-brown gravelly loam, and the subsoil is yellowish-brown to yellowish-red silty clay loam. The parent material was colluvium derived from acid soils and deposited over limestone. Gentle slopes predominate.

These soils are commonly near or adjacent to the Edgemont, Manor, and Bedford soils. They are less acid than the Edgemont soils and have a redder and finer textured subsoil. They are deeper to bedrock than the Manor soils, are less acid, and ordinarily have a redder subsoil. They are better drained and less acid than the Bedford soils and have a redder and unmottled subsoil.

Typical profile of Murrill gravelly loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field:

A_p 0 to 10 inches, dark-brown (7.5YR 3/2) gravelly loam; weak, fine, granular structure; very friable; pH 6.2; abrupt, smooth lower boundary; 8 to 12 inches thick.

B_1 10 to 18 inches, yellowish-brown (10YR 5/6) gravelly loam; weak, medium, subangular blocky structure; friable; pH 5.8; clear, smooth lower boundary; 6 to 9 inches thick.

B_2 18 to 28 inches, reddish-yellow (5YR 6/8) gravelly silty clay loam; moderate, fine, subangular blocky structure; firm; pH 5.6; gradual, smooth lower boundary; 8 to 12 inches thick.

B_3 28 to 40 inches, yellowish-red (5YR 5/4) gravelly silty clay loam; moderate, medium, subangular blocky structure; faint, discontinuous clay films on ped faces; firm; pH 5.8; gradual, smooth lower boundary; 10 to 14 inches thick.

C 40 to 72 inches +, yellowish-red (5YR 4/6) gravelly silty clay loam; moderate, medium, subangular blocky structure; distinct, continuous clay films on ped faces; firm when moist, slightly sticky and slightly plastic when wet; pH 6.0; 20 to 50 inches thick.

The surface layer is dark brown to dark reddish brown, and the subsoil is yellowish brown to yellowish red. From 20 to 40 percent of the surface layer and from 30 to 60 percent of the subsoil are gravel.

In the vicinity of Moulstown, there are some inclusions of a soil that has less clearly differentiated horizons. The surface layer is dark reddish brown, and the subsoil is dark brown to dark reddish brown. The A horizon is less leached than in the typical Murrill soils, and there is less difference in texture between the A horizon and the B horizon.

The Murrill soils are medium acid to slightly acid and are highly fertile. They are permeable and have good tilth. The available moisture capacity is high. All the Murrill soils except the very stony phases are well suited to all crops commonly grown in the county.

Murrill gravelly loam, 0 to 3 percent slopes (MwA).—This soil occurs as small areas near areas of the gently sloping Murrill soils. The profile is deeper than the one described as typical of the series. The depth to bedrock is generally more than 8 feet. There is little or no erosion hazard.

This soil is well suited to all the crops commonly grown in the county. Most of it is now in cultivation. Excellent yields can be obtained, and only simple management practices are required. Examples of suitable rotations are the following: a row crop, small grain, and hay; or, a row crop, a cover crop, spring-sown oats, and hay. Slopes near the upper limit of the slope range should be farmed on the contour. Cover crops, barnyard manure, and crop residues help to conserve moisture and to maintain the organic-matter content. Pastures of bluegrass are good in spring and fall, but bluegrass becomes dormant in summer. (Capability unit I–2; woodland group 2.)

Murrill gravelly loam, 3 to 8 percent slopes (MwB).—The profile of this soil is a little deeper to bedrock than the profile described as typical of the series. Slopes of little more than 3 percent predominate. Some areas have a karst topography.

This soil is suited to all the crops commonly grown in the county. Almost all of it is used as cropland. Excellent yields can be obtained if management includes proper rotations, control of erosion, the use of cover crops, and the application of lime and fertilizer according to the results of soil tests. A 3-year rotation should include a year of hay. Alfalfa and red clover make a good hay mixture. The shorter slopes should be farmed on the contour. The longer slopes need contour strips, cropland terraces, diversion terraces, and grassed waterways, all of which are used to control erosion and to conserve moisture. For areas that have a karst topography, the only feasible conservation practice is to lengthen the rotation. A rotation that includes a row crop only once in 4 years is suitable. (Capability unit IIe–1; woodland group 2.)

Murrill gravelly loam, 3 to 8 percent slopes, moderately eroded (MwB2).—This soil is on foot slopes. The profile is like the one described as typical of the series. Some areas have a karst topography.

This soil is suited to all the crops commonly grown in the county. High yields can be obtained under a management system that includes proper rotation of crops, control of erosion, and the use of cover crops and barnyard manure. A 3-year rotation should include at least 1 year of hay. Alfalfa and red clover make a suitable hay mixture. In most areas erosion can be controlled and moisture conserved by means of contour farming, cropland terraces, diversion terraces, and grassed waterways. For the areas that have a karst topography, the only feasible practice is to lengthen the rotation. A 4-year rotation that includes only one row crop is suitable. Tall grasses and legumes do well in pastures. Lime and fertilizer should be applied according to the results of soil tests. (Capability unit IIe–1; woodland group 2.)

Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded (MwC2).—This soil generally occurs as part of a fairly long slope, just below areas of steeper soils that formed from residuum. The profile is shallower than the one described as typical of the series. The depth to bedrock is generally more than 7 feet. Some areas have a karst topography.

This soil is suited to all the crops commonly grown in the county. Most of it is in crops, but small areas are used as pasture. Good yields can be obtained under a management system that includes suitable rotations, control of erosion, and liming and fertilizing according to the results of soil tests. A row crop should be grown no more than once in a 4-year rotation. For hay, red clover or an alfalfa-grass mixture is suitable. Contour farming, stripcropping, diversion terraces, and grassed waterways are not feasible for areas that have a karst topography. These areas can be protected by a longer crop rotation in which hay is grown 3 years out of 5. Pastures of bluegrass are good in spring and fall, but bluegrass becomes dormant during the hot summer. Tall grasses and legumes provide more forage than bluegrass. (Capability unit IIIe–1; woodland group 6.)

Murrill gravelly loam, 8 to 15 percent slopes, severely eroded (MwC3).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is generally more than 5 feet. Most of the original surface layer has been lost through erosion, and patches of yellowish-brown or yellowish-red silty clay loam have been exposed. Shallow gullies are fairly common, and there are a few deep gullies. The available moisture capacity is moderate.

This soil is used, in about equal proportions, for crops, hay, and pasture. Pasture or long-term hay is the best use. A row crop should be grown no more often than once in 5 years. Pastures and hayfields should be reseeded in alternate contour strips. A row crop can be grown for 1 year, then a small grain for 1 year, before hay or pasture plants are reseeded. Diversion terraces are

needed to protect the longer slopes. Where necessary, gullies should be stabilized by smoothing, mulching, heavy seeding, and fertilization. (Capability unit IVe-1; woodland group 8.)

Murrill very stony loam, 0 to 8 percent slopes (MxB).—Rounded stones 10 inches or more in diameter cover 3 to 15 percent of the surface of this soil. Between the stones is a layer of black mull-like material about 1 inch thick. Under this is a 3-inch layer of light brownish-gray silt loam that in turn is underlain by about 8 inches of pale-brown silt loam. From the B_1 horizon down, the profile is like the one described as typical of the series.

Most of this soil is wooded, and it is best left as woodland. It is too stony to be cultivated. Areas where light machinery can be used are fair for pasture and good for orchard. Seedbeds should be disked, if possible. Orchard trees should be planted in contour rows and lined up and down the slope to facilitate air drainage. Woodland management requirements include protection from fire and grazing and underplanting with trees of desirable species. (Capability unit VIs–1; woodland group 2.)

Murrill very stony loam, 8 to 25 percent slopes (MxD).—Stones more than 10 inches in diameter cover 3 to 15 percent of the surface of this soil, and there are stones throughout the profile. Between the surface stones is a layer of black mull-like material about half an inch thick. Under this is a 2-inch layer of light brownish-gray silt loam that in turn is underlain by a 6-inch layer of pale-brown silt loam. From the B_1 horizon down, the profile is like the one described as typical of the series.

This soil is almost entirely wooded, and it should be left as woodland unless its use for agriculture is absolutely necessary. It is too stony to be cultivated, and it would be difficult to mow. Areas where light machinery can be used are fair for orchards. The trees should be planted in contour rows. Woodland management requirements include protection from fire and grazing and underplanting with trees of desirable species. (Capability unit VIs–1; woodland group 6.)

Penn Series

This series consists of shallow to moderately deep, well-drained, nearly level to very steep soils on uplands. The surface layer is dark reddish-brown silt loam or loam, and the subsoil is reddish-brown to dusky-red silt loam, silty clay loam, or sandy clay loam. The parent material weathered from red Triassic sandstone and shale. Gentle and moderate slopes predominate.

These soils are commonly near or adjacent to the Lansdale, Readington, and Lewisberry soils. They are much redder throughout than the Lansdale soils. They are shallower and better drained than the Readington soils, and they are not mottled in the subsoil. They are finer textured and shallower than the Lewisberry soils.

Typical profile of Penn silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated field 1¼ miles southwest of Dover:

- A_p 0 to 9 inches, dark reddish-brown (5YR 3/3) silt loam; weak, fine, granular structure; friable; pH 7.8; clear, wavy lower boundary; 8 to 10 inches thick.
- B_1 9 to 14 inches, reddish-brown (2.5YR 4/4) silt loam; weak, subangular blocky structure; some platiness near top of horizon; some tongues of lighter colored, more silty A_2 horizon material; also some thin, discontinuous clay films on peds; friable; pH 6.4; clear, wavy lower boundary; 3 to 7 inches thick.
- B_{21} 14 to 20 inches, dusky-red (10R 3/4) heavy silt loam; moderate, fine to medium, subangular blocky structure; thin, continuous clay films on peds; many fragments of weathered siltstone; firm; pH 4.7; gradual, wavy lower boundary; 5 to 8 inches thick.
- B_{22} 20 to 23 inches, dusky-red (10R 3/4) heavy silt loam; weak, medium, platy structure breaking to moderate, fine, blocky structure; prominent clay films on peds; firm; pH 4.7; clear, wavy lower boundary; 2 to 5 inches thick.
- C_1 23 to 26 inches, dusky-red (10R 3/4) shaly silt loam; weak, subangular blocky structure showing some platiness; thin, discontinuous clay films on peds and shale fragments; firm; pH 4.9; gradual, wavy lower boundary; 2 to 6 inches thick.
- C_2 26 to 30 inches, dusky-red (10R 3/4) weathered shale; weak, medium, platy structure to weak, fine, blocky structure; thin, discontinuous clay films; firm; pH 5.0; 3 to 7 inches thick.
- D_r 30 inches +, Triassic red shale.

The surface layer is dark reddish brown to dark reddish gray, and the subsoil is reddish brown to dusky red.

The loam mapping units include some areas of moderately sloping, severely eroded terrace soils that have a thin mantle of terrace material over the Penn soil material. Included with the silt loams are a few small areas that appear to have a mantle of loess; in these areas the uneroded soil is about 42 inches deep over bedrock. Also included in the silt loams are a few small areas of channery silt loam.

The Penn soils are strongly acid and moderately fertile. Tilth ranges from good to poor, depending on the soil type and the severity of erosion. The available moisture capacity ranges from moderate, for the less severely eroded silt loams, to low, for the severely eroded shaly silt loams.

Penn silt loam, 0 to 3 percent slopes, moderately eroded (PgA2).—The profile of this soil is a little deeper than the profile described as typical of the series, even though as much as three-fourths of the original surface layer has been removed by erosion. The depth to bedrock is ordinarily about 34 inches.

This soil is suited to the common crops of the area. Much of it is used as cropland. It is easy to work and fairly productive. Two years of hay in a 4-year rotation is needed to supply organic matter. In prolonged periods of wet weather, water may stand on the surface long enough to drown some crops. Graded strips that carry surface water to safe outlets will prevent this. On long slopes, diversion terraces and grassed waterways are needed. (Capability unit IIs–1; woodland group 19.)

Penn silt loam, 3 to 8 percent slopes (PgB).—The profile of this soil is deeper than the profile described as typical of the series. The depth to bedrock is about 34 inches.

Although this soil is suitable for the common crops of the area, a considerable proportion of it is still wooded. It is easy to work and is fairly productive if organic matter, lime, and fertilizer are supplied. It is moderately susceptible to erosion. Short slopes should be farmed on the contour, and longer slopes need contour strips, diversion terraces, and grassed waterways. In a wet season water may stand on the gentle slopes long enough to drown some crops. Graded strips that drain into well-sodded outlets may be needed to prevent this. (Capability unit IIe–4; woodland group 19.)

Penn silt loam, 3 to 8 percent slopes, moderately eroded (PgB2).—This soil generally occurs on broad, low, un-

dulating ridges. The profile is like the one described as typical of the series. The depth to bedrock is about 30 inches. As much as three-fourths of the original surface layer has been lost, and a few shallow gullies have formed. The available moisture capacity is moderate.

This soil is nearly all cultivated. It erodes very readily unless protected. Short slopes should be farmed on the contour, and longer slopes need contour strips and diversion terraces. On the gentler slopes, graded strips may be needed to carry off surface water during prolonged periods of wet weather. Organic matter is needed to combat droughtiness. It can be supplied by growing green-manure crops, utilizing crop residues, applying barnyard manure, and growing crops in a suitable rotation. A 4-year crop rotation should include at least 2 years of hay. For pasture, deep-rooted tall grasses and legumes are better than bluegrass. (Capability unit IIe–4; woodland group 19.)

Penn silt loam, 3 to 8 percent slopes, severely eroded (PgB3).—This soil has lost much of its original surface layer through erosion, and the present plow layer is mostly subsoil. Patches of the dusky-red subsoil are exposed. Shallow gullies are common. In places there are fragments of shale or sandstone on the surface. The depth to bedrock is ordinarily about 22 inches.

As cropland, this soil has rather severe limitations and requires intensive conservation practices. To prevent further erosion, water must be diverted from the eroded areas. Contour farming, contour stripcropping, and grassed waterways are also needed. Special measures are needed to stabilize gullies. Hay should be grown 3 years out of 5, and green-manure crops and crop residues should be utilized to supply organic matter and to conserve moisture. In pastures, grazing should be carefully controlled and should not be permitted at all until late in spring, after the plant roots are well established. Bluegrass is not a suitable pasture plant for this soil (Capability unit IIIe–4; woodland group 21.)

Penn silt loam, 8 to 15 percent slopes (PgC).—The profile of this soil is 2 to 4 inches shallower over the weathered red shale than the profile described as typical of the series.

Most of this soil is wooded. If cleared and cultivated, the short slopes and long narrow ridges should be farmed in field strips. The long smooth slopes would need contour strips, diversion terraces, and grassed waterways. Crop residues, barnyard manure, green-manure crops, and hay crops in the rotation will supply the needed organic matter. A 5-year rotation should include at least 3 years of hay. Lime and fertilizer are needed for good stands of hay. (Capability unit IIIe–4; woodland group 22.)

Penn silt loam, 8 to 15 percent slopes, moderately eroded (PgC2).—The profile of this soil is shallower than the profile described as typical of the series. The depth to the weathered red shale is ordinarily about 22 inches. The slopes are generally long, but there are some short slopes and some long narrow ridges. These variations in topography make it difficult to lay out contour strips and diversion terraces. In many places the only practical system is to lay out field strips of even width and lengthen the rotation. A 5-year rotation should include at least 3 years of hay. The common crops of the area are grown, although the soil is slow to dry out in spring and is droughty in a dry summer. (Capability unit IIIe–4; woodland group 22.)

Penn silt loam, 8 to 15 percent slopes, severely eroded (PgC3).—This soil is much droughtier and lower in organic matter than Penn silt loam, 3 to 8 percent slopes, moderately eroded, and it has a shallower profile. The depth to bedrock is 9 to 17 inches. Gullies are common, and a few have cut down to the bedrock.

Nearly all of this soil has been cleared and farmed, but some is now idle or reverting to woodland. Intensive conservation practices would be required to stabilize and restore these soils. The major requirement would be to divert water from eroded areas. Long-term hay or pasture is the best use. If a row crop is grown, it should be followed by a small grain and then by 4 or 5 years of hay. Contour strips and grassed waterways are needed. Gullies should be smoothed, mulched, limed, fertilized, and heavily seeded. (Capability unit IVe–4; woodland group 24.)

Penn silt loam, 15 to 25 percent slopes (PgD).—The profile of this soil is shallower than the one described as typical of the series. The depth to bedrock is only about 14 inches. Small fragments of red shale are common in the surface layer and even more numerous in lower layers. The available moisture capacity is moderately low, and the fertility is moderately low.

This soil is not well suited to row crops. It erodes readily if cultivated. Woodland or long-term hay is the best use. A 6-year rotation should include at least 4 years of hay. All crops need lime and fertilizer. Erosion can be controlled by means of contour strips and grassed waterways. On the gentler slopes, diversion terraces may be practical. Hayfields should be reseeded in contour strips, and alternate strips should be left in sod while the others are being tilled. Disking is the best method of preparing seedbeds. (Capability unit IVe–4; woodland group 22.)

Penn silt loam, 15 to 25 percent slopes, moderately eroded (PgD2).—The profile of this soil is shallower than the profile described as typical of the series. Erosion has removed as much as three-fourths of the original surface layer. The depth to bedrock is ordinarily about 12 inches. Small fragments of red shale are numerous throughout the profile.

This soil is not well suited to row crops. Practically all of it has been cultivated, but most of it is now used as pasture. Some is reverting to briers, weeds, and native shrubs. The pastures are of poor quality. Fair yields of hay can be obtained if drought-resistant grasses are seeded and lime and fertilizer are used. The longer slopes need to be protected by diversion terraces. Hayfields should be reseeded in contour strips, and seedbeds should be disked. If a row crop is grown, it should be in a rotation that includes 4 years of hay in every 6 years. In pastures, deep-rooted grasses and legumes should be seeded. (Capability unit IVe–4; woodland group 22.)

Penn loam, 3 to 8 percent slopes, moderately eroded (PeB2).—The profile of this soil is similar to the profile described as typical of the series. The depth to bedrock is ordinarily about 30 inches. In many areas as much as three-fourths of the original surface layer has been removed by erosion, and patches of dusky-red loam have been exposed. In some places there is enough gravel in the plow

layer to interfere with cultivation. Included are small areas of silt loam and sandy loam.

The common crops of the area are grown on this soil. Crops that require large amounts of moisture yield well only in those years when rainfall is above normal and the rainfall is well distributed. Adding organic matter is a major management requirement. This can be done by growing green-manure crops, applying barnyard manure, and including hay crops in the rotation. Hay should be grown at least 2 out of every 4 years. To get a good stand of hay, lime and fertilizer are needed. Erosion can be controlled by means of contour strips, diversion terraces, and grassed waterways. Where the topography makes contour strips impractical, field strips can be used. In pastures, deep-rooted grasses and legumes should be seeded. (Capability unit IIe–4; woodland group 19.)

Penn loam, 3 to 8 percent slopes, severely eroded (PeB3).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is ordinarily about 22 inches. In many places all of the original surface layer has been removed by erosion and the subsoil is exposed. On narrow ridgetops patches of dusky-red soil material are at the surface. Gravel in the surface layer interferes with cultivation in some places. Included are small areas of silt loam and sandy loam and of soil that is gravelly or channery at the surface. Many shallow gullies and a few deep ones have formed. The available moisture capacity is low.

Only crops that require little moisture should be grown on this soil. Contour strips, diversion terraces, and grassed waterways are needed to control erosion. Where the topography is too uneven for contour strips, protection can be provided by even-width field strips and a long rotation. Supplying organic matter is a major management requirement. Crop residues, green-manure crops, and barnyard manure should be utilized, and a 5-year rotation should include 3 years of hay. Lime and fertilizer are needed. Gullied areas may need diversion terraces that will prevent further damage and permit stabilization. For pasture, deep-rooted grasses and legumes are suitable. Overgrazing should be prevented. (Capability unit IIIe–4: woodland group 21.)

Penn loam, 8 to 15 percent slopes, moderately eroded (PeC2).—As much as three-fourths of the original surface layer of this soil has been removed by erosion. Shallow gullies have formed in some places. Some spots are gravelly. The depth to bedrock is ordinarily about 20 inches. The available moisture capacity is moderately low, and the fertility is moderately low.

This soil is suited to the common crops of the area, including strawberries and raspberries. Organic matter is needed to improve the moisture-holding capacity and to retard leaching. Crop residues, green-manure crops, and barnyard manure should be utilized, and a 5-year rotation should include at least 3 years of hay. Lime and fertilizer are needed. Erosion can be controlled by means of contour strips, diversion terraces, and grassed waterways. Where the topography makes contour strips impractical, protection can be provided by field strips of even width. Pastures should be seeded to drought-resistant, deep-rooted grasses and legumes. (Capability unit IIIe-4; woodland group 22.)

Penn loam, 8 to 15 percent slopes, severely eroded (PeC3).—All of the original surface layer of this soil has been removed by erosion, and in places some of the subsoil also. The present surface layer is dusky red. Shallow gullies and a few deep ones have formed. The depth to bedrock ranges from 9 to 17 inches. Included are small areas of sandy loam and silt loam and some areas that are gravelly. The available moisture capacity is low.

This soil is not well suited to row crops, because it will erode further if not protected. Woodland or long-term hay is the best use. Row crops should be grown only in long rotations in which hay is grown 4 out of 6 years. Hayfields should be reseeded in contour strips, and the seedbeds should be prepared by disking. Only drought-resistant grasses are suitable. Diversion terraces are needed on long slopes and above gullied areas. All waterways should be kept in sod. For pasture, deep-rooted grasses and legumes are suitable. (Capability unit IVe–4; woodland group 24.)

Penn shaly silt loam, 3 to 8 percent slopes, severely eroded (PfB3).—This is a very shallow soil. All of the original surface layer and much of the original subsoil have been washed away. The depth to bedrock is only 5 to 8 inches. From 20 to 50 percent of the surface layer consists of fragments of shale, and from 40 to 85 percent of the subsoil. There are many loose fragments of shale on the surface.

This soil is unsuitable for cultivation but can be used to a limited extent for pasture. If not needed for pasture, it can be planted to shrubs that furnish food and cover for game. (Capability unit VIs–3; woodland group 21.)

Penn shaly silt loam, 8 to 15 percent slopes, severely eroded (PfC3).—This is a very shallow and droughty soil. All of the original surface layer and practically all of the original subsoil have been washed away. There are many fragments of shale on the surface.

This soil is not suitable for cultivated crops or for hay. Pastures are poor even under the best of management. Idle areas not needed for pasture should be planted to trees of drought-resistant species. Brush, briers, and undesirable trees should be cleared off before tree seedlings are planted. Trees grow slowly on this soil. (Capability unit VIs–3; woodland group 24.)

Penn shaly silt loam, 15 to 25 percent slopes, severely eroded (PfD3).—This is a shallow and droughty soil. All of the original surface layer and much of the original subsoil have been washed away. There are many shale fragments on the surface. In some places bedrock is exposed. Runoff is rapid.

The best use for this soil is woodland. Trees of drought-resistant species should be planted. Trees grow slowly. (Capability unit VIIe–2; woodland group 24.)

Penn soils, 15 to 25 percent slopes, severely eroded (PhD3).—Shallow, droughty Penn soils of various textures make up this unit. All of the original surface layer and practically all of the original subsoil have been lost through erosion. There are some rock fragments on the surface.

These soils are not suitable for cultivated crops or hay, and they are poor for pasture. If used for pasture, they need large amounts of fertilizer and should be seeded to drought-resistant pasture plants. Woodland is the best use. Idle areas should be planted to trees of drought-resistant species. (Capability unit VIe–3; woodland group 24.)

Penn soils, 25 to 35 percent slopes, severely eroded (PhE3).—These are very shallow soils of various textures.

Bedrock is at the surface in some places. Woodland is the best use. Idle areas should be planted to trees of drought-resistant species. (Capability unit VIIe–2; woodland group 28.)

Penn soils, 35 to 60 percent slopes, severely eroded (PhF3).—These are very shallow soils of various textures. Bedrock is at the surface in many places. Woodland is the best use. Idle areas should be planted to trees of drought-resistant species. (Capability unit VIIe–2; woodland group 28.)

Penn very stony loam, 0 to 8 percent slopes (PmB).—Stones more than 10 inches in diameter cover about 15 percent of the surface of this soil, and there are stones throughout the profile. Fresh leaves, twigs, and fragments of bark are between the stones. The uppermost 2 inches of soil is very dark brown, very friable, granular loam. The subsoil is permeable to water and roots.

Practically all of this soil is wooded. It is too stony to be tilled. It could be used to a very limited extent for pasture. Removing loose stones from the surface would make mowing and disking easier. Only drought-resistant pasture plants are suitable. Lime and fertilizer should be applied before seeding. (Capability unit VIs–3; woodland group 19.)

Penn very stony loam, 8 to 25 percent slopes (PmD).—This soil generally occurs on high ridges, such as those in the Conewago Mountains. Stones more than 10 inches in diameter cover from 3 to 15 percent of the surface, and there are stones throughout the profile. The depth to bedrock is ordinarily about 18 inches, but in some places bedrock is exposed.

Practically all of this soil is wooded. It is too stony to be cultivated, but where light machinery can be used it is fair for pasture and orchard. Removing some of the stones would make mowing easier but is not economically practical. It is best to leave this soil as woodland; it can be managed as a wildlife habitat, used to produce wood products, or used to protect the watershed. Woodland management requirements include protection from fire and grazing. Skid trails and logging roads will become gullies unless carefully used. (Capability unit VIs–3; woodland group 22.)

Penn very stony loam, 25 to 60 percent slopes (PmF).—This soil occurs largely on steep valley walls along the larger streams. On the steepest slopes there has been some downhill slipping or creeping of soil material. The surface layer is very dark brown, friable, granular, and permeable. The depth to bedrock is ordinarily about 12 inches, but in some places bedrock is at the surface. Stones more than 10 inches in diameter cover about 15 percent of the surface, and there are stones throughout the profile.

All of this soil is wooded and should remain so. Any thinly wooded or open areas should be planted to trees or to shrubs that provide food and cover for game. (Capability unit VIIs–1; woodland group 26.)

Penn-Lansdale loams, 0 to 3 percent slopes (PnA).—The two soils in this complex are essentially alike, except in color. The Penn soil is dominantly reddish, and the Lansdale soil is dominantly yellowish brown. The depth to bedrock is ordinarily about 35 inches. The Lansdale soils are described in detail under the heading "Lansdale Series." Included in this mapping unit are a few small areas of silt loam.

Most of this unit is in native woodland. If cleared, these soils would be suitable for the common crops of the area, but droughtiness would limit yields in dry years. Organic matter should be supplied regularly by returning all crop residues, growing green-manure crops, and applying all available barnyard manure. A 4-year crop rotation should include at least 2 years of hay. Lime and fertilizer are needed. Contour cultivation and contour stripcropping may be advisable. For pasture, deep-rooted grasses and legumes are suitable. (Capability unit IIs–1; woodland group 19.)

Penn-Lansdale loams, 3 to 8 percent slopes, moderately eroded (PnB2).—The soils in this complex have lost as much as three-fourths of their original surface layer. The depth to bedrock is ordinarily about 30 inches.

These soils are suited to the common crops of the area. They are permeable and easy to work but tend to be droughty. Contour strips, diversion terraces, and grassed waterways help to control erosion and to conserve moisture. Short slopes should be farmed on the contour. Organic matter should be supplied either by growing at least 2 years of hay in a 4-year rotation or by utilizing green-manure crops, crop residues, and barnyard manure. Large amounts of fertilizer are required. Fruit trees should be planted on the contour. For pasture, deep-rooted grasses and legumes are better than bluegrass, which becomes dormant at the first sign of drought. (Capability unit IIe–4; woodland group 19.)

Penn-Lansdale loams, 3 to 8 percent slopes, severely eroded (PnB3).—The soils in this complex are so severely eroded that the plow layer consists mostly of what was originally the subsoil. Shallow gullies and some deep ones have formed.

These soils are suitable for the common crops of the area. They are permeable and easy to work but tend to be droughty. Yields decline in dry years. Controlling erosion, conserving moisture, increasing fertility, and supplying organic matter are important management requirements. Contour strips, diversion terraces, and grassed waterways are needed. If possible, diversion terraces should be constructed above gullied areas. Gullies should be smoothed, limed and fertilized, and seeded. A row crop should not be grown more than once in 4 years. For pasture, deep-rooted grasses and legumes are better than bluegrass. (Capability unit IIIe–4; woodland group 21.)

Penn-Lansdale loams, 8 to 15 percent slopes, moderately eroded (PnC2).—The soils in this complex are eroded to the extent that some of the original subsoil is now mixed with the plow layer. Some shallow gullies have formed.

These soils are suitable for the common crops of the area. Controlling erosion, conserving moisture, adding organic matter, and increasing fertility are important management requirements. Erosion can be controlled by means of contour strips, diversion terraces, and grassed waterways. Organic matter can be supplied by growing crops in a suitable rotation, growing green-manure crops, turning under crop residues, and applying barnyard manure. A row crop should be grown not more than once in 4 years. Lime and fertilizer are needed. For pasture, deep-rooted grasses and legumes are better than bluegrass. (Capability unit IIIe–4; woodland group 22.)

Penn-Lansdale loams, 8 to 15 percent slopes, severely eroded (PnC3).—The soils in this complex are so severely eroded that the plow layer consists mostly of what was originally subsoil. Shallow gullies and a few deep ones have formed.

The best use for these soils is long-term hay or pasture. A row crop should be grown not more than once in 6 years. Stripcropping, diversion terraces, and grassed waterways are needed to control erosion. Gullies can be stabilized by seeding suitable grasses. Pastures and hayfields should be reseeded in contour strips, and alternate strips should be left in sod. Disking is better than plowing for the preparation of seedbeds. Lime and fertilizer are needed to get a good cover of hay or pasture. Deep-rooted grasses and legumes do better than bluegrass. Pastures should not be overgrazed. (Capability unit IVe–4; woodland group 24.)

Penn-Lansdale loams, 15 to 25 percent slopes, severely eroded (PnD3).—Woodland is the best use for these soils. Pastures are only fair, even under the best management. Only drought-resistant pasture plants are suitable. Reseeding should be done in alternate contour strips. Disking is the best way to prepare seedbeds. Diversion terraces on long slopes and above gullied areas would help to control runoff. Unless needed for pasture, these soils should be reforested. (Capability unit VIe–3; woodland group 24.)

Penn and Readington shaly silt loams, 3 to 8 percent slopes, moderately eroded (PrB2).—This undifferentiated mapping unit consists of soils that resemble both the Penn and the Readington soils but differ somewhat from the typical soil of either series. The soils in this unit are shallower than the typical Penn soils and less well drained. They are much shallower than the typical Readington soils and are mottled less distinctly but closer to the surface. The parent material was derived from the same kind of acid red shale as was the parent material of both the Penn and Readington soils.

Typically, the soils in this unit have a 6- to 11-inch surface layer of dusky-red shaly silt loam that has moderate granular structure. Under this is a 1- to 4-inch layer of weak-red shaly silt loam that has medium, distinct, reddish-gray and red mottles. This in turn is underlain by 4 to 6 inches of weak-red weathered fragments of siltstone, sandstone, and shale. The fragments have coatings of silty clay loam and a few mottles of red and reddish gray.

These soils tend to remain wet until late in spring and then to become droughty late in summer and in fall. Runoff is moderate. The fertility is low.

These soils should have a cover of vegetation most of the time, to protect them against erosion. A 5-year rotation should include at least 3 years of hay and not more than one row crop. Lime and fertilizer are needed. Diversion terraces are not practical, because the soils are so shallow. Where practical, contour farming, contour stripcropping, and sod waterways are advisable. Pastures and hayfields should be seeded to moisture-tolerant grasses and legumes. Pastures should not be grazed until late in spring, after the ground is firm. (Capability unit IIIe–4; woodland group 15.)

Penn and Readington shaly silt loams, 3 to 8 percent slopes, severely eroded (PrB3).—Except that the soils are shallower, this unit is like Penn and Readington shaly silt loams, 3 to 8 percent slopes, moderately eroded. The depth to bedrock is ordinarily about 13 inches. Most of the original surface layer has been lost through erosion, and patches of weak-red shaly silt loam are exposed. Shallow gullies are common, and a few gullies have cut down to bedrock. The available moisture capacity is moderate to low. The fertility is low. These soils remain wet until late in spring and are very droughty in summer. In spring, seepage spots are common.

These soils are not suitable for row crops. They are only fairly well suited to hay and pasture. Organic matter and large amounts of fertilizer are required. Disking is better than plowing for the preparation of seedbeds. Special measures may be needed to control gullies. (Capability unit IVe–4; woodland group 15.)

Penn and Readington shaly silt loams, 8 to 15 percent slopes, severely eroded (PrC3).—Except that the slopes are steeper and the profile much shallower, this unit is like Penn and Readington shaly silt loams, 3 to 8 percent slopes, moderately eroded. The depth to bedrock is ordinarily about 9 inches. All of the original surface layer has been lost through erosion, and the present surface layer consists predominantly of weak-red shaly silt loam. Gullies that have cut down to bedrock are common. In winter and spring there are many seepage spots, but in a normal summer these soils are droughty. The available moisture capacity is low.

These soils are suited to pasture and woodland. In pastures, it is usually necessary to control gullies by smoothing, mulching, liming, fertilizing, and seeding heavily. Disking is the best way to prepare seedbeds. Barnyard manure should be applied, if available, to increase the available moisture capacity and to improve the soil structure. Areas not used for pasture can be planted to trees. Reforested areas should be protected from fire and grazing. (Capability unit VIs–3; woodland group 14.)

Pequea Series

This series consists of shallow to moderately deep soils on uplands. The surface layer is dark grayish-brown silt loam, and the subsoil is light brownish-gray silt loam. The parent material weathered from calcareous schist.

These soils are commonly near or adjacent to the Conestoga and Manor soils. The Conestoga soils are deeper and have a firm, yellowish-brown subsoil. The Manor soils formed from material weathered from acid schist, and they are somewhat lighter colored throughout.

The Pequea soils in York County are inextensive and not important agriculturally.

Typical profile of Pequea silt loam, 8 to 15 percent slopes, moderately eroded, in a cultivated field 1 mile west of East Prospect:

- A_p 0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; pH 6.5; abrupt, smooth lower boundary; 5 to 9 inches thick.
- B_{21} 7 to 14 inches, grayish-brown (10YR 5/2) silt loam; weak, fine, subangular blocky structure; friable; pH 6.8; gradual, smooth lower boundary; 5 to 9 inches thick.
- B_{22} 14 to 19 inches, light brownish-gray (10YR 6/2) micaceous silt loam; weak, fine and medium, subangular blocky structure; friable; pH 7.0; gradual, smooth lower boundary; 4 to 9 inches thick.
- C_1 19 to 25 inches +, disintegrated gray, calcareous, micaceous schist.

The surface soil is dark grayish brown to brownish gray, and the subsoil is very dark grayish brown to light

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brownish gray. The parent material is olive gray to dark gray.

The Pequea soils are slightly acid to neutral in reaction. They are droughty and highly erodible. The available moisture capacity is moderately low. Tilth is fair, and permeability is good.

Pequea silt loam, 3 to 8 percent slopes, moderately eroded (PsB2).—The profile of this soil is deeper than the profile described as typical of the series. The depth to the weathered parent material is ordinarily about 24 inches.

Most of this soil is used for crops. A row crop should be grown no more often than once in 4 years. Deep-rooted grasses and legumes should be grown the rest of the time. A mixture of alfalfa and grasses is suitable. Short slopes should be farmed on the contour. Longer slopes need contour strips, cropland terraces, diversion terraces, and grassed waterways. Pastures need to be protected from overgrazing. (Capability unit IIe–5; woodland group 20.)

Pequea silt loam, 8 to 15 percent slopes, moderately eroded (PsC2).—The profile of this soil is like the profile described as typical of the series. The slopes are moderately long, and the soil is erodible.

This soil is used in about equal proportions as cropland and as pasture. Erosion control measures should include contour cultivation, contour stripcropping, diversion terraces, and sod waterways. Organic matter should be supplied regularly by growing green-manure crops, returning crop residues, and including deep-rooted grasses and legumes in the rotation. A 5-year rotation should include at least 3 years of hay. Legume hays, including alfalfa and red clover, do well. Pastures need to be protected from overgrazing. No grazing should be permitted until late in spring, after the plants are well established. (Capability unit IIIe–5; woodland group 23.)

Pequea silt loam, 8 to 15 percent slopes, severely eroded (PsC3).—The profile of this soil is shallower than the profile described as typical of the series. The depth to the parent material is ordinarily about 14 inches. Most of the original surface layer has been lost through erosion, and patches of grayish-brown, micaceous silt loam are exposed. Shallow gullies are common, and there are a few deep ones. The available moisture capacity is low.

Most of this soil is idle or in low-grade pasture. Long-term hay, pasture, or woodland is the best use. Row crops should be grown only for the purpose of reestablishing hay or pasture stands. Pastures and hayfields should be reseeded in alternate contour strips. Deep-rooted grasses and legumes will supply the needed organic matter. All waterways should be sodded. (Capability unit IVe–5; woodland group 25.)

Pequea silt loam, 15 to 25 percent slopes, severely eroded (PsD3).—The profile of this soil is shallower than the profile described as typical of the series. The depth to the weathered parent material is ordinarily about 10 inches. Erosion has removed all of the original surface layer, and grayish-brown micaceous silt loam is exposed. Shallow gullies are common, and a few gullies have cut down to the parent material.

Woodland is the best use for this soil, but most of it is now idle or in low-grade pasture. As pasture, it has rather severe limitations. Seeding should be done in alternate strips. Seedbeds should be prepared by disking so that a grass mulch is left on or near the surface. Mulching, smoothing, heavy seeding, and liberal use of lime and fertilizer are needed to stabilize gullied areas. If suitable outlets are available, diversion terraces above gullied areas are beneficial. Pastures should be protected from overgrazing. Areas that are reforested need to be protected from fire and grazing. (Capability unit VIe–1; woodland group 25.)

Pequea silt loam, 25 to 35 percent slopes, moderately eroded (PsE2).—The profile of this soil is shallower than the profile described as typical of the series. The depth to the weathered parent material is ordinarily only about 10 inches. There are a few shallow gullies.

Woodland is the best use for this soil, but most of the acreage is now idle or in scrub pasture. The slopes are too steep to be mowed, and only hand tools could be used for seeding and for brush control. Areas that are reforested should be protected from fire and grazing. (Capability unit VIe–1; woodland group 27.)

Raritan Series

This series consists of deep, moderately well drained, nearly level to gently sloping soils on stream terraces. The surface layer is brown silt loam, the upper part of the subsoil is strong-brown silt loam, and the lower part is mottled brown silty clay loam. The parent material was old alluvium washed from uplands underlain by red Triassic shale and sandstone. Gentle slopes predominate.

In York County, the Raritan soils occur principally on the terraces along Conewago Creek and its tributaries. They are near or adjacent to the Birdsboro and Lamington soils. They are less well drained than the Birdsboro soils and less red throughout and are mottled in the subsoil. They are better drained than the Lamington soils and are free of mottling to a greater depth.

Typical profile of Raritan silt loam, 3 to 8 percent slopes, moderately eroded, 1¼ miles west of Davidsburg:

- A_p 0 to 8 inches, brown (10YR 4/3) to dark-brown silt loam; weak, fine, granular structure; very friable; pH 6.2; clear, smooth lower boundary; 7 to 10 inches thick.
- A_3 8 to 10 inches, brown (7.5YR 5/4) silt loam; moderate, thin to medium, platy and blocky structure; friable; pH 6.0; clear, smooth lower boundary; 2 to 4 inches thick.
- B_1 10 to 15 inches, strong-brown (7.5YR 5/6) silt loam; moderate, fine and medium, blocky structure; firm; pH 5.0; gradual, wavy lower boundary; 4 to 8 inches thick.
- B_2 15 to 25 inches, brown (7.5YR 5/4) silty clay loam; moderate, fine and medium, subangular blocky structure; distinct clay films; some black coatings, probably of manganese and iron, on ped faces; firm; pH 5.0; gradual, wavy lower boundary; 8 to 12 inches thick.
- B_{2g} 25 to 32 inches, brown (7.5YR 5/4) silty clay loam; common, fine, distinct, grayish-brown (10YR 5/2) and dark yellowish-brown (10YR 4/4) mottles; moderate, medium, subangular blocky structure; distinct, continuous clay films on ped faces; very firm; pH 4.8; gradual, wavy lower boundary; 5 to 9 inches thick.
- B_{3g} 32 to 46 inches +, dominantly brown (7.5YR 5/4) silty clay; many, medium, distinct, light brownish-gray (10YR 6/2) mottles; strong, medium and coarse, subangular blocky structure; distinct, continuous clay films on ped faces; very firm; pH 4.8; 10 to 20 inches thick.

The surface layer is brown to grayish brown, and the upper part of the subsoil is brown to strong brown. The

depth to mottling is ordinarily between 18 and 26 inches, but it may be as little as 15 inches or as much as 30 . The upper layers of the profile are about 5 percent fine to medium quartz gravel, and the lower part of the subsoil, about 15 percent. Included in the silt loam mapping units are small areas of loam.

The Raritan soils are strongly acid and moderately fertile. Tilth is fair to good. The available moisture capacity is moderately high. Permeability is slow in the lower part of the subsoil; consequently, the water table is high in winter and in the early part of spring.

Raritan silt loam, 0 to 3 percent slopes (RaA).—The profile of this soil is ordinarily deeper than the profile described as typical of the series, and a little less well drained. The depth to bedrock is ordinarily about 6 feet. Runoff is slow. Impeded drainage in the lower part of the subsoil results in a high water table in winter and the early part of spring. The erosion hazard is only slight.

This soil is used in about equal proportions for cultivated crops, hay, and pasture. It is fairly well suited to corn, hay, and pasture, but not to alfalfa or to potatoes or other root crops. An example of a suitable rotation is the following: a row crop, a small grain, and 2 years of hay. Disposal of excess water is a major management requirement. Terraces with suitable outlets are needed at the base of the adjoining hillsides to divert runoff. Graded rows, graded strips, and drainage terraces should be used where practical. Bedding and tiling are effective in some places. Pastures should be seeded to moisture-tolerant grasses and legumes. (Capability unit IIw–2; woodland group 11.)

Raritan silt loam, 3 to 8 percent slopes, moderately eroded (RaB2).—This soil is eroded to the extent that the present plow layer is a mixture of the original surface layer and subsoil. The profile is like the one described as typical of the series. The depth to bedrock is ordinarily more than 5 feet. Because of the slowly permeable lower subsoil, this soil remains cold and wet until rather late in spring.

All of this soil is in cultivation. It is fairly well suited to spring-sown grain, corn, and moisture-tolerant grasses and legumes, but not to alfalfa or to potatoes or other row crops. The rotation should be no more intensive than the following: corn, a cover crop, a spring-sown small grain, and hay. Erosion control measures and water control measures are necessary. Graded rows, graded strips, and drainage terraces provide adequate protection on slopes near the lower limit of the slope range. Where suitable outlets are available, terraces to divert runoff from adjoining hillsides are beneficial. The organic matter needed can be supplied by applying barnyard manure, growing green-manure crops, and disking in crop residues. (Capability unit IIe–7; woodland group 11.)

Readington Series

This series consists of moderately deep to deep, moderately well drained to somewhat poorly drained, nearly level to gently sloping soils on uplands. The surface layer is reddish-brown silt loam, and the subsoil is reddish silty clay loam mottled with shades ranging from reddish yellow to gray. The parent material weathered principally from red Triassic sandstone and shale.

These soils are commonly near or adjacent to the Penn, Croton, and Lansdale soils. They are deeper and less well drained than the Penn soils, and they have a mottled and less permeable subsoil. They are better drained than the Croton soils, less gray throughout, and unmottled in the surface layer. They are redder and less well drained than the Lansdale soils and have a less permeable subsoil.

Typical profile of Readington silt loam, 0 to 3 percent slopes, in a cultivated field 1 mile southwest of Dover:

A_p 0 to 9 inches, reddish-brown (5YR 4/5) silt loam; weak, fine, granular structure; friable; pH 7.1; abrupt, smooth lower boundary; 8 to 11 inches thick.

A_2 9 to 12 inches, reddish-brown (5YR 5/3) silt loam; weak, fine and medium, platy structure; friable; pH 5.8; clear, wavy lower boundary; 2 to 5 inches thick.

B_1 12 to 15 inches, reddish-brown (5YR 5/4) silt loam; few, fine, distinct, pinkish-gray (5YR 6/2) mottles; weak, medium, subangular blocky structure; thin, discontinuous clay films on peds; friable; few sandstone fragments up to 15 millimeters in diameter; pH 5.0; wavy lower boundary; 2 to 5 inches thick.

B_{21} 15 to 19 inches, reddish-brown (5YR 5/4) silty clay loam; common, distinct, yellowish-red (5YR 5/6) and pinkish-gray (5YR 6/2) mottles; weak, medium, subangular blocky structure; distinct clay films on peds; firm; pH 5.4; gradual, wavy lower boundary; 2 to 6 inches thick.

B_{22} 19 to 25 inches, reddish-brown (2.5YR 4/4) silty clay loam; brown and gray streaks, mottles, and coatings on some ped faces; weak, fine to medium, subangular blocky structure; firm; 10 to 15 percent shale fragments; pH 4.8; gradual, wavy lower boundary; 4 to 8 inches thick.

B_3 25 to 30 inches, dusky-red (10R 3/3) channery silty clay loam; about 50 percent siltstone fragments; moderate, fine, blocky structure modified by shale; some iron and manganese coatings on shale and ped faces; firm in place; pH 4.6; clear, irregular lower boundary; 3 to 8 inches thick.

C_1 30 to 36 inches, dusky-red (10R 3/3) shale; prominent clay films; about 20 percent silty clay loam in interstices; platy structure; very firm in place; pH 4.6; clear, wavy lower boundary; 4 to 9 inches thick.

C_2 36 to 56 inches, dusky-red (10R 3/3) siltstone with a few clay films and many iron and manganese coatings; platy structure; very firm in place; pH 5.0; 15 to 25 inches thick.

D_r 56 inches +, Triassic red siltstone.

The depth to mottling ranges from 15 to 30 inches. The depth to bedrock ranges from 28 to 60 inches; the greater depths are at the lower elevations, where alluvium from higher up the slopes has been deposited.

Included in the silt loam mapping units are small areas of loam and sandy loam These occur where the parent material weathered predominantly from sandstone. The color of the surface layer in these areas may be brown or yellowish brown because of variations in the color of the rock from which the parent material was derived.

The Readington soils are strongly acid and moderately fertile. Because of slow permeability in the lower part of the subsoil, the water table is seasonally high.

Readington silt loam, 0 to 3 percent slopes (RdA).—The profile of this soil is like the one described as typical of the series. The depth to bedrock is ordinarily about 55 inches. Runoff is slow. Impeded drainage in the lower part of the subsoil results in a high water table in winter and spring. There is little or no erosion hazard.

Most of this soil is used as cropland or as pasture. It is fairly well suited to corn, hay, and pasture but is not suited to alfalfa or to potatoes or other root crops. An example of a suitable rotation is the following: a row crop, a small grain, and hay. Drainage is the principal management problem. Slopes near the upper limit of

the slope range can be drained by means of graded rows, graded strips, and drainage terraces. Diversion terraces at the base of adjoining slopes will help to control runoff. Tiling, bedding, and open drains are feasible in some places. Pastures should be seeded to moisture-tolerant grasses and legumes. (Capability unit IIw–2; woodland group 11.)

Readington silt loam, 3 to 8 percent slopes (RdB).—The profile of this soil is shallower than the profile described as typical of the series. Drainage is a little better than in the more gently sloping soil. The depth to mottling is about 20 inches. The depth to bedrock is about 50 inches. Runoff is moderate. Impeded drainage in the lower part of the subsoil results in a high water table in winter and in the early part of spring.

This soil is used in about equal proportions for crops and for pasture. It is fairly well suited to corn, spring-sown grain, and moisture-tolerant hay and pasture plants, but not to alfalfa or to root crops. The crop rotation should be no more intensive than the following: corn, a cover crop, a spring-sown small grain, and 2 years of hay. Ladino clover and a moisture-tolerant grass make a good pasture mixture. Erosion control and water control are major management needs. Where suitable outlets exist, diversion terraces to intercept runoff from higher areas are beneficial. Graded rows, graded strips, and drainage terraces also help. Maintaining the supply of organic matter is important. (Capability unit IIe–7; woodland group 11.)

Readington silt loam, 3 to 8 percent slopes, moderately eroded (RdB2).—This soil occurs most commonly at the head of drainageways. The profile is shallower than the one described as typical of the series. The depth to bedrock is about 45 inches. Runoff from higher areas of Penn and Lansdale soils has formed some shallow gullies. Impeded drainage in the lower part of the subsoil results in a high water table in winter and the early part of spring.

This soil is used mostly as pasture. It is, however, fairly well suited to corn, spring-sown grain, and moisture-tolerant grasses and legumes. It is not suited to alfalfa or to potatoes or other root crops. The crop rotation should be no more intensive than the following: corn, a cover crop, a spring-sown small grain, and 2 years of hay. Moisture-tolerant grasses and legumes should be seeded in pastures.

Erosion control and water control are major management requirements. Terraces to divert runoff from adjoining slopes are especially important. Suitable outlets should be located before the terraces are constructed. On slopes near the lower limit of the slope range, drainage can be provided by means of graded rows, graded strips, and drainage terraces. Pastures should not be grazed until the ground is firm. (Capability unit IIe–7; woodland group 11.)

Rowland Series

This series consists of moderately well drained, nearly level soils on flood plains. The surface layer is dark reddish-brown silt loam, the upper part of the subsoil is reddish-brown silt loam, and the lower part is yellowish-red silty clay loam mottled with reddish gray and gray. The parent material was recent alluvium washed from Penn, Readington, and Lansdale soils, all of which formed in material weathered from Triassic sandstone and shale.

These soils are commonly near or adjacent to the Bermudian and Bowmansville soils. The Bermudian soils are better drained and are not mottled in the subsoil. The Bowmansville soils are less well drained; they are mottled in the surface layer and are grayer throughout.

Typical profile of Rowland silt loam in a pasture three-quarters of a mile northeast of Erney:

A_p 0 to 10 inches, dark reddish-brown (5YR 3/3) silt loam; weak, medium, granular structure; friable; pH 5.6; clear, smooth lower boundary; 8 to 11 inches thick.

C_1 10 to 24 inches, reddish-brown (5YR 4/3) silt loam; weak, fine, angular blocky structure; friable; pH 5.4; gradual, wavy lower boundary; 8 to 20 inches thick.

C_{2g} 24 to 40 inches +, yellowish-red (5YR 5/4) silty clay loam; common, medium, distinct mottles of reddish gray (5YR 5/2) and dark gray (N 4/0); weak, fine and medium, subangular blocky structure; friable; pH 5.2; 12 to 30 inches thick.

The depth to mottling is ordinarily about 24 inches but ranges from 12 to 30 inches. Included in the silt loam mapping units are small areas of sandy loam; most of these are in areas where the parent material was derived partly from Lewisberry sandy loam. In places the color is less red than in the typical profile, probably because the parent material was influenced by gray metamorphic rock or gray sandstone. Directly under the surface layer, in a few places, is fine sandy loam, sandy loam, or gravel.

The Rowland soils are acid and moderately fertile. The major hazards to crops are flooding and a high water table in wet seasons.

Rowland silt loam (Ro).—On broad flood plains where the depth to the normal level of the stream is 36 inches or more, this soil occurs in narrow bands between areas of the Bermudian soils, which adjoin the streambank, and the Bowmansville soils, which are farther back on the flood plain. In a few places they adjoin the gently sloping to moderately steep Birdsboro soils, which are on terraces, or the Penn soils, which are on uplands. On narrower flood plains and on a few of the broader ones, where stream channels are crooked and the depth to the normal level of the stream is between 24 and 36 inches, this soil extends to the streambank and the Bowmansville soils are farther back on the flood plain. Small areas that are gently sloping are included in this mapping unit, but most of the acreage is nearly level.

If drained, this soil is suited to rotation crops. An example of a suitable rotation is the following: corn, a cover crop, a spring-sown small grain, and hay. Crops respond to lime and fertilizer. Improved drainage and protection from flooding are the major management requirements. Tile and open ditches are effective means of providing drainage where suitable outlets exist. Terraces at the base of adjoining slopes help by intercepting runoff. Deepening and straightening stream channels lowers the water table and helps to prevent flooding. Growing crops is not feasible on the narrower bottoms, and these areas are used as pasture. They provide good bluegrass pasture until midsummer, but they should not be grazed until the ground is firm. (Capability unit IIw–1; woodland group 11.)

Sciotoville Series

This series consists of deep, moderately well drained, level and gently sloping soils on stream terraces. The surface layer is brown silt loam, the upper part of the sub-

soil is yellowish-brown silt loam, and the lower part is strong-brown to yellowish-red, mottled silty clay loam. The parent material was old alluvium washed from soils that formed in glacial deposits.

These soils are commonly near or adjacent to the Wheeling and Bowmansville soils. They are less well drained than the Wheeling soils, which are free of mottling throughout. They are better drained than the Bowmansville soils, which are subject to flooding and have a grayer color throughout.

The Sciotoville soils in York County occupy only a very small acreage, all in the extreme northern part of the county near New Market. Most of the acreage is in urban areas.

Typical profile of Sciotoville silt loam, 0 to 3 percent slopes, in an idle field near New Market:

A_p 0 to 9 inches, brown (10YR 5/3) silt loam; weak, fine, granular structure; friable; pH 5.6; clear, smooth lower boundary; 8 to 10 inches thick.

B_1 9 to 14 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, subangular blocky structure; friable; pH 5.6; gradual, smooth lower boundary; 4 to 8 inches thick.

B_2 14 to 24 inches, brownish-yellow (10YR 6/6) silt loam; few, fine, faint, pale-brown (10YR 6/3) mottles; moderate, medium, subangular blocky structure; friable; pH 5.6; gradual, smooth lower boundary; 8 to 12 inches thick.

B_{22g} 24 to 36 inches, strong-brown (7.5YR 5/6) silty clay loam; common, fine, distinct, pale-brown (10YR 6/3) and brownish-yellow (10YR 6/6) mottles; moderate, medium, subangular blocky structure; thin, continuous clay films on ped faces; firm when moist, slightly plastic when wet, hard when dry; pH 5.4; clear, wavy lower boundary; 10 to 14 inches thick.

B_{3g} 36 to 45 inches +, yellowish-red (5YR 4/8) silty clay loam; many, medium, distinct, pinkish-gray (5YR 6/2) and strong-brown (7.5YR 5/8) mottles; weak, coarse, subangular blocky structure; thin, continuous clay films on ped faces; firm when moist, slightly plastic when wet, hard when dry; pH 5.4; 9 to 20 inches thick.

The surface layer is brown to very dark grayish brown, and the upper part of the subsoil is dark yellowish brown to brownish yellow. The depth to mottling is ordinarily between 18 and 26 inches but ranges from 15 to 30 inches. The upper layers are commonly 10 percent fine to medium quartz and sandstone gravel, and the lower part of the subsoil is about 20 percent. Small areas of loam are included in the silt loam mapping units.

The Sciotoville soils are strongly acid and moderately fertile. The water table is high in winter and spring.

Sciotoville silt loam, 0 to 3 percent slopes (ScA).—The profile of this soil is like the profile described as typical of the series. Runoff is slow, and drainage in the lower part of the subsoil is moderately slow. The depth to bedrock is more than 5 feet.

This soil is almost all in urban or suburban areas. It is fairly well suited to residential, commercial, and industrial development, but all buildings should be connected with established sewerage and water systems. The seasonal high water table makes sealing and draining of basements a problem, and it also may interfere with the operation of septic tanks for weeks at a time. (Capability unit IIw–2; woodland group 11.)

Sciotoville silt loam, 3 to 8 percent slopes (ScB).—The profile of this soil is a little less deep than the profile described as typical of the series. Runoff is moderate, and drainage in the subsoil is moderately slow. The depth to bedrock is ordinarily more than 5 feet.

This soil is almost all in urban areas. It is fairly well suited to residential, commercial, and industrial development, but all buildings should be connected with established sewerage and water systems. The seasonal high water table makes sealing and draining of basements a problem, and it also may interfere with the operation of septic tanks. (Capability unit IIe–7; woodland group 11.)

Steinsburg Series

This series consists of shallow to moderately deep, well-drained to excessively drained, moderately sloping to steep soils on uplands. The surface layer is dark grayish-brown channery loam, and the thin subsoil is yellowish-brown channery sandy loam. The parent material weathered from gray and brownish Triassic sandstone. Moderately steep slopes predominate.

These soils are commonly near or adjacent to the Penn and Lansdale soils. They are shallower and coarser textured than either of the associated soils and are less red than the Penn soils.

The Steinsburg soils in York County occur as small scattered acreages, mostly in the area called Dover Plain and in the northernmost part of the county.

Typical profile of Steinsburg channery loam, 8 to 15 percent slopes, severely eroded, in an idle field 1 mile north of Emigsville:

A_p 0 to 6 inches, dark grayish-brown (10YR 4/2) channery loam; weak, fine, granular structure; very friable; pH 5.4; gradual, wavy lower boundary; 7 to 10 inches thick.

B_2 6 to 10 inches, yellowish-brown (10YR 5/3) channery sandy loam; weak, medium, subangular blocky structure; friable; pH 4.5; gradual, wavy lower boundary; 3 to 7 inches thick.

C_1 10 to 16 inches, yellowish-brown (10YR 5/4) sandy loam; about 60 percent channery fragments; structureless; friable; pH 4.5; 6 to 10 inches thick.

D_r 16 inches +, gray Triassic sandstone.

The surface layer is dark grayish brown to very dark gray, and the subsoil is yellowish brown to brown. From 20 to 60 percent, by volume, of the surface soil consists of channery fragments, and from 30 to 80 percent of the subsoil. Small areas of loam and channery sandy loam are included in the channery loam mapping units.

The Steinsburg soils are strongly to very strongly acid. Tilth is poor, and the fertility is low. The available moisture capacity is low.

Steinsburg channery loam, 8 to 15 percent slopes, severely eroded (SsC3).—This very droughty soil occurs most commonly downslope from gently sloping Lansdale or Penn soils. The profile is like the one described as typical of the series. Gullies are common, and a few have cut down to bedrock. Included are a few areas that are only moderately eroded.

This soil has severe limitations that make it unsuitable for cultivated crops. Most of it is in pasture or is idle. A small acreage is used for crops. Pasture or woodland is the best use. For pasture, deep-rooted grasses and legumes are suitable.

Topdressing pasture with barnyard manure helps to build up the organic-matter content. Overgrazing is harmful, and so is grazing early in spring before the grass roots are well established. Reseeding should be done in

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strips, and seedbeds should be prepared by disking. Special measures may be needed to control gullies. Areas not needed for pasture can be planted to trees of suitable species. (Capability unit VIe–3; woodland group 24.)

Steinsburg channery loam, 15 to 25 percent slopes, severely eroded (SsD3).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is ordinarily about 12 inches. Practically all of the original surface layer has been lost through erosion, and the present surface layer consists mostly of yellowish-brown channery sandy loam. Gullies are common, and a few have cut down to bedrock. Very little organic matter remains.

This soil has all been cultivated or used as pasture. It is now idle or in low-grade pasture. It is not suitable for cultivated crops and requires intensive conservation measures if used as pasture. Diversion terraces are needed to intercept runoff from higher soils, and gullies should be smoothed, mulched, seeded heavily, limed, and fertilized. (Capability unit VIIe–2; woodland group 24.)

Steinsburg channery loam, 25 to 35 percent slopes, moderately eroded (SsE2).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is ordinarily about 12 inches. Most of the original surface layer has been lost through erosion, and a few shallow gullies have formed.

This soil was clear cut of trees and became low-grade pasture. Most of it is now idle or in scrub pasture. It is unsuitable for cultivated crops and has severe limitations if used as pasture. The best use is to plant it to trees or to allow it to revert to natural forest vegetation. If seedling trees are planted, diversion terraces may be needed to control runoff from higher areas until the trees become established. (Capability unit VIIe–2; woodland group 26.)

Steinsburg channery loam, 25 to 35 percent slopes, severely eroded (SsE3).—The profile of this soil is shallower than the profile described as typical of the series. All of the original surface layer has been lost through erosion, and the present surface layer is yellowish-brown channery sandy loam. Gullies are common, and a few have cut down to bedrock. Very little organic matter remains.

Most of this soil was clear cut of trees and became low-grade pasture. Now, most of it is idle. It is not suitable for cultivated crops or for pasture and should be planted to trees of suitable species. Diversion terraces to intercept runoff from higher areas may be needed until the trees are well established. Smoothing and mulching may also be necessary. (Capability unit VIIe–2; woodland group 28.)

Watchung Series

This series consists of poorly drained, nearly level or gently sloping soils that generally occur in low areas and depressions on uplands. The surface layer is very dark grayish-brown silt loam, and the subsoil is mottled silty clay loam. The parent material weathered from diabase.

These soils are commonly near or adjacent to the Montalto and Mount Lucas soils. They are much more poorly drained than the Montalto soils and are less reddish throughout. They are more poorly drained than the Mount Lucas soils, which are free of mottling in the upper part of the subsoil. Also, they have a finer textured subsoil than the Mount Lucas soils.

Typical profile of Watchung silt loam, 0 to 3 percent slopes, in a pasture 1 mile southwest of Franklintown:

- A_1 1 to 6 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; friable; pH 6.0; gradual, smooth lower boundary; 3 to 9 inches thick.
- A_2 6 to 9 inches, grayish-brown (10YR 5/2) silt loam; few, fine, faint, light brownish-gray (2.5Y 6/2) mottles; weak, fine, subangular blocky structure; friable; pH 6.0; abrupt, smooth lower boundary; 2 to 5 inches thick.
- B_{1g} 9 to 19 inches, yellowish-brown (10YR 5/8) silty clay loam; common, medium, distinct, light brownish-gray (10YR 6/2) mottles; moderate, medium, subangular blocky structure; continuous clay films on ped faces; firm when moist, slightly sticky and slightly plastic when wet; pH 6.2; gradual, wavy lower boundary; 8 to 12 inches thick.
- B_{2g} 19 to 28 inches, yellowish-brown (10YR 5/4) silty clay loam; common, medium, distinct, light-gray (10YR 7/2) and strong-brown (7.5YR 5/8) mottles; moderate, medium, blocky structure; continuous clay films on ped faces; firm when moist, sticky and plastic when wet; pH 6.2; gradual, wavy lower boundary; 7 to 10 inches thick.
- B_{3g} 28 to 36 inches, dominantly brown (10YR 5/3) silty clay loam; many, medium, distinct, strong-brown (7.5YR 5/6) and light brownish-gray (10YR 6/2) mottles; strong, medium, blocky structure; continuous clay films on ped faces; firm when moist, sticky and plastic when wet; pH 6.4; gradual, wavy lower boundary; 7 to 10 inches thick.
- C_{1g} 36 to 45 inches, dark yellowish-brown (10YR 4/3) gritty heavy silt loam; few, medium, distinct, grayish-brown (10YR 5/2) mottles; moderate, medium and coarse, subangular blocky structure; firm when moist, slighty sticky and slighty plastic when wet; pH 6.4; 7 to 11 inches thick.
- D_r 45 inches +, diabase.

The surface soil is grayish brown to very dark grayish brown, and the subsoil is mottled yellowish brown to mottled gray. Mottling ordinarily begins at a depth of about 6 inches but may begin anywhere between the surface and a depth of 15 inches. The texture of the subsoil is silty clay loam to silty clay. In depressions, colluvium from the adjacent slopes has accumulated. The colluvial material ranges from only a few inches to 2 feet in depth.

The Watchung soils are medium acid in the upper layers and slightly acid in the lower layers. Tilth is poor. Because of slow permeability in the subsoil, the water table is high during much of the growing season. Draining these soils artificially is difficult.

Watchung silt loam, 0 to 3 percent slopes (WaA).—This soil occurs in depressions, generally next to areas of more strongly sloping Watchung or Lehigh soils. The profile is like the one described as typical of the series. The depth to bedrock is ordinarily more than 4 feet.

This soil is not likely to erode, but it has other limitations that are very difficult to remedy. It should not be worked, grazed, or driven over when wet. It is wet most of the year and is difficult to drain. Because of the slowly permeable subsoil, tiling is generally impractical, but properly placed rock wells (sumps), with tile, improve drainage where suitable outlets exist. Open ditches are of some benefit, but suitable outlets for these are lacking in many places. Bedding improves drainage somewhat in pastures and hayfields.

Pasture, woodland, and wildlife habitats are the only uses for which this soil is suitable. At present about

half of the acreage is used as pasture, and the rest is in hay or trees or is idle. Only plants that will tolerate large amounts of moisture can be used for hay and pasture.

Pin oak, beech, and red maple are the native trees that should be favored. For underplanting, white pine should be used. (Capability unit Vw–1; woodland group 18.)

Watchung silt loam, 3 to 5 percent slopes (WaB).—This soil is a little better drained than Watchung silt loam, 0 to 3 percent slopes, and its profile is a little shallower. It ordinarily occurs at the upper end of drainageways, above the nearly level Watchung soil.

This soil is only slightly erodible, but it has other limitations that are very difficult to remedy. It should not be worked, grazed, or driven over when wet. It is subject to heavy seepage from higher slopes, and, because of slow permeability in the subsoil, it remains wet much of the year. Tiling is generally impractical. Open ditches have to be carefully graded, to prevent cutting. Properly placed rock wells (sumps), with tile, are of some benefit. Diversion terraces that will intercept water from higher slopes will help where outlets are available. Bedding is effective in many places on slopes that are near the lower limit of the slope range.

Most of this soil is used as pasture or is idle. Pasture, woodland, and wildlife habitats are the only suitable uses. Only moisture-tolerant grasses and trees can be grown. (Capability unit Vw–1; woodland group 18.)

Watchung very stony silt loam, 0 to 8 percent slopes (WcB).—All of this soil is wooded. Diabase boulders 3 feet or more in diameter occupy from 3 to 15 percent of the surface, and there are stones throughout the profile. Between the stones, the surface is covered with a layer of black mull-like material about 3 inches thick. Beneath this layer, the profile is like the one described as typical of the series, except for being stony.

There is little or no likelihood of erosion, but, because of stoniness and other severe limitations, this soil is suitable only for woodland and for wildlife habitats. It is not suitable for pasture, because it is too stony to be mowed and removing stones is impractical. Drainage is also impractical, because of the stones and the slowly permeable subsoil.

Native trees that should be encouraged are pin oak, beech, and red maple. For underplanting, white pine is suitable. (Capability unit VIIs–2; woodland group 18.)

Wehadkee Series

This series consists of poorly drained, nearly level soils on flood plains. The surface layer is dark grayish brown, the upper part of the subsoil is mottled yellowish brown, and the lower part of the subsoil is mottled grayish brown. Most of the soil material washed from uplands underlain by schist, phyllite, diabase, and metabasalt.

These soils are commonly near or adjacent to the Congaree and Chewacla soils. The Chewacla soils are better drained than the Wehadkee and are unmottled in the surface layer and in the upper part of the subsoil. The Congaree soils are much better drained and are unmottled.

Typical profile of Wehadkee silt loam in a pasture 1 mile north of Bridgeton:

A_p 0 to 10 inches, dark grayish-brown (10YR 4/2) silt loam; few, fine, faint, yellowish-brown (10YR 5/4) mottles; weak, fine, granular structure; friable; pH 5.8; 8 to 10 inches thick.

C_{1g} 10 to 27 inches, yellowish-brown (10YR 5/4) silt loam; common, medium, distinct, yellow (10YR 7/6) and pale-brown (10YR 6/3) mottles; weak, fine, subangular blocky structure; friable; pH 5.6; 13 to 25 inches thick.

C_{2g} 27 to 36 inches +, grayish-brown (2.5Y 5/2) silty clay loam; common, coarse, distinct mottles of gray (N 6/0) and light yellowish brown (10YR 6/4); weak, fine, subangular blocky structure; firm when moist; pH 5.4; 10 to 30 inches thick.

The surface layer is dark grayish brown to light brownish gray, and the subsoil is mottled yellowish brown to mottled grayish brown. The texture of the subsoil is silty clay loam to silty clay. Mottling ordinarily begins at a depth of about 7 inches but may begin anywhere between the surface and a depth of 12 inches. Where the soil material was derived from schist, the content of mica is high; where the soil material was derived from diabase, metabasalt, and phyllite, the mica content is relatively low. Included are small areas of soils formed from materials washed from quartzite, quartz, and aporhyolite.

The Wehadkee soils are moderately fertile and strongly acid. Unless drained, they have a high water table during much of the growing season. Where the stream channels are deep enough and suitable outlets are available. drainage is effective. Flooding is the principal hazard. Tilth is fair to poor.

Wehadkee silt loam (Wd).—Where the depth to the normal level of the stream is 25 inches or more, this soil is somewhat removed from the streambank. Where the depth to the normal level of the stream is less than 25 inches, this soil may extend to the streambank.

If drained and protected from floods, this soil is fairly well suited to late-season corn and to small grain. Deepening and straightening the stream channels lowers the water table and helps to prevent flooding. Open drains are feasible where there are suitable outlets, and tile are effective in a few places that have suitable outlets.

Narrow areas of this soil that adjoin moderately steep slopes should be used as pasture. Pastures should not be grazed when wet. (Capability unit IIIw–1; woodland group 17.)

Wehadkee silt loam, local alluvium, 3 to 8 percent slopes (We).—This soil is on toe slopes and in the upper part of drainageways. Generally it is next to areas of Manor or Glenelg soils. It is not likely to be flooded, but it has a high water table in winter and spring, principally as a result of seepage from the adjoining uplands. The profile is like the one described as typical of the series, except that a thin layer of local alluvium has been deposited over the original surface layer.

To make this soil productive, drainage is necessary. Diversion terraces at the base of the adjoining slopes will help to control runoff and seepage. Open drains with suitable outlets may be effective on slopes near the lower limit of the slope range. Tile are effective in some places.

If drained, this soil is fairly well suited to late-season corn and to small grain. An example of a suitable rotation is the following: corn, a cover crop, a spring-sown small grain, and 2 years of hay. Much of the acreage is used as pasture. Pastures should be seeded to moisture-tolerant grasses and legumes and should not be grazed when wet. (Capability unit IIIw–1; woodland group 17.)

Wheeling Series

This series consists of deep, well-drained soils on stream terraces. The surface layer is brown to dark-brown silt loam, and the subsoil is yellowish-brown to brown silt loam or sandy loam. The parent material was old alluvium washed from soils formed in glacial deposits.

These soils are commonly near or adjacent to the Sciotoville and Penn soils. They are better drained than the Sciotoville soils, which are mottled in the lower part of the subsoil. They are less red than the Penn soils, which are on uplands, and they have a much thicker solum.

Wheeling soils occur in the extreme northern part of York County, near New Market. The acreage is very small and is mostly urban.

Typical profile of Wheeling silt loam, 3 to 8 percent slopes, moderately eroded, in an idle field near New Market:

- A_p 0 to 9 inches, brown to dark-brown (10YR 4/3) silt loam; weak, medium, granular structure; friable; pH 5.8; clear, smooth lower boundary; 7 to 10 inches.
- A_2 9 to 14 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine, subangular blocky structure; friable; pH 5.6; clear, wavy lower boundary; 4 to 6 inches thick.
- B_1 14 to 26 inches, dark yellowish-brown (10YR 5/6) silt loam; weak, medium, subangular blocky structure; friable; pH 5.6; clear, smooth lower boundary; 10 to 14 inches thick.
- B_2 26 to 32 inches, brownish-yellow (10YR 6/6) silt loam; moderate, medium, subangular blocky structure; friable; pH 5.4; gradual, wavy lower boundary; 5 to 8 inches thick.
- IIB_3 32 to 48 inches, brown to dark-brown (7.5YR 4/4) fine sandy loam; moderate, medium, subangular blocky structure; friable; pH 5.4; gradual, wavy lower boundary; 14 to 20 inches thick.
- IIC_1 48 to 60 inches +, dominantly yellowish-brown (10YR 6/2) sandy loam; about 15 percent gravel; structureless; weakly cemented in place; friable when crushed; pH 5.0; 10 to 30 inches thick.

The surface layer is brown to very dark grayish brown, and the subsoil is dark yellowish brown to reddish brown. Internal drainage is rapid to moderately rapid. Fine and medium gravel of quartzite and sandstone constitutes about 10 percent, by volume, of the upper layers of the profile and about 20 percent of the lower layers. In some places the subsoil contains stratified sand and gravel. Included in the silt loam mapping units are small areas of loam.

The Wheeling soils are strongly acid and are moderately high in fertility. They are good sites for residential, commercial, and industrial development.

Wheeling silt loam, 3 to 8 percent slopes, moderately eroded (WgB2).—The profile of this soil is like the profile described as typical of the series. Runoff is moderate, and internal drainage is medium.

This soil is very well suited to residential, commercial, and industrial development. Most of it is in urban or suburban locations. Since the depth to bedrock is ordinarily more than 6 feet, construction of residences usually does not necessitate excavation into bedrock. Foundation conditions are good. Normal loads of sewage and industrial waste can be disposed of satisfactorily in most places. All grasses, shrubs, and trees that require a well-drained soil can be grown. (Capability unit IIe–2; woodland group 1.)

Wheeling silt loam, 8 to 15 percent slopes, moderately eroded (WgC2).—Most of this soil is on short slopes adjacent to areas of the gently sloping Wheeling soil. The profile is shallower than the one described as typical of the series.

This soil is suited to residential, commercial, and industrial development. Most of it is in urban or suburban locations. Since the depth to bedrock is ordinarily more than 5 feet, construction of residences usually does not necessitate excavation into bedrock. Foundation conditions are good. Normal loads of sewage and industrial waste can be disposed of satisfactorily. Because there is some likelihood of erosion, preparation for seeding or planting should be on the contour. (Capability unit IIIe–2; woodland group 5.)

Whiteford Series

This series consists of deep to moderately deep, gently sloping to moderately sloping, well-drained soils on uplands. The surface layer is brown to dark-brown silt loam, and the subsoil is yellowish-red to reddish-brown silty clay loam. The parent material weathered from slate. Moderate slopes predominate.

These soils are near or adjacent to the Cardiff and Chester soils. They are deeper than the Cardiff soils and have a redder and finer textured subsoil. They have a redder subsoil than the Chester soils and are finer textured in the lower part of the subsoil.

Whiteford soils occur near Delta in York County. The acreage is small.

Typical profile of Whiteford silt loam, 3 to 8 percent slopes, moderately eroded, in an idle field 1 mile southwest of Slate Hill:

- A_p 0 to 9 inches, brown to dark-brown (7.5YR 4/2) silt loam; weak, medium, granular structure; friable; pH 5.8; clear, smooth lower boundary; 8 to 10 inches thick.
- B_1 9 to 14 inches, reddish-brown (5YR 4/3) silt loam; weak, fine, subangular blocky structure; friable; pH 5.5; clear, smooth lower boundary; 3 to 7 inches thick.
- B_{21} 14 to 22 inches, yellowish-red (5YR 4/8) silty clay loam; weak to moderate, medium, subangular blocky structure; firm when moist, slightly plastic when wet; pH 5.5; gradual, smooth lower boundary; 6 to 10 inches thick.
- B_{22} 22 to 32 inches, yellowish-red (5YR 4/6) slaty silty clay loam; strong, medium, subangular blocky structure; firm when moist, slightly plastic when wet; pH 5.3; gradual, wavy lower boundary; 8 to 12 inches thick.
- C_1 32 to 37 inches, reddish-brown (5YR 4/3) slaty silty clay loam; weak, medium, platy structure; firm when moist, slightly plastic when wet; pH 5.3; 3 to 7 inches thick.
- D_r 37 inches +, slate.

The surface layer is brown to dark brown. The upper part of the subsoil is ordinarily reddish brown but ranges to yellowish brown. From 5 to 15 percent of the surface layer, by volume, consists of slate fragments, and from 10 to 15 percent of the subsoil. Small areas of a slaty phase are included in the silt loam mapping units. Also included are areas of a deep soil that formed from material weathered from Martinsburg shale and that has a reddish B horizon.

The Whiteford soils are strongly acid and moderately fertile. They are erodible, but tilth is good. The available moisture capacity is moderate to moderately high.

Whiteford silt loam, 3 to 8 percent slopes, moderately eroded (WhB2).—This soil occurs on moderately broad

ridgetops, next to areas of more strongly sloping Whiteford and Cardiff soils. The profile is like the one described as typical of the series.

This soil is suitable for all the crops commonly grown in the county if the organic-matter content is maintained, moisture is conserved, and crops are grown in proper rotation. A 3-year rotation should include at least 1 year of hay. All cultivation should be on the contour. The longer slopes need contour strips, diversion terraces, cropland terraces, and sodded waterways. Lime and fertilizer are required. (Capability unit IIe–2; woodland group 1.)

Whiteford silt loam, 8 to 15 percent slopes, moderately eroded (WhC2).—The profile of this soil is shallower than the profile described as typical of the series. The depth to bedrock is ordinarily about 30 inches. A few shallow gullies have formed.

Maintaining the organic-matter content and conserving moisture are important in managing this erodible soil. A row crop should be grown no more often than once in 4 years. The longer slopes need to be protected by contour strips, grassed waterways, and diversion terraces.

Pastures should be seeded to deep-rooted grasses and legumes, and grazing should be controlled. (Capability unit IIIe–2; woodland group 5.)

Wickham Series

This series consists of deep, well-drained, level or gently sloping soils on stream terraces. The parent material was old alluvium derived wholly or largely from schist and phyllite.

These soils are commonly near or adjacent to soils of the Congaree catena, which are on bottom lands, and to the Manor and Chester soils, which are on uplands. The soils of the bottom lands are subject to flooding; they are less well developed than the Wickham soils and are less red in the lower part of the subsoil. The Manor soils are channery and have a thinner solum than the Wickham soils. The Chester soils have a thinner solum and a finer textured lower subsoil.

Wickham soils occur in the central part of York County, principally along Codorus Creek.

Typical profile of Wickham silt loam, 0 to 3 percent slopes, in a cultivated field along Codorus Creek 1 mile southwest of York:

- A_p 0 to 8 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine, granular structure; friable; pH 6.0; clear, smooth lower boundary; 7 to 10 inches thick.
- B_1 8 to 13 inches, yellowish-brown (10YR 5/6) silt loam; weak, fine, subangular blocky structure; friable; pH 5.8; gradual, smooth lower boundary; 4 to 7 inches thick.
- B_2 13 to 22 inches, strong-brown (7.5YR 5/6) silty clay loam; weak, medium, subangular blocky structure; friable; pH 5.6; clear, smooth lower boundary; 7 to 11 inches thick.
- B_3 22 to 36 inches, reddish-yellow (7.5YR 6/6) silty clay loam; moderate, medium, subangular blocky structure; thin, continuous clay films on ped faces; firm when moist, slightly plastic when wet; pH 5.4; gradual, wavy lower boundary; 10 to 16 inches thick.
- C_1 36 to 50 inches +, yellowish-red (5YR 5/8) silty clay loam to silty clay; about 20 percent gravel; weak, medium and coarse, subangular blocky structure; continuous clay films on ped faces; firm when moist, slightly sticky and slightly plastic when wet, hard when dry; pH 5.0; 14 to 30 inches thick.

The surface layer is brownish gray to dark yellowish brown, and the subsoil is yellowish brown to reddish brown. The content of mica is high. The alluvial deposit in which these soils formed is ordinarily about 5½ feet thick, but it ranges from 4 to 7 feet in thickness. Gravel of milky quartz, rose quartz, and quartzite constitutes from 5 to 15 percent of the surface layer, by volume, and from 10 to 30 percent of the subsoil.

The Wickham soils are strongly acid and highly fertile. Tilth is good. The available moisture capacity is moderately high. All the common crops of the county can be grown.

Wickham silt loam, 0 to 3 percent slopes (WkA).—This soil is generally next to areas of the gently sloping Wickham soil. The profile is like the one described as typical of the series. The depth to bedrock is ordinarily about 72 inches. Tilth is good, and the fertility is high. There is little or no risk of erosion.

This is an excellent soil for all the crops commonly grown in the county. It can be farmed intensively if managed so as to preserve the soil structure and to maintain the organic-matter content. Examples of suitable rotations are the following: a row crop, a cover crop, another row crop, and a small grain or hay; or, a row crop, a small grain, and hay. Slopes near the upper limit of the slope range should be farmed on the contour. Truck crops do very well, and nearby streams are a convenient source of water for irrigating such crops. (Capability unit I–3; woodland group 1.)

Wickham silt loam, 3 to 8 percent slopes, moderately eroded (WkB2).—This soil is generally adjacent to areas of the nearly level Wickham soil and to flood-plain soils of the Congaree catena. The slopes are short. The profile is a little shallower than the one described as typical of the series.

This soil is suitable for all the crops commonly grown in the county. Truck crops do well; they can be irrigated with water from nearby streams. All cultivation should be on the contour. A 3-year rotation should include at least 1 year of hay. Yields can be increased substantially by adding organic matter through the use of barnyard manure, green manure, and crop residues. (Capability unit IIe–2; woodland group 1.)

Worsham Series

This series consists of poorly drained, nearly level soils that occur in depressions and on the lower part of slopes and are affected by seepage water. The surface layer is brown to dark-brown silt loam, the upper part of the subsoil is grayish-brown mottled silty clay loam, and the lower part is light-gray mottled silty clay loam. The parent material was colluvium weathered from schist and phyllite.

These soils commonly occur on toe slopes below areas of the Chester, Glenelg, Manor, and Glenville soils. The Chester, Glenelg, and Manor soils are better drained than the Worsham and are unmottled throughout. Both the Manor and the Glenelg soils have a thinner solum than the Worsham. The Glenville soils are better drained

than the Worsham, are less gray throughout, and are unmottled in the upper part of the subsoil.

Typical profile of Worsham silt loam (3 to 8 percent slopes) in a pasture:

A_1 0 to 5 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; pH 6.0; abrupt, smooth lower boundary; 3 to 6 inches thick.

A_2 5 to 9 inches, dark-brown (10YR 4/3) silt loam; few, fine, faint, grayish-brown (10YR 5/2) mottles; weak, fine, subangular blocky structure; friable; pH 5.8; clear, wavy lower boundary; 2 to 6 inches thick.

B_{1g} 9 to 20 inches, grayish-brown (10YR 5/2) silt loam; common, fine, distinct, grayish-brown (10YR 5/2) and yellowish-red (5YR 4/8) mottles; weak, medium, subangular blocky structure; firm when moist, slightly plastic when wet; pH 5.6; clear, wavy lower boundary; 8 to 13 inches thick.

B_{2g} 20 to 30 inches, light-gray (5Y 6/1) silty clay loam; common, prominent, reddish-yellow (5YR 6/4) and dark-gray (10YR 4/1) mottles; moderate, medium, subangular blocky structure; continuous clay films on ped faces; firm when moist, plastic and slightly sticky when wet; pH 5.0; abrupt, smooth lower boundary; 8 to 14 inches thick.

B_{3g} 30 to 36 inches, grayish-brown (2.5Y 5/2) silty clay loam; common, distinct, reddish-brown (5YR 4/4) mottles; weak, coarse, subangular blocky structure; continuous clay films on ped faces; very firm when moist, plastic and sticky when wet; pH 5.0; 4 to 12 inches thick.

C_1 36 inches +, partly weathered schist fragments.

The surface layer is light gray to dark grayish brown, and the subsoil is mottled light gray to mottled light grayish brown. The texture of the subsoil is silty clay loam to silty clay. Mottling ordinarily begins at a depth of about 7 inches but may begin anywhere from the surface to a depth of 15 inches. The colluvial fragments range from a few inches to 2 feet in diameter. The content of mica is higher where the parent material weathered from schist and lower where the parent material was derived from phyllite. Locally, the parent material included material weathered from quartzite, quartz, and aporhyolite. Small areas of poorly drained soils on terraces are included in the mapping units.

The Worsham soils are strongly acid. Tilth is fair to poor. Because of slow permeability in the subsoil, there is a seasonally high water table that may persist well into the growing season. These soils are not suitable for alfalfa or for potatoes or other root crops. Even if drained, they are best used for hay or pasture.

Worsham silt loam (Wo).—This soil generally occurs on toe slopes, below areas of the moderately well drained Glenville soils. It is affected by seepage from the adjoining slopes and is wet a good part of the year. In some areas a foot or more of silt loam local alluvium has been deposited over the original surface layer; otherwise, the profile is like the one described as typical of the series. There is little or no erosion hazard.

Almost all of this soil is in hay or pasture. Drainage is the principal management problem. Because the subsoil is slowly permeable, tile are effective only where a covering of local alluvium has been deposited. The alluvium is more permeable than the original soil. Open drains can be used if suitable outlets are available. Diversion terraces are needed to intercept runoff from the adjoining hillsides. Pastures should be seeded to moisture-tolerant grasses and legumes. Fertilizer and organic matter are needed. If worked, grazed, or driven over when wet, this soil will become compact and its structure will be destroyed. (Capability unit Vw-1; woodland group 17.)

Formation and Classification of Soils

Soil is created by the forces of weathering and soil development acting on parent material that was deposited or accumulated by geologic agencies. At any given place the characteristics of the soil depend on (1) the physical and mineralogical composition of the parent material; (2) the climate under which the soil material accumulated and has existed since accumulation; (3) the plant and animal life on and in the soil; (4) the relief, or lay of the land; and (5) the length of time the forces of development have acted on the material.

The five soil-forming factors are interdependent; each modifies the effects of the others. Climate and vegetation are the active forces, but the effects of climate and vegetation are influenced by relief. Relief affects surface drainage, the amount of water that percolates through the soil, erosion, and the vegetation of the soil. In some places the kind of profile that forms is determined almost entirely by the nature of the parent material, which modifies the effects of climate and vegetation. Finally, time is required for the development of all soils. The length of time that the forces of soil formation have worked is reflected in the degree of differentiation of the soil horizons.

The first part of this section describes the factors of soil formation in York County. The second gives the classification of the soils by great soil groups, and the third gives the classification of the soils by catenas.

Factors of Soil Formation

The factors of soil formation are so closely interrelated in their effects that few generalizations can be made about one factor unless conditions are specified for the other four. The interrelations of these factors are so complex that many of the soil-development processes are unknown.

Parent material

The parent material of the soils in this county is of two broad classes: (1) alluvium and colluvium—unconsolidated deposits of material transported by water or gravity or both; and (2) residuum—material weathered from the underlying rock. Soils that formed from residuum are by far the more extensive. Soils that formed from alluvium and colluvium occupy a comparatively small acreage, principally along streams and drainageways and in depressions.

The residuum weathered from igneous, sedimentary, and metamorphic rock of many different kinds, including limestone, shale, sandstone, schist, gneiss, diabase, metabasalt, and aporhyolite.

In the northern part of the county, red shale and sandstone of Triassic age are the most extensive of the sedimentary rocks. They were the source of parent material for the Penn and Readington soils. Schist and gneiss are the major metamorphic rocks. They were the source of parent material for the Chester, Glenelg, and Manor soils. In some parts of the county, limestone has supplied parent material for some inextensive but highly productive soils, principally the Hagerstown, Conestoga, and Bedford.

Metabasalt and aporhyolite, both igneous rocks, are most extensive in the southern part of the county. Diabase, which occurs as intrusions in the Triassic sandstone and shale, is common in the northern part. The Montalto

and the Highfield are the principal soils that formed from material weathered from the igneous rocks.

The Huntington, Lindside, and Melvin soils are the most extensive of the soils that formed from transported material.

Climate

York County has a humid, temperate climate. The average annual temperature is about 53 degrees, and the average annual precipitation is about 40 inches.

The climate is uniform over the county. Therefore, although the climate has had an important overall influence on the characteristics of the soils, it has had little bearing on local differences among them. Because temperatures are moderate and the precipitation is ample, physical and chemical weathering has been moderately rapid. Soluble materials have been leached from the soils, and the less soluble materials have been moved downward in the profile.

Some variations in plant and animal life result from variations in temperature and from the action of other climatic forces. To that extent, climate influences changes that depend on the effect of plant and animal population.

Plant and animal life

Plants, micro-organisms, earthworms, and other forms of life on and in the soil are active in the soil-forming processes. The changes they bring about depend mainly on the kind of life processes peculiar to each. The kinds of plants and animals are determined by climate, parent material, relief, age of the soil, and by other organisms.

Most of the soils in York County formed under forest. Oaks, hickories, pines, and yellow-poplars are prominent in the present forests and probably were numerous in the original forests.

Decayed leaves, twigs, roots, and entire plants accumulate on the surface of forest soils and then decompose as a result of the action of micro-organisms, earthworms, and other forms of life and as a result of chemical reactions brought about by the forces of climate. Through this process organic matter is added to the soils. The amount of organic matter is likely to be greater in hollows and depressions, where the soils remain moist, than the amount on slopes.

Relief and age

Relief affects the formation of soils by modifying internal drainage, runoff, the rate of erosion, and other results of water action. In York County the relief varies considerably from place to place. Because of these variations, different soils have developed from the same kind of parent material.

Generally, the longer the soil material remains in place, the more fully developed the soil profile will be. Differences in parent material, relief, and climate cause some to mature more slowly than others. Alluvial soils are immature because the transported parent materials are young and new materials are deposited periodically. Soils on steep slopes are also likely to be immature because geologic erosion removes the soil as fast as it forms. Some kinds of parent rock are so resistant to weathering that soil development is very slow even though other conditions are favorable. A mature soil is one that has well-developed A and B horizons that were produced by the natural processes of soil formation. An immature soil has little or no differentiation.

Classification of Soils

The soils of York County have been grouped according to two classification systems: the great soil group and the soil catena.

Great soil groups

A great soil group consists of soils that are similar in several fundamental characteristics. They have the same kind and number of horizons, although corresponding horizons are not necessarily of the same thickness or expressed with the same degree of clarity. In some characteristics the soils of any given group may differ considerably. Many soils have some of the significant characteristics of more than one great soil group and are called intergrades. The following list shows the classification of the soils of York County.

Gray-Brown Podzolic soils (intergrading to Red-Yellow Podzolic soils)

Athol	Glenville
Bedford	Hagerstown
Birdsboro	Highfield
Brecknock	Lansdale
Chester	Murrill
Conestoga	Raritan
Duffield	Readington
Edgemont	Sciotoville
Elk	Wheeling
Glenelg	Wickham

Gray-Brown Podzolic soils (intergrading to Lithosols)

Cardiff	Pequea
Legore	Steinsburg
Penn	

Gray-Brown Podzolic soils (intergrading to Planosols)

Lehigh

Gray-Brown Podzolic soils (intergrading to Alluvial soils)

Ashton

Red-Yellow Podzolic soils

Altavista	Whiteford
Elioak	

Red-Yellow Podzolic soils (intergrading to Reddish-Brown Lateritic soils)

Arendtsville	Mount Lucas
Montalto	

Sols Bruns Acides

Lewisberry	Manor

Planosols

Croton	Lawrence
Guthrie	Watchung
Lamington	

Low-Humic Gley soils

Bowmansville	Wehadkee
Melvin	Worsham

Alluvial soils

Bermudian	Huntington
Chewacla	Lindside
Congaree	Rowland

Lithosols

Catoctin

Each of the groups in this classification is described in the following paragraphs.

Gray-Brown Podzolic soils (intergrading to Red-Yellow Podzolic soils).—Undisturbed soils in this group have a relatively thin organic layer and a moderately leached A horizon. The B horizon contains a little more clay than the A horizon and has a moderately developed subangular blocky or blocky structure. Only small amounts of the easily weathered minerals remain in these soils, and the degree of base saturation is moderately low.

The well-drained soils in this group are the Athol, Birdsboro, Brecknock, Chester, Conestoga, Duffield,

Edgemont, Elk, Glenelg, Hagerstown, Highfield, Lansdale, Murrill, Wheeling, and Wickham. The moderately well drained soils are the Bedford, Glenville, Raritan, Readington, and Sciotoville.

These Gray Brown Podzolic soils developed under a mixed hardwood forest. Podzolization and some laterization have been the soil-forming processes. The Athol, Bedford, Conestoga, Duffield, and Hagerstown soils developed from material weathered from limestone and dolomite but are moderately low in bases. The other soils formed from more acid materials, and all of them except the Chester and Murrill soils are low in bases, particularly in calcium and magnesium. The profile of Chester silt loam in the section "Descriptions of the Soils" is typical of this group.

Gray-Brown Podzolic soils (intergrading to Lithosols).—The soils in this group are shallow or moderately shallow to bedrock. They commonly have large amounts of fragmented parent material on the surface and mixed through the profile. The B horizon is thin and discontinuous. It has a slight to moderate accumulation of clay and weak to moderate structure. The Cardiff, Legore, Penn, Pequea, and Steinsburg soils are in this group. The profile of Penn silt loam in the section "Descriptions of the Soils" is typical of the group.

Gray-Brown Podzolic soils (intergrading to Planosols).—These soils have a slowly permeable layer in the subsoil, which inhibits drainage and limits root development. There is a distinct boundary between the silt loam surface layer and the silty clay or silty clay loam subsoil. The Lehigh soils are in this group.

Gray-Brown Podzolic soils (intergrading to Alluvial soils).—The Ashton soils are the only ones in this group. They are similar to the soils in the Alluvial great soil group, but they are slightly above the normal flood plain and seldom receive deposits of new material. The B horizon has a moderate subangular blocky structure, and there has been a moderate increase in its clay content. The horizons differ very little in color.

Red-Yellow Podzolic soils.—Soils of the Red-Yellow Podzolic group are characterized by a strongly leached, light-colored surface horizon low in organic matter. The subsoil is finer textured, higher in sesquioxides, and red or yellowish red in color. The Altavista, Elioak, and Whiteford soils are in this group.

Red-Yellow Podzolic soils (intergrading to Reddish-Brown Lateritic soils).—These soils are much like the Gray-Brown Podzolic soils intergrading to Red-Yellow Podzolic soils. The A_2 horizon, however, is thinner or more weakly expressed, and the B horizon is finer textured and contains larger amounts of sesquioxides. The well drained Arendtsville and Montalto soils and the moderately well drained Mount Lucas soils are in this group.

Sols Bruns Acides.—Soils in this group are characterized by weak development in the A and B horizons. The A horizon is strongly leached. The B horizon has stronger chroma than the A horizon but does not contain much more clay, and the structure in the B horizon is only weakly to moderately developed. The soils are strongly acid and low in base saturation. The Lewisberry and Manor soils are in this group.

Planosols.—The soils in this group are somewhat poorly drained or poorly drained. They have one or more horizons abruptly separated from and distinctly contrasting with an adjacent horizon because of high clay content or firm or very firm consistence. The distinct contrast usually occurs as a strongly developed fragipan or clayey pan in the lower part of the B horizon. This slowly permeable layer restricts drainage and limits root development. The Croton, Guthrie, Lamington, Lawrence, and Watchung soils are in this group.

Low-Humic Gley soils.—The soils in this group are poorly drained. They occur in low areas and depressions and are affected by seep water and a high water table. They have a thin surface horizon, usually relatively high in organic matter. The subsoil is distinctly mottled and usually finer textured and lighter colored than the surface horizon. The Bowmansville, Melvin, Wehadkee, and Worsham soils are in this group. All but the Worsham soils are on bottom lands and are subject to flooding. The profile of Wehadkee silt loam in the section "Descriptions of the Soils" is typical of the group.

TABLE 9.—*Soil catenas in York County*

SOILS ON UPLANDS

Parent material	Shallow; well drained	Moderately deep; well drained	Deep; well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
Residuum from—							
Relatively pure limestone.	----------	----------	Hagerstown---	Bedford-----	Lawrence-----	Guthrie-----	----------
Dark-colored limestone and calcareous shale.	----------	----------	Duffield-----	Duffield [1]----	Lawrence-----	----------	----------
				Lawrence [2]---	----------	----------	----------
Dark-gray calcareous graphitic schist.	Pequea-----	Pequea [3]-----	Conestoga----	Bedford-----	Lawrence-----	Guthrie-----	Guthrie.
		Conestoga [4]---	----------	----------	----------	----------	----------
Schist and phyllite-----	Manor-----	Glenelg-----	Chester-----	Glenville----	Glenville [1]----	Worsham----	Worsham.
					Worsham [2]----	----------	----------
Schist and phyllite (strongly weathered).	----------	----------	Elioak------	Glenville----	Glenville [1]----	Worsham-----	Worsham.
					Worsham [2]----	----------	----------
Quartzite----------	----------	Edgemont----	Edgemont----	----------	----------	----------	----------
Slate----------	Cardiff-----	Cardiff [3]-----	Whiteford----	----------	----------	----------	----------
Diabase (dark-colored basic igneous rock).	Legore-----	Legore [3]-----	Montalto-----	Mount Lucas--	Mount Lucas [1]--	Watchung----	----------
					Watchung [2]----	----------	----------
Triassic slate (porcelanite).	----------	Brecknock----	----------	Lehigh------	Lehigh [1]------	Croton------	Croton.[1]
					Croton [2]------	----------	----------
Triassic red shale and sandstone.	Penn [4]-----	Penn---------	----------	Readington---	Readington [1]--	Croton------	Croton.[1]
					Croton [2]------	----------	----------

See footnotes at end of table.

TABLE 9.—*Soil catenas in York County*—Continued

SOILS ON UPLANDS—Continued

Parent material	Shallow; well drained	Moderately deep; well drained	Deep; well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
Residuum from—							
Triassic red shale				Penn	Penn [1]	Croton	
				Readington	Readington		
					Croton [2]		
Triassic gray sandstone and shale.	Steinsburg	Steinsburg [3]	Lansdale	Readington	Readington [1]	Croton	
		Lansdale [4]			Croton [2]		
Triassic sandstone and conglomerate.			Lewisberry	Readington			
Triassic mixed breccia (fanglomerate).			Arendtsville				
Triassic limestone breccia.		Athol	Athol				
Aporhyolite and various kinds of schist.	Catoctin	Catoctin [3]	Highfield	Glenville	Glenville [1]	Worsham	Worsham.
		Highfield [4]			Worsham [2]		
SOILS ON COLLUVIAL SLOPES							
Colluvium from—							
Soils derived from limestone and having a firm B horizon.				Bedford	Lawrence	Guthrie	
Soils derived from sandstone and shale; deposited over limestone.			Murrill				
Soils derived from limestone.			Huntington (local alluvium).		Lawrence	Guthrie	
SOILS ON TERRACES							
Old alluvium from—							
Soils formed in glacial outwash and having a strong B horizon.			Wheeling	Sciotoville	Sciotoville [1]		
Soils derived predominantly from limestone.			Elk				
Soils derived predominantly from Triassic red sandstone and shale.			Birdsboro	Raritan	Raritan [1]	Lamington	
					Lamington [2]		
Soils derived predominantly from schist and phyllite.			Wickham	Altavista	Altavista [1]		
SOILS ON FLOOD PLAINS							
Recent alluvium from—							
Soils derived predominantly from limestone.			Huntington	Lindside	Lindside [1]	Melvin	
					Melvin [2]		
Soils derived from limestone, shale, and sandstone.			Ashton				
Soils derived from schist, phyllite, diabase, and metabasalt.			Congaree	Chewacla	Chewacla [1]	Wehadkee	
					Wehadkee [2]		
Soils derived from Triassic red shale and sandstone.			Bermudian	Rowland	Rowland [1]	Bowmansville.	
					Bowmansville. [2]		

[1] This series, as represented in this county, is in the better drained range of this drainage class.

[2] This series, as represented in this county, is in the more poorly drained range of this drainage class.

[3] This series, as represented in this county, is in the shallower range of this depth class.

[4] This series, as represented in this county, is in the deeper range of this depth class.

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Alluvial soils.—Alluvial soils occur on bottom lands. They form from water-deposited sediments that have been in place only a relatively short time. New material is deposited by recurrent floods. There is little if any horizon development. The soils are separated according to drainage and the source of the soil material. The Bermudian, Chewacla, Congaree, Huntington, Lindside, and Rowland soils are in this group.

Lithosols.—Lithosols do not have clearly expressed, genetically related horizons. They form in material that is shallow or very shallow to bedrock. Many are stony. They occur in hilly or mountainous regions, on steep slopes. The Catoctin soils are in this group.

Soil catenas

A different, but very helpful and practical, grouping of soils is grouping by catenas. A catena consists of soils that developed from similar parent material under the same climatic conditions but that are differentiated by characteristics resulting from differences in relief and drainage. The soils in a catena are ordinarily closely

TABLE 10.—*Physical*

[Except as indicated by footnote 1, determinations were made at the Soil Characterization Laboratory,

Soil type, location of samples, and sample numbers	Horizon	Depth	Size class and diameter of particles		
			Very coarse sand (2–1 mm.)	Coarse sand (1–0.5 mm.)	Medium sand (0.5–0.25 mm.)
		In.	*Pct.*	*Pct.*	*Pct.*
Cardiff slaty silt loam (1 mile east of Delta).					
S57 Pa 66–5–1	A_p	0–8	7. 5	5. 4	3. 4
S57 Pa 66–5–2	B_{21}	8–18	4. 7	4. 1	2. 9
S57 Pa 66–5–3	B_{22}	18–23	5. 4	5. 6	3. 3
S57 Pa 66–5–4	B_3	23–25			
S57 Pa 66–5–5	C_1	25–30	6. 9	8. 2	6. 4
Cardiff slaty silt loam (1½ miles south of Peach Bottom).					
S57 Pa 66–6–1	A_p	0–8	6. 5	6. 0	4. 7
S57 Pa 66–6–2	B_{21}	8–13	6. 7	6. 1	5. 5
S57 Pa 66–6–3	B_{22}	13–18	7. 2	7. 5	6. 4
S57 Pa 66–6–4	C_1	18–27	6. 1	6. 7	6. 1
S57 Pa 66–6–5	C_2	27–32	7. 7	9. 0	8. 6
Chester silt loam (1 mile west of Fawn Grove).					
S57 Pa 66–7–1	A_p	0–11	1. 9	4. 5	8. 7
S57 Pa 66–7–2	B_{21}	11–17	1. 0	2. 5	4. 6
S57 Pa 66–7–3	B_{22}	17–23	1. 3	3. 2	5. 7
S57 Pa 66–7–4	B_{23}	23–28	2. 0	5. 9	8. 6
S57 Pa 66–7–5	B_3	28–30	3. 4	8. 4	12. 7
S57 Pa 66–7–6	C_1	30–34	3. 3	8. 7	13. 9
S57 Pa 66–7–7	C_2	34–44	4. 2	12. 1	17. 4
Chester silt loam (1.1 miles north of New Park).					
S57 Pa 66–8–1	A_p	0–8	4. 2	6. 3	7. 9
S57 Pa 66–8–2	B_1	8–14	3. 2	8. 0	8. 5
S57 Pa 66–8–3	B_{21}	14–21	3. 2	8. 1	8. 7
S57 Pa 66–8–4	B_{22}	21–26	4. 9	7. 9	8. 7
S57 Pa 66–8–5	B_3	26–28	3. 4	8. 4	8. 8
S57 Pa 66–8–6	C_1	28–34	6. 9	14. 1	12. 8
S57 Pa 66–8–7	C_2	34–41	7. 0	13. 0	11. 9
Croton silt loam (1 mile southwest of Dover).					
S57 Pa 66–3–1	A_p	0–8	. 3	. 7	. 9
S57 Pa 66–3–2	A_{2g}	8–10	. 5	1. 1	1. 5
S57 Pa 66–3–3	B_{1g}	10–15	. 2	3. 7	. 4
S57 Pa 66–3–4	B_{21g}	15–21	. 1	. 1	. 3
S57 Pa 66–3–5	B_{22g}	21–27	. 1	. 9	1. 7
S57 Pa 66–3–6	C_{1g}	27–34	. 4	2. 4	4. 7
S57 Pa 66–3–7	C_{2g}	34–44	. 4	1. 8	5. 2
Croton silt loam (4 miles northeast of Dover).					
S57 Pa 66–10–1	A_p	0–9	1. 1	1. 7	2. 8
S57 Pa 66–10–2	A_{3g}	9–13	. 3	. 6	. 8
S57 Pa 66–10–3	B_{21g}	13–17	. 1	. 3	. 8
S57 Pa 66–10–4	B_{22g}	17–26	. 0	. 2	. 9
S57 Pa 66–10–5	B_{3g}	26–28	. 0	. 2	1. 1
S57 Pa 66–10–6	C_{1g}	28–34	. 4	1. 0	1. 8

See footnotes at end of table.

associated with each other in the field. Table 9 shows how the soils of York County are grouped into catenas.

Laboratory Determinations

The physical and chemical properties of selected soils of nine series in York County are shown in tables 10 and 11. The series sampled are Cardiff, Chester, Croton, Elioak, Lehigh, Lewisberry, Manor, Penn, and Readington.

Two sites were selected for each series. Typical profiles were located in areas that were most nearly representative in slope, erosion, stoniness, 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. Four-quart samples were collected from each horizon. Samples were collected and tests made by R. P. Matelski, C. F. Engle, and E. C. Mason of the Soil Characterization Laboratory of the Pennsylvania Agricultural Experiment Station. A few soils were tested for bulk density and moisture retention characteristics at the USDA Soil Survey Laboratory, Beltsville, Md.

properties of selected soils

Pennsylvania Agricultural Experiment Station. Lack of data indicates determination was not made]

Size class and diameter of particles—Continued					Textural class	Bulk density	Moisture held at tension of—	
Fine sand (0.25–0.10 mm.)	Very fine sand (0.10–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (less than 0.002 mm.)	Coarse fragments (more than 2 mm.) by weight			⅓ atmosphere (core)	15 atmospheres (fragments)
Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*		*Gm./cu. cm.*	*Pct.*	*Pct.*
3.0	3.0	58.6	19.1	44.7	Silt loam	[1] 0.99	[1] 22.7	[1] 9.1
2.6	2.3	59.3	24.1	54.1	Silt loam	1.16	20.8	7.0
3.4	2.5	52.7	27.1	74.6	Clay loam	1.40	15.5	9.7
				84.7				
5.7	4.8	48.7	19.3	76.6	Loam			9.2
5.4	4.2	51.8	21.4	30.7	Silt loam			11.2
6.2	4.5	47.7	23.3	53.2	Loam			10.9
7.3	4.5	44.4	22.7	58.0	Loam			10.6
6.4	4.8	46.6	23.3	38.2	Loam			10.7
12.1	6.8	26.9	28.9	75.6	Clay loam			12.3
11.8	8.4	45.4	19.3	8.7	Loam	[1] 1.28	[1] 24.8	[1] 7.3
7.3	6.1	54.5	24.0	2.0	Silt loam	1.45	23.9	8.6
9.6	7.7	47.3	25.2	5.3	Loam	1.24	24.1	10.7
16.2	12.5	34.7	20.1	6.5	Loam	1.25	23.0	9.2
20.5	15.5	26.0	13.5	11.3	Fine sandy loam	1.19	17.9	6.3
25.8	15.4	21.8	11.1	4.5	Fine sandy loam	1.22	17.8	5.4
26.7	17.3	18.2	4.1	26.9	Loamy sand	1.16	14.4	3.1
7.3	5.9	46.0	22.4	37.5	Loam	[1] 1.22	[1] 19.6	[1] 8.6
7.7	6.8	39.4	26.4	35.5	Loam	1.39	18.8	9.7
8.5	6.4	39.3	25.8	44.7	Loam	1.30	19.2	11.0
8.5	7.6	30.8	31.6	28.1	Clay loam	1.46	18.4	11.2
9.8	8.6	26.2	34.8	36.4	Clay loam			14.5
11.3	8.7	16.5	29.7	67.5	Sandy clay loam			12.9
12.3	9.2	17.2	29.4	59.2	Sandy clay loam			12.5
1.6	2.6	65.5	28.4	.1	Silty clay loam	[1] 1.17	[1] 32.1	[1] 12.8
2.1	2.4	69.0	23.4	.4	Silt loam	1.57	25.8	7.0
.9	1.7	66.9	26.2	.9	Silt loam	1.46	24.4	3.7
1.0	2.3	54.6	41.6	.3	Silty clay	1.33	32.2	16.3
3.6	5.4	49.6	38.7	.1	Silty clay loam	1.56	30.2	17.1
7.2	8.3	49.4	27.6	.2	Clay loam	1.73	22.9	11.1
13.0	14.4	42.1	23.1	.2	Loam	1.84		11.6
6.2	6.4	64.1	17.7	3.6	Silt loam	1.34	27.1	7.8
1.0	1.7	71.4	24.2	.0	Silt loam	1.48	31.6	9.0
1.1	1.7	67.0	29.0	.0	Silty clay loam	1.52	33.5	12.5
2.3	2.0	66.8	27.8	.0	Silty clay loam	1.58	32.3	12.2
2.2	5.1	61.7	29.7	.0	Silty clay loam			12.0
4.5	10.2	58.6	23.5	.0	Silt loam			11.6

TABLE 10.—*Physical properties*

Soil type, location of samples, and sample numbers	Horizon	Depth	Size class and diameter of particles		
			Very coarse sand (2–1 mm.)	Coarse sand (1–0.5 mm.)	Medium sand (0.5–0.25 mm.)
		In.	*Pct.*	*Pct.*	*Pct.*
Elioak silt loam (1½ miles south of Cross Roads).					
S58 Pa 66-1-1	A_p	0–8	0.9	3.3	6.0
S58 Pa 66-1-2	A_2	8–12	1.7	2.7	4.1
S58 Pa 66-1-3	B_1	12–15	1.6	2.1	4.2
S58 Pa 66-1-4	B_{21}	15–23	2.3	2.7	4.2
S58 Pa 66-1-5	B_{22}	23–32	2.9	5.1	8.2
S58 Pa 66-1-6	B_{31}	32–38	3.3	6.4	9.3
S58 Pa 66-1-7	B_{32}	38–44	1.9	3.5	5.8
S58 Pa 66-1-8	C_1	44–50	3.1	8.0	12.0
Elioak silt loam (1½ miles east of Stewartstown).					
S58 Pa 66-2-1	A_p	0–8	2.7	4.0	6.8
S58 Pa 66-2-2	A_2	8–11	3.0	3.8	5.4
S58 Pa 66-2-3	B_1	11–17	2.2	3.6	5.9
S58 Pa 66-2-4	B_{21}	17–23	2.1	3.4	5.8
S58 Pa 66-2-5	B_{22}	23–32	1.7	3.7	6.2
S58 Pa 66-2-6	B_{23}	32–37	2.3	4.3	7.4
S58 Pa 66-2-7	B_3	37–45	2.3	5.6	11.4
S58 Pa 66-2-8	C_1	45–51	4.3	7.1	10.8
S58 Pa 66-2-9	C_2	51–55	4.7	9.9	13.4
Lehigh channery silt loam (1 mile southwest of Wellsville).					
S57 Pa 66-11-1	A_p	0–8	2.9	2.9	1.7
S57 Pa 66-11-2	A_3	8–11	2.6	2.7	1.4
S57 Pa 66-11-3	B_{21g}	11–14	2.1	2.0	1.1
S57 Pa 66-11-4	B_{22g}	14–22	3.0	1.8	1.2
S57 Pa 66-11-5	C_1	22–32	3.9	3.9	2.6
Lehigh channery silt loam (1½ miles northwest of Wellsville).					
S57 Pa 66-12-1	A_p	0–9	1.8	1.1	.6
S57 Pa 66-12-2	B_{21g}	9–14	2.6	1.8	1.2
S57 Pa 66-12-3	B_{22g}	14–23	4.4	3.6	2.6
S57 Pa 66-12-4	C_1	23–28+	1.7	1.5	1.2
Lewisberry very stony sandy loam (⅛ mile northeast of Mount Zion school).					
S57 Pa 66-15-1	A_1	0–2	2.1	11.5	24.5
S57 Pa 66-15-2	A_{21}	2–6	2.5	11.8	24.8
S57 Pa 66-15-3	A_{22}	6–12	3.0	10.2	21.3
S57 Pa 66-15-4	B_1	12–20	3.7	10.5	19.2
S57 Pa 66-15-5	B_{21}	20–24	4.9	11.2	17.9
S57 Pa 66-15-6	B_{22}	24–31	5.8	11.1	15.7
S57 Pa 66-15-7	B_3	31–39	4.6	10.3	15.7
S57 Pa 66-15-8	C_1	39–45+	6.2	14.7	18.6
Lewisberry very stony sandy loam (1½ miles west of Silver Lake).					
S57 Pa 66-16-1	A_1	0–1	1.9	7.3	22.4
S57 Pa 66-16-2	A_{21}	1–6	1.6	7.4	21.1
S57 Pa 66-16-3	A_{22}	6–11	1.6	7.2	21.7
S57 Pa 66-16-4	B_1	11–14	3.8	8.1	19.3
S57 Pa 66-16-5	B_{21}	14–20	5.4	15.3	24.4
S57 Pa 66-16-6	B_{22}	20–26	4.9	9.7	18.4
S57 Pa 66-16-7	B_3	26–36	4.5	10.7	18.3
S57 Pa 66-16-8	C_1	36+	5.7	12.1	21.6
Manor channery loam (2 miles north of Delta).					
S57 Pa 66-13-1	A_p	0–7	5.1	4.1	4.4
S57 Pa 66-13-2	B_2	7–11	8.2	6.1	5.5
S57 Pa 66-13-3	C_1	11–14	7.8	6.8	5.8
Manor channery loam (¼ mile southwest of Loganville).					
S57 Pa 66-14-1	A_p	0–10	8.5	7.9	5.7
S57 Pa 66-14-2	B_2	10–17	7.9	8.4	6.9
S57 Pa 66-14-3	C_1	17–25	6.5	7.0	7.0
S57 Pa 66-14-4	C_2	25–28	8.8	9.7	7.3

See footnote at end of table.

of selected soils—Continued

Size class and diameter of particles—Continued					Textural class	Bulk density	Moisture held at tension of—	
Fine sand (0.25–0.10 mm.)	Very fine sand (0.10–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (less than 0.002 mm.)	Coarse fragments (more than 2 mm.) by weight			⅓ atmosphere (core)	15 atmospheres (fragments)
Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*		*Gm./cu. cm.*	*Pct.*	*Pct.*
9. 3	7. 2	55. 3	18. 0	22. 5	Silt loam	1. 39	19. 1	8. 1
7. 6	5. 9	51. 8	26. 2	43. 3	Silt loam	1. 56	16. 1	10. 0
8. 1	6. 8	50. 9	26. 3	19. 1	Silt loam	1. 46	18. 5	14. 7
8. 9	7. 1	28. 5	46. 3	67. 4	Clay	1. 46	25. 1	18. 2
15. 1	11. 1	15. 6	42. 0	41. 1	Clay	1. 57	16. 4	16. 0
18. 3	12. 2	14. 8	35. 7	28. 5	Sandy clay	1. 42	16. 1	14. 2
11. 6	9. 3	29. 8	38. 1	27. 9	Clay loam	1. 38	25. 4	17. 1
23. 5	14. 7	16. 9	21. 8	50. 3	Sandy clay loam			9. 9
8. 9	7. 6	50. 4	19. 6	25. 6	Silt loam	1. 29	21. 6	9. 0
7. 8	6. 6	44. 4	29. 0	28. 9	Clay loam	1. 53	20. 2	9. 6
8. 6	7. 5	43. 4	28. 8	15. 9	Clay loam	1. 44	21. 7	11. 8
9. 7	8. 7	41. 0	29. 3	13. 1	Clay loam	1. 52	23. 4	13. 1
10. 3	9. 7	34. 6	33. 8	10. 2	Clay loam	1. 58	22. 2	14. 8
15. 1	12. 1	25. 4	33. 4	19. 9	Clay loam	1. 41	25. 9	14. 2
20. 9	16. 4	26. 6	16. 8	9. 7	Fine sandy loam	1. 43	22. 6	8. 6
20. 9	15. 2	32. 0	9. 7	29. 3	Fine sandy loam	1. 46	15. 9	6. 0
21. 6	16. 6	14. 1	19. 7	24. 5	Fine sandy loam			6. 8
2. 0	2. 8	72. 2	15. 5	9. 8	Silt loam	1. 12	33. 6	8. 3
1. 6	2. 6	71. 5	17. 6	11. 5	Silt loam	1. 55	30. 6	7. 8
1. 3	2. 2	70. 5	20. 8	11. 2	Silt loam	1. 55	26. 4	9. 8
1. 7	2. 4	60. 2	29. 7	22. 9	Silty clay loam	1. 55	31. 5	13. 9
2. 3	2. 5	55. 7	29. 1	55. 8	Silty clay loam			17. 4
2. 0	9. 3	71. 4	13. 8	31. 7	Silt loam			11. 0
2. 9	9. 8	70. 3	11. 4	47. 9	Silt loam			5. 8
4. 4	11. 2	62. 5	11. 3	28. 8	Silt loam			6. 7
3. 4	11. 4	68. 8	12. 0	28. 5	Silt loam			6. 8
15. 1	7. 6	30. 7	8. 5	25. 5	Sandy loam			8. 7
14. 1	7. 5	31. 2	8. 1	30. 9	Sandy loam			6. 2
12. 7	6. 1	39. 0	7. 7	14. 4	Sandy loam			4. 4
11. 3	6. 5	37. 2	11. 6	15. 7	Loam			4. 8
12. 2	6. 7	31. 4	15. 7	25. 3	Sandy loam			6. 6
11. 5	7. 2	29. 8	18. 9	26. 3	Loam			8. 6
11. 3	7. 1	29. 8	21. 2	23. 9	Loam			9. 0
9. 0	6. 2	27. 4	17. 9	23. 9	Sandy loam			8. 0
17. 4	8. 9	35. 5	6. 6	18. 5	Sandy loam			10. 1
17. 2	7. 8	37. 7	7. 2	18. 4	Sandy loam			5. 5
16. 0	7. 9	37. 4	8. 2	16. 8	Sandy loam			3. 9
16. 3	7. 4	34. 5	10. 6	16. 2	Sandy loam			4. 4
6. 8	2. 5	32. 4	13. 2	24. 1	Sandy loam			9. 7
14. 4	6. 6	31. 2	14. 8	17. 8	Sandy loam			6. 6
12. 1	5. 8	32. 4	16. 2	43. 5	Loam			7. 0
14. 3	5. 3	22. 2	18. 8	43. 9	Sandy loam			6. 2
13. 3	20. 5	36. 7	15. 9	43. 4	Loam			8. 7
12. 3	19. 3	32. 1	16. 5	56. 3	Loam			9. 0
13. 5	18. 9	32. 1	15. 1	56. 8	Fine sandy loam			8. 7
6. 5	7. 1	40. 2	24. 1	42. 0	Loam			11. 0
8. 3	9. 2	37. 8	21. 5	51. 1	Loam			11. 6
9. 4	13. 5	37. 4	19. 2	53. 3	Loam			11. 3
9. 0	11. 6	34. 8	18. 8	63. 7	Loam			11. 6

TABLE 10.—*Physical properties*

Soil type, location of samples, and sample numbers	Horizon	Depth	Size class and diameter of particles		
			Very coarse sand (2–1 mm.)	Coarse sand (1–0.5 mm.)	Medium sand (0.5–0.25 mm.)
		In.	*Pct.*	*Pct.*	*Pct.*
Penn silt loam (1¼ miles southwest of Dover).					
S57 Pa 66–1–1	A_p	0–9	1. 8	3. 5	5. 7
S57 Pa 66–1–2	B_1	9–14	1. 5	3. 2	4. 9
S57 Pa 66–1–3	B_{21}	14–21	. 7	2. 8	3. 9
S57 Pa 66–1–4	B_{22}	21–24	2. 3	5. 6	5. 7
S57 Pa 66–1–5	C_1	24–30	. 9	4. 4	4. 0
S57 Pa 66–1–6	C_2	30–49	1. 3	6. 5	6. 0
Penn silt loam (4 miles northeast of Dover).					
S57 Pa 66–9–1	A_p	0–8	1. 6	1. 1	2. 5
S57 Pa 66–9–2	B_{21}	8–12	2. 7	3. 8	4. 4
S57 Pa 66–9–3	B_{22}	12–20	2. 6	8. 7	7. 5
S57 Pa 66–9–4	B_3	20–24	4. 1	7. 0	5. 8
S57 Pa 66–9–5	C_1	24–30	3. 6	6. 1	4. 1
Readington silt loam (1 mile southwest of Dover).					
S57 Pa 66–2–1	A_p	0–9	1. 0	2. 0	2. 1
S57 Pa 66–2–2	A_2	9–12	. 7	1. 7	1. 3
S57 Pa 66–2–3	B_1	12–15	. 3	1. 1	5. 2
S57 Pa 66–2–4	B_{21}	15–19	. 5	1. 4	1. 2
S57 Pa 66–2–5	B_{22}	19–25	1. 2	3. 6	1. 9
S57 Pa 66–2–6	B_3	25–30	. 9	4. 3	2. 5
S57 Pa 66–2–7	C_1	30–36	2. 9	8. 7	5. 6
S57 Pa 66–2–8	C_2	36–56	1. 4	8. 6	5. 6
Readington silt loam (4 miles northeast of Dover).					
S57 Pa 66–4–1	A_p	0–8	. 4	1. 3	2. 6
S57 Pa 66–4–2	A_2	8–11	. 3	. 8	2. 0
S57 Pa 66–4–3	B_{21g}	11–15	. 3	1. 0	1. 9
S57 Pa 66–4–4	B_{22g}	15–18	. 3	1. 2	2. 4
S57 Pa 66–4–5	B_3	18–29	. 5	1. 5	1. 5
S57 Pa 66–4–6	C_1	29–36	. 4	1. 4	1. 8

[1] Determination made at USDA Soil Survey Laboratory, Beltsville, Md.

TABLE 11.—*Chemical properties*

[Analyses by the Soil Characterization Laboratory, Pennsylvania Agricultural

Soil type, location of samples, and sample numbers	Horizon	Depth	Reaction	Organic carbon	Nitrogen	C/N ratio
		In.	*pH*	*Pct.*	*Pct.*	
Cardiff slaty silt loam (1 mile east of Delta).						
S57 Pa 66–5–1	A_p	0–8	6. 4	1. 98	0. 137	14. 5
S57 Pa 66–5–2	B_{21}	8–18	5. 3	. 53	. 056	9. 5
S57 Pa 66–5–3	B_{22}	18–23	5. 7	. 44	. 058	7. 6
S57 Pa 66–5–4	B_3	23–25	5. 1	. 40	----------	----------
S57 Pa 66–5–5	C_1	25–30	5. 3	. 31	. 045	6. 9
Cardiff slaty silt loam (1½ miles south of Peach Bottom).						
S57 Pa 66–6–1	A_p	0–8	5. 2	2. 64	. 197	13. 4
S57 Pa 66–6–2	B_{21}	8–13	6. 0	1. 11	. 109	10. 2
S57 Pa 66–6–3	B_{22}	13–18	6. 2	. 20	. 085	2. 4
S57 Pa 66–6–4	C_1	18–27	6. 3	. 33	. 068	4. 8
S57 Pa 66–6–5	C_2	27–32	6. 5	. 35	. 067	5. 2

of selected soils—Continued

Size class and diameter of particles—Continued					Textural class	Bulk density	Moisture held at tension of—	
Fine sand (0.25–0.10 mm.)	Very fine sand (0.10–0.05 mm.)	Silt (0.05–0.002 mm.)	Clay (less than 0.002 mm.)	Coarse fragments (more than 2 mm.) by weight			⅓ atmosphere (core)	15 atmospheres (fragments)
Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*		*Gm./cu. cm.*	*Pct.*	*Pct.*
7. 0	7. 3	60. 7	14. 0	3. 2	Silt loam	[1] 1. 38	[1] 21. 8	[1] 6. 2
8. 0	8. 8	57. 6	16. 0	3. 0	Silt loam	1. 44	19. 9	6. 8
4. 3	5. 9	64. 1	18. 3	4. 2	Silt loam	1. 54	16. 0	8. 2
3. 6	2. 8	60. 3	19. 7	5. 8	Silt loam	1. 48	14. 4	9. 2
3. 5	5. 7	60. 8	20. 7	11. 6	Silt loam	1. 56	14. 0	8. 6
5. 6	5. 6	59. 0	16. 0	6. 6	Silt loam			9. 2
3. 6	7. 5	68. 6	15. 1	6. 8	Silt loam	1. 39	30. 1	7. 2
3. 4	6. 5	62. 1	17. 1	10. 9	Silt loam	1. 62	27. 2	8. 6
3. 7	5. 3	55. 5	16. 7	14. 7	Silt loam	1. 73	26. 7	9. 8
4. 4	8. 6	52. 9	17. 2	6. 7	Silt loam			9. 6
2. 9	10. 5	57. 6	15. 2	7. 3	Silt loam			8.
2. 4	4. 9	68. 7	18. 9	4. 4	Silt loam	[1] 1. 26	[1] 26. 0	[1] 6. 8
2. 0	5. 8	65. 9	22. 6	2. 6	Silt loam	1. 34	23. 0	6. 7
5. 5	2. 2	61. 5	24. 2	1. 6	Silt loam	1. 36	23. 9	8. 1
3. 3	10. 6	64. 8	18. 2	1. 3	Silt loam	1. 36	24. 4	10. 2
3. 1	12. 4	59. 1	18. 7	4. 3	Silt loam	1. 34	23. 0	10. 1
2. 6	9. 2	63. 1	17. 4	9. 3	Silt loam	1. 36	21. 2	9. 0
4. 3	3. 9	55. 0	19. 6	73. 9	Silt loam			10. 7
3. 5	5. 8	62. 0	13. 1	72. 2	Silt loam			9. 6
5. 0	6. 7	67. 2	16. 8	1. 3	Silt loam	[1] 1. 21	[1] 23. 2	[1] 8. 8
4. 3	5. 4	66. 6	20. 6	1. 0	Silt loam	1. 14	24. 6	5. 9
4. 6	5. 6	64. 5	22. 1	. 4	Silt loam	1. 30	23. 0	9. 4
6. 1	8. 9	54. 9	26. 2	1. 2	Silt loam	1. 32	21. 4	12. 0
7. 8	16. 3	48. 8	23. 6	5. 1	Loam	1. 38	20. 1	11. 6
11. 1	23. 7	49. 3	12. 3	5. 2	Loam			7. 8

of selected soils

Experiment Station. Lack of data indicates determination was not made]

Extractable cations (milliequivalents per 100 grams of soil)					Cation exchange capacity (by NH_4Ac)	Base saturation	Mineral composition of clay fraction			
Calcium	Magnesium	Hydrogen	Sodium	Potassium			Kaolinite	Illite	Chlorite	Vermiculite
					Meq./100 gm.	*Pct.*				
6. 4	0. 9	6. 0	0. 2	0. 6	11. 7	69	Abundant	Abundant	Low	Not detected.
2. 0	1. 0	4. 4	. 1	. 3	8. 2	41	Dominant	Moderate	Low	Not detected.
2. 5	1. 1	5. 4	. 1	. 3	8. 7	46	Dominant	Abundant	Low	Not detected.
3. 1	1. 4	3. 2	. 1	. 6			Dominant	Abundant	Low	Trace.
2. 3	. 8	5. 1	. 1	. 2	6. 8	50	Dominant	Abundant	Low	Trace.
2. 9	. 9	9. 6	. 2	1. 2	12. 4	42	Dominant	Abundant	Low	Not detected.
3. 9	. 9	7. 5	. 2	. 7	11. 5	50	Dominant	Abundant	Low	Not detected.
3. 2	. 7	5. 5	. 2	. 2	7. 7	56	Dominant	Abundant	Low	Not detected.
3. 1	. 9	5. 5	. 2	. 1	7. 4	58	Dominant	Abundant	Low	Trace.
3. 1	. 9	4. 3	. 2	. 1	7. 2	60	Dominant	Abundant	Low	Trace.

TABLE 11.—*Chemical properties*

Soil type, location of samples, and sample numbers	Horizon	Depth	Reaction	Organic carbon	Nitrogen	C/N ratio
		In.	*pH*	*Pct.*	*Pct.*	
Chester silt loam (1 mile west of Fawn Grove).						
S57 Pa 66-7-1	A_p	0–11	5. 6	1. 33	. 127	10. 5
S57 Pa 66-7-2	B_{21}	11–17	6. 2	. 38	. 048	7. 9
S57 Pa 66-7-3	B_{22}	17–23	6. 5	. 15	. 028	5. 4
S57 Pa 66-7-4	B_{23}	23–28	6. 1	. 06	. 018	3. 3
S57 Pa 66-7-5	B_3	28–30	5. 6	. 05	. 013	3. 9
S57 Pa 66-7-6	C_1	30–34	5. 2	. 03	. 011	2. 7
S57 Pa 66-7-7	C_2	34–44	5. 2	. 02	. 007	2. 9
Chester silt loam (1.1 miles north of New Park).						
S57 Pa 66-8-1	A_p	0–8	5. 1	1. 51	. 144	10. 5
S57 Pa 66-8-2	B_1	8–14	6. 3	. 28	. 052	5. 4
S57 Pa 66-8-3	B_{21}	14–21	6. 6	. 22	. 038	5. 8
S57 Pa 66-8-4	B_{22}	21–26	6. 9	. 10	. 034	2. 9
S57 Pa 66-8-5	B_3	26–28	6. 7	. 11	. 030	3. 7
S57 Pa 66-8-6	C_1	28–34	6. 1	. 12	. 027	4. 4
S57 Pa 66-8-7	C_2	34–41	5. 4	. 09	. 027	3. 3
Croton silt loam (1 mile southwest of Dover).						
S57 Pa 66-3-1	A_p	0–8	6. 6	2. 50	. 219	11. 4
S57 Pa 66-3-2	A_{2g}	8–10	6. 2	1. 11	. 090	12. 3
S57 Pa 66-3-3	B_{1g}	10–15	5. 6	. 52	. 048	10. 8
S57 Pa 66-3-4	B_{21g}	15–21	4. 8	. 45	. 050	9. 0
S57 Pa 66-3-5	B_{22g}	21–27	4. 8	. 34	. 038	8. 9
S57 Pa 66-3-6	C_{1g}	27–34	5. 1	. 17	. 023	7. 4
S57 Pa 66-3-7	C_{2g}	34–44	7. 2	. 21	. 023	9. 1
Croton silt loam (4 miles northeast of Dover).						
S57 Pa 66-10-1	A_p	0–9	6. 7	1. 00	. 106	9. 4
S57 Pa 66-10-2	A_{3g}	9–13	6. 7	. 20	. 048	4. 2
S57 Pa 66-10-3	B_{21g}	13–17	5. 4	. 14	. 037	3. 8
S57 Pa 66-10-4	B_{22g}	17–26	5. 0	. 12	. 032	3. 7
S57 Pa 66-10-5	B_{3g}	26–28	5. 5	. 06	. 029	2. 1
S57 Pa 66-10-6	C_{1g}	28–34	5. 6	. 06	. 027	2. 2
Elioak silt loam (1½ miles south of Cross Roads).						
S58 Pa 66-1-1	A_p	0–8	6. 9	2. 05	. 200	10. 3
S58 Pa 66-1-2	A_2	8–12	7. 0	. 46	. 050	9. 2
S58 Pa 66-1-3	B_1	12–15	6. 9	. 28	. 036	7. 8
S58 Pa 66-1-4	B_{21}	15–23	5. 5	. 28	. 031	9. 0
S58 Pa 66-1-5	B_{22}	23–32	5. 1	. 20	. 019	10. 5
S58 Pa 66-1-6	B_{31}	32–38	5. 1	. 16	. 019	8. 4
S58 Pa 66-1-7	B_{32}	38–44	5. 0	. 13	. 028	4. 6
S58 Pa 66-1-8	C_1	44–50	5. 0	. 13	. 015	8. 7
Elioak silt loam (1½ miles east of Stewartstown).						
S58 Pa 66-2-1	A_p	0–8	6. 3	1. 70	. 139	12. 2
S58 Pa 66-2-2	A_2	8–11	6. 9	. 50	. 044	11. 4
S58 Pa 66-2-3	B_1	11–17	6. 9	. 26	. 036	7. 2
S58 Pa 66-2-4	B_{21}	17–23	6. 8	. 14	. 026	5. 4
S58 Pa 66-2-5	B_{22}	23–32	6. 4	. 14	. 010	14. 0
S58 Pa 66-2-6	B_{23}	32–37	5. 8	. 08	. 010	8. 0
S58 Pa 66-2-7	B_3	37–45	5. 6	. 10	. 006	16. 7
S58 Pa 66-2-8	C_1	45–51	5. 4	. 06	. 008	7. 5
S58 Pa 66-2-9	C_2	51–55	5. 2	. 08	. 018	4. 4
Lehigh channery silt loam (1 mile southwest of Wellsville).						
S57 Pa 66-11-1	A_p	0–8	5. 4	1. 04	. 119	8. 7
S57 Pa 66-11-2	A_3	8–11	5. 8	. 28	. 067	4. 2
S57 Pa 66-11-3	B_{21g}	11–14	5. 2	. 07	. 036	1. 9
S57 Pa 66-11-4	B_{22g}	14–22	4. 9	. 13	. 031	4. 2
S57 Pa 66-11-5	C_1	22–32	5. 8	. 30	. 031	9. 7
Lehigh channery silt loam (1½ miles northwest of Wellsville).						
S57 Pa 66-12-1	A_p	0–9	6. 4	2. 68	. 234	11. 5
S57 Pa 66-12-2	B_{21g}	9–14	6. 6	1. 47	. 081	18. 2
S57 Pa 66-12-3	B_{22g}	14–23	6. 6	. 13	. 039	3. 3
S57 Pa 66-12-4	C_1	23–28	6. 6	. 38	. 035	10. 9

of selected soils—Continued

Extractable cations (milliequivalents per 100 grams of soil)					Cation exchange capacity (by NH_4Ac)	Base saturation	Mineral composition of clay fraction			
Calcium	Magnesium	Hydrogen	Sodium	Potassium			Kaolinite	Illite	Chlorite	Vermiculite
					Meq./100 gm.	*Pct.*				
4.6	1.6	7.5	.2	1.1	11.5	65	Dominant	Moderate	Low	Not detected.
4.5	1.6	5.8	.2	.4	9.7	69	Dominant	Moderate	Low	Not detected.
5.3	1.3	5.7	.2	.3	12.1	59	Dominant	Moderate	Low	Low.
3.5	1.5	4.7	.2	.2	8.4	64	Dominant	Moderate	Trace	Low.
2.4	1.4	3.5	.2	.1	5.7	72	Dominant	Moderate	Trace	Low.
2.2	.8	3.8	.1	.2	5.1	65	Dominant	Moderate	Trace	Low.
.9	.3	1.7	.1	.2	3.3	45	Dominant	Moderate	Trace	Trace.
3.7	.7	10.7	.3	.5	12.2	43	Abundant	Moderate	Moderate	Not detected.
1.7	.6	5.3	.2	.1	8.4	31	Dominant	Moderate	Moderate	Not detected.
3.1	.6	7.4	.2	.1	9.1	44	Dominant	Moderate	Moderate	Not detected.
2.3	.5	7.1	.2	.1	9.9	31	Dominant	Moderate	Moderate	Not detected.
2.0	.1	8.0	.2	.1	10.2	24	Dominant	Moderate	Moderate	Not detected.
1.6	.5	9.3	.2	.1	9.2	26	Dominant	Moderate	Moderate	Not detected.
1.4	.8	9.8	.2	.1	8.9	28	Dominant	Moderate	Moderate	Not detected.
11.1	2.3	8.6	.2	.4	19.6	71	Moderate	Low	Moderate	Not detected.
5.0	1.7	8.5	.1	.1	14.4	48	Moderate	Low	Moderate	Not detected.
5.7	1.7	4.8	.2	.1	10.1	76	Abundant	Low	Low	Not detected.
5.1	4.3	12.4	.3	.2	17.4	57	Abundant	Low	Low	Not detected.
5.4	5.5	13.3	.3	.2	20.6	55	Abundant	Moderate	Low	Low.
4.4	5.6	7.3	.5	.2	16.6	64	Moderate	Moderate	Low	Low.
5.8	7.5	3.3	1.0	.2	15.4	94	Abundant	Moderate	Low	Low.
6.5	.4	7.5	.1	.2	13.0	55	Abundant	Moderate	Moderate	Not detected.
6.2	1.3	6.6	.1	.1	12.6	61	Abundant	Moderate	Moderate	Not detected.
6.6	2.5	10.9	.1	.1	17.8	52	Abundant	Moderate	Moderate	Low.
6.2	3.6	12.5	.1	.1	18.4	54	Abundant	Moderate	Low	Low.
7.7	6.2	8.8	.1	.1	17.6	80	Moderate	Abundant	Low	Low.
7.5	5.9	7.2	.1	.1	17.4	78	Moderate	Abundant	Low	Moderate.
9.2	1.0	1.4	.4	.3	12.3	89	Abundant	Low	Low	Not detected.
4.1	.8	3.5	.3	.2	8.6	63	Abundant	Low	Low	Not detected.
4.2	.3	5.1	.3	.2	12.1	41	Abundant	Low	Low	Not detected.
3.9	1.1	8.2	.3	.2	12.8	43	Abundant	Low	Moderate	Not detected.
2.2	1.1	8.5	.3	.2	10.6	36	Abundant	Low	Moderate	Not detected.
1.6	.5	8.0	.2	.2	9.8	26	Dominant	Low	Moderate	Not detected.
2.3	.3	9.4	.2	.2	11.8	25	Dominant	Low	Moderate	Not detected.
1.0	.5	5.4	.2	.2	7.0	27	Dominant	Low	Moderate	Not detected.
7.0	.9	5.1	.3	.3	12.2	70	Abundant	Low	Moderate	Not detected.
4.7	.4	6.0	.3	.2	12.5	45	Abundant	Low	Moderate	Not detected.
5.1	.5	2.5	.3	.2	9.3	66	Dominant	Low	Moderate	Not detected.
4.6	.5	3.2	.4	.2	9.4	61	Dominant	Low	Moderate	Not detected.
5.0	1.3	4.0	.4	.2	9.4	73	Dominant	Low	Moderate	Not detected.
3.3	.4	5.1	.3	.2	9.5	44	Dominant	Low	Low	Not detected.
2.1	.1	3.3	.2	.2	7.2	36	Dominant	Low	Low	Not detected.
1.8	.3	3.2	.2	.1	5.7	42	Abundant	Abundant	Low	Low.
1.8	.3	3.3	.2	.1	5.7	42	Abundant	Abundant	Low	Low.
6.3	1.7	9.9	.1	.1	16.4	50	Abundant	Moderate	Moderate	Low.
5.7	2.0	8.0	.2	.1	15.8	51	Abundant	Moderate	Moderate	Low.
5.5	3.7	12.7	.3	.1	20.8	46	Abundant	Moderate	Moderate	Moderate.
6.4	7.3	17.9	.8	.1	28.1	52	Abundant	Moderate	Moderate	Moderate.
10.9	3.4	8.3	3.2	.3	31.0	57	Abundant	Moderate	Low	Abundant.
8.2	1.7	4.4	.1	.2	13.0	78	Abundant	Moderate	Moderate	Low.
4.3	1.8	3.1	.1	.1	9.6	66	Abundant	Abundant	Moderate	Low.
3.8	2.1	3.1	.1	.1	9.3	66	Abundant	Abundant	Moderate	Low.
3.7	3.0	3.3	.1	.1	8.9	77	Dominant	Moderate	Moderate	Low.

TABLE 11.—*Chemical properties*

Soil type, location of samples, and sample numbers	Horizon	Depth	Reaction	Organic carbon	Nitrogen	C/N ratio
		In.	*pH*	*Pct.*	*Pct.*	
Lewisberry very stony sandy loam (⅛ mile northeast of Mount Zion school).						
S57 Pa 66-15-1	A_1	0–2	4. 3	2. 87	0. 165	17. 4
S57 Pa 66-15-2	A_{21}	2–6	4. 6	1. 85	. 112	16. 5
S57 Pa 66-15-3	A_{22}	6–12	4. 5	. 39	. 045	8. 7
S57 Pa 66-15-4	B_1	12–20	4. 5	. 26	. 030	8. 7
S57 Pa 66-15-5	B_{21}	20–24	4. 5	. 21	. 033	6. 4
S57 Pa 66-15-6	B_{22}	24–31	4. 7	. 16	. 040	4. 0
S57 Pa 66-15-7	B_3	31–39	4. 7	. 11	. 039	2. 8
S57 Pa 66-15-8	C_1	39–45	4. 7	. 04	. 027	1. 5
Lewisberry very stony sandy loam (1½ miles west of Silver Lake).						
S57 Pa 66-16-1	A_1	0–1	4. 2	3. 72	. 185	20. 1
S57 Pa 66-16-2	A_{21}	1–6	4. 8	1. 32	. 092	14. 3
S57 Pa 66-16-3	A_{22}	6–11	4. 9	. 50	. 045	11. 1
S57 Pa 66-16-4	B_1	11–14	4. 8	. 21	. 031	6. 8
S57 Pa 66-16-5	B_{21}	14–20	4. 9	. 11	. 024	4. 6
S57 Pa 66-16-6	B_{22}	20–26	4. 8	. 09	. 026	3. 5
S57 Pa 66-16-7	B_3	26–36	4. 8	. 09	. 030	3. 0
S57 Pa 66-16-8	C_1	36+	4. 8	. 16	. 027	5. 9
Manor channery loam (2 miles north of Delta).						
S57 Pa 66-13-1	A_p	0–7	5. 6	1. 86	. 154	12. 1
S57 Pa 66-13-2	B_2	7–11	6. 3	. 48	. 051	9. 4
S57 Pa 66-13-3	C_1	11–14	6. 3	. 41	. 048	8. 5
Manor channery loam (¼ mile southwest of Loganville).						
S57 Pa 66-14-1	A_p	0–10	6. 1	1. 31	. 127	10. 3
S57 Pa 66-14-2	B_2	10–17	6. 3	. 15	. 035	4. 3
S57 Pa 66-14-3	C_1	17–25	6. 4	. 12	. 029	4. 1
S57 Pa 66-14-4	C_2	25–28	6. 4	. 15	. 021	7. 1
Penn silt loam (1¼ miles southwest of Dover).						
S57 Pa 66-1-1	A_p	0–9	7. 7	1. 13	. 091	12. 4
S57 Pa 66-1-2	B_1	9–14	4. 7	. 36	. 020	18. 0
S57 Pa 66-1-3	B_{21}	14–21	6. 4	. 17	. 027	6. 3
S57 Pa 66-1-4	B_{22}	21–24	5. 0	. 07	. 020	3. 5
S57 Pa 66-1-5	C_1	24–30	5. 5	. 04	. 018	2. 2
S57 Pa 66-1-6	C_2	30–49	7. 2	. 01	. 020	. 5
Penn silt loam (4 miles northeast of Dover).						
S57 Pa 66-9-1	A_p	0–8	6. 9	1. 11	. 111	10. 0
S57 Pa 66-9-2	B_{21}	8–12	5. 0	. 08	. 062	1. 3
S57 Pa 66-9-3	B_{22}	12–20	4. 6	. 09	. 049	1. 8
S57 Pa 66-9-4	B_3	20–24	4. 5	. 04	. 033	1. 2
S57 Pa 66-9-5	C_1	24–30	4. 7	. 04	. 035	1. 1
Readington silt loam (1 mile southwest of Dover).						
S57 Pa 66-2-1	A_p	0–9	7. 2	1. 25	. 120	10. 4
S57 Pa 66-2-2	A_2	9–12	5. 0	. 28	. 045	6. 2
S57 Pa 66-2-3	B_1	12–15	4. 7	. 19	. 039	4. 9
S57 Pa 66-2-4	B_{21}	15–19	4. 7	. 15	. 040	3. 8
S57 Pa 66-2-5	B_{22}	19–25	4. 7	. 08	. 023	3. 5
S57 Pa 66-2-6	B_3	25–30	4. 7	. 06	. 026	2. 3
S57 Pa 66-2-7	C_1	30–36	4. 7	. 07	. 028	2. 5
S57 Pa 66-2-8	C_2	36–56	5. 0	. 04	. 023	1. 7
Readington silt loam (4 miles northeast of Dover).						
S57 Pa 66-4-1	A_p	0–8	7. 1	. 80	. 092	8. 7
S57 Pa 66-4-2	A_2	8–11	6. 7	. 30	. 034	8. 8
S57 Pa 66-4-3	B_{21g}	11–15	5. 0	. 12	. 042	2. 9
S57 Pa 66-4-4	B_{22g}	15–18	5. 0	. 08	. 031	2. 6
S57 Pa 66-4-5	B_3	18–29	5. 2	. 06	. 017	3. 5
S57 Pa 66-4-6	C_1	29–36	6. 9	. 00	. 018	. 0

of selected soils—Continued

Extractable cations (milliequivalents per 100 grams of soil)					Cation exchange capacity (by NH_4Ac)	Base saturation	Mineral composition of clay fraction			
Calcium	Magnesium	Hydrogen	Sodium	Potassium			Kaolinite	Illite	Chlorite	Vermiculite
					Meq./100 gm.	*Pct.*				
0.4	1.8	14.6	0.1	0.1	9.8	24	Moderate	Low	Low	Not detected.
.4	1.9	9.5	.1	.1	6.8	37	Low	Low	Moderate	Not detected.
.4	1.8	5.9	.1	.1	5.9	41	Moderate	Low	Moderate	Not detected.
.3	1.8	6.6	.1	.1	4.6	50	Moderate	Low	Moderate	Trace.
.6	2.1	6.5	.1	.1	5.8	50	Moderate	Moderate	Moderate	Trace.
.9	2.8	6.8	.1	.1	6.0	65	Abundant	Abundant	Low	Trace.
.7	2.9	6.3	.1	.1	6.3	60	Abundant	Abundant	Low	Trace.
.6	3.0	5.2	.1	.1	7.2	53	Abundant	Abundant	Low	Trace.
.7	2.1	15.6	.1	.2	13.0	23	Moderate	Low	Moderate	Not detected.
.4	1.7	9.0	.1	.1	7.2	32	Moderate	Low	Moderate	Not detected.
.4	1.6	4.6	.1	.1	5.5	40	Moderate	Low	Moderate	Not detected.
.3	1.7	2.6	.1	.1	4.8	46	Moderate	Moderate	Moderate	Not detected.
.4	1.8	2.7	.1	.1	6.0	40	Dominant	Moderate	Moderate	Low.
.9	1.2	4.0	.1	.2	6.9	35	Dominant	Abundant	Low	Low.
.7	1.3	4.1	.2	.2	----------	----------	Dominant	Abundant	Low	Low.
.7	1.4	1.1	.1	.2	----------	----------	Dominant	Abundant	Low	Low.
4.8	.6	11.5	.1	.3	14.2	40	Dominant	Low	Moderate	Not detected.
3.7	.7	5.1	.1	.2	11.2	41	Dominant	Low	Low	Not detected.
3.6	.5	5.0	.1	.2	10.9	39	Dominant	Low	Low	Not detected.
5.9	.7	7.3	.1	.3	10.5	67	Abundant	Abundant	Low	Not detected.
3.8	.7	5.6	.1	.2	9.4	51	Dominant	Abundant	Low	Not detected.
3.5	.7	4.6	.1	.1	9.3	47	Dominant	Abundant	Low	Not detected.
3.3	.1	4.9	.1	.1	9.1	40	Dominant	Moderate	Low	Not detected.
9.4	.8	3.0	.2	.1	12.0	88	Moderate	Low	Low	Trace.
5.7	4.1	10.8	.4	.1	13.4	77	Moderate	Abundant	Low	Low.
7.1	1.5	5.6	.3	.1	19.3	47	Moderate	Moderate	Low	Low.
6.5	5.8	8.9	.6	.1	21.4	61	Low	Moderate	Low	Low.
7.3	5.7	5.6	.8	.1	20.4	68	Low	Abundant	Low	Low.
9.1	8.2	1.7	1.0	.2	22.0	84	Low	Abundant	Low	Low.
8.0	1.2	4.4	.1	.7	11.6	86	Moderate	Low	Moderate	Not detected.
7.1	1.6	8.0	.1	.4	16.4	56	Moderate	Moderate	Moderate	Low.
5.9	2.4	12.7	.2	.4	18.5	48	Moderate	Moderate	Low	Low.
5.4	3.9	10.9	.2	.4	18.9	52	Moderate	Moderate	Low	Low.
6.1	4.1	8.4	.2	.4	17.2	63	Moderate	Moderate	Low	Low.
8.1	1.3	3.7	.1	.5	12.4	81	Moderate	Low	Low	Not detected.
3.4	1.0	7.0	.1	.3	11.8	41	Moderate	Low	Moderate	Low.
2.9	1.4	10.5	.1	.2	15.6	30	Moderate	Low	Moderate	Low.
3.0	2.1	13.8	.1	.3	18.5	30	Moderate	Low	Low	Low.
2.8	3.4	13.3	.1	.4	20.2	33	Moderate	Low	Low	Low.
3.7	4.1	12.4	.2	.3	22.6	37	Moderate	Low	Low	Low.
3.9	4.9	13.1	.2	.4	24.3	39	Low	Moderate	Low	Trace.
6.5	6.5	4.4	.4	.3	22.5	61	Low	Moderate	Low	Trace.
7.2	1.2	4.0	.2	.3	11.1	80	Low	Low	Low	Not detected.
6.4	1.0	6.4	.2	.2	13.4	58	Moderate	Low	Moderate	Low.
5.2	1.9	11.6	.2	.2	16.2	46	Moderate	Low	Low	Low.
5.8	5.1	12.7	.3	.3	20.7	56	Low	Low	Low	Low.
7.0	7.4	6.6	.5	.3	19.0	80	Low	Low	Low	Low.
6.6	6.8	2.8	.5	.2	16.7	84	Low	Moderate	Low	Low.

Methods of analysis

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

In preparation for laboratory analysis, air-dry samples were crushed with a rolling pin. Care was taken not to break non-soil 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 ⅓ 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 ⅓ atmosphere was determined by testing core samples on porous plate (*12*). Moisture retention at a tension of 15 atmospheres was determined by testing fragmented samples in pressure membrane apparatus (*8*).

The reaction was determined by a Beckman zeromatic pH meter, 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 (*2*), modified by trapping ammonia in a boric acid solution and titrating with sulphuric 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 distillation of adsorbed ammonia after extraction with sodium chloride (*6*).

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 soils analyzed are generally medium textured. Silt loams and loams predominate. Because of the presence of micaceous material, the Chester, Elioak, and Manor soils contain a high proportion of particles in the size range of sand, but these are so flat and thin that they have many of the properties of silt. Most of the soils analyzed have a textural B horizon. Only the Manor soils definitely lack a concentration of clay in the B horizon. In the Cardiff, Lehigh, Penn, and Readington soils, the increase in clay in the B horizon is so variable that, even in the selected typical profiles, the textural B horizon is borderline. The percentage of coarse fragments in the surface soil (by weight) ranges from less than 1 to 45.

Bulk density is medium. The maximum bulk density in most profiles is 1.4 to 1.6. The Chester soils, which are high in micaceous material, have low bulk density. In cultivated soils, the bulk density of the A_p horizon ranges up to 1.39, indicating considerable compaction. Moisture held against 15 atmospheres tension, which is about the wilting point of most plants, ranges from 5.8 to 18.2 percent in the medium-textured soils. In the sandy Lewisberry soils, it is as little as 3.9 percent.

All of the soils tested are naturally acid, but several have horizons that, as a result of liming or of transportation of bases by ground water, are now neutral or nearly so.

The organic-matter content of the plow layer, as shown by the content of organic carbon, is moderate for most of the cultivated soils. One profile each of the Croton and Readington soils is low in organic-matter content. The carbon-nitrogen ratio is fairly narrow for all of the cultivated soils.

The cation exchange capacity is low for most of the soils, except in the surface layer, which contains the most organic matter. The Croton, Penn, and Readington soils and one Lehigh soil are moderately high in exchange capacity. Most profiles are moderate to moderately high in base saturation.

In the soils overlying crystalline rocks, in the southern part of the county, calcium is the principal base. In the soils that overlie Triassic shale and sandstone, the proportion of exchangeable magnesium is high in the lower horizons.

Kaolinite is an important clay mineral in all of the soils and is dominant in the clay fraction of the Cardiff, Chester, Croton, Elioak, Lewisberry, and Manor soils. Illite is present in all the soils and is abundant in the Cardiff, Manor, and Penn soils and in the lower horizons of the Lewisberry soils. At least a trace of chlorite is present in all profiles. Vermiculite occurs as traces or in low concentrations in most of the soils that formed over shale and in the lower horizons of some other soils. In the Lehigh soils, vermiculite is low to abundant.

Cardiff slaty silt loam contains large quantities of coarse fragments, which dominate its physical appearance. Both of the Cardiff profiles are low in cation exchange capacity but fairly high in base saturation. Calcium acquired as a result of liming is the principal base. Profile S57 Pa 66–5 has a thin but continuous B_3 horizon (23 to 25 inches), which differs in color and is very high in coarse fragments. Particle size distribution for this horizon was not determined, because there is only a small amount of material finer than 2 millimeters in diameter. The mineral composition of the clay is the same as in the horizons above and below. Kaolinite and illite predominate.

The two samples of Chester silt loam are well within the range of the series but differ in structure and in hardness of the parent material. At one of the sampling sites the soil is underlain by saprolite, which leaves very few coarse fragments, while at the other site the soil is underlain by schist and contains many hard channery fragments. Both samples contain many mica fragments the size of sand; consequently, although the particle size distribution is that of loam, the physical properties are more like those of silt loam than loam. The cation exchange capacity is relatively low in the Chester soils, but the degree of base saturation is fairly high. Calcium is the principal base. Liming and fertilizing have in-

creased the exchangeable cation content. The bulk density is very low. Kaolinite is the dominant clay mineral.

Croton silt loam is poorly drained and has both a textural B horizon and a fragipan. The hard, brittle pan has a blocky structure that breaks to platy, but its bulk density is lower than is usual for a fragipan. Loughry,[3] in a study of these soils, noted that, in the case of profile S57 Pa 66–3, the low bulk density of the fragipan resulted in part from a low content of coarse fragments and the formation and subsequent refilling of root channels. In profile S57 Pa 66–10, Loughry noted a somewhat higher bulk density but still less than that usual in a fragipan. As a further check, he determined pore size distribution with a mercury porosimeter and found that in small peds the total pore space is more than 27 percent but in the B_{21g} and B_{22g} horizons, which are recognized as the fragipan, only 11 percent of the total volume is in pores larger than 0.5 micron. Larger pores are more numerous in the B_3 and C horizons, even though the total porosity of the peds increases only a little and the porosity between peds decreases, as shown by the increasing bulk density of the core samples. Platy structure and very little porosity between peds account for the typical firmness of the peds and the slow permeability. Kaolinite and illite are the predominant types of clay.

The Elioak soils are deeply and thoroughly weathered. The B horizon shows a strong increase in clay, and a considerable number of hard rock fragments, including fragments of quartz, have accumulated in the solum. The influence of liming is shown in the relatively high degree of base saturation in the upper horizons as compared to that in the lower horizons. Kaolinite is the dominant clay mineral.

The Lehigh soils are associated with partially metamorphosed shale adjacent to intrusions of diabase. Fragments of porcelanite are common in the soil. Profile S57 Pa 66–11 has an unusually high cation exchange capacity for a soil in this area. The higher content of vermiculite in the clay fraction is a striking feature of this profile and may explain the high exchange capacity.

The Lewisberry very stony sandy loams are the only soils that were sampled at undisturbed woodland sites. They also are the the only moderately coarse textured soils studied. Both samples have more clay in the B and C horizons than in the A horizon. They are, however, tentatively classified as Sols Bruns Acides on the basis of field descriptions. Both are low in cation exchange capacity and have a moderate amount of bases. In both, the content of magnesium exceeds that of exchangeable calcium. Kaolinite and illite occur in moderate to low amounts in the clays in the upper horizons and are abundant in the clays in the B_2 horizons.

The Manor soils lack a textural B horizon, although the slightly finer textured A_p horizon of profile S57 Pa 66–14 suggests that it may contain the residue of the B horizon of a truncated deeper soil. The sand fraction is nearly all mica flakes or little bits of schist. The cation exchange capacity is moderately low, but liming has increased the calcium content and raised the pH.

The Penn silt loams studied contain fewer coarse fragments than most of the Penn soils. Profile S57 Pa 66–1 has a textural B horizon, but profile S57 Pa 66–9 does not. Stratification of the parent shale appears to contribute to textural differences. The cation exchange capacity is moderately high for a soil in this area. Liming has increased the calcium content and raised the pH of the upper horizons. A relatively high content of exchangeable magnesium in the lower horizons indicates differences in parent material, which are also evident in the Readington and Croton profiles. Kaolinite, illite, chlorite, and vermiculite all occur in small amounts, but none is abundant in the Penn soils.

The Readington soils have very few coarse fragments above the C horizon. In profile S57 Pa 66–4, there is a textural B horizon. In profile S57 Pa 66–2, there is a very thin B_1 horizon that shows a very slight increase in clay and a B_2 horizon in which there is a decrease in clay. This situation appears to be due to stratification of the parent material, as it is accompanied by an increase in the proportion of very fine sand and a change in the proportions of the other sand fractions. The bulk density is very low, even in the horizon usually considered to be the fragipan. This is accounted for partly by the lack of coarse rock fragments and partly by pore size distribution. Loughry[3] studied profile S57 Pa 66–4 and found that the pore distribution is similar to that in the Croton soils; that is, there is a high proportion of very fine pores in the B horizon and, consequently, percolation is limited and the horizon appears to be compact, even though the total pore space is fairly high. All types of clay are usually present in small or small to moderate amounts.

General Nature of the County

York County has a well-balanced agricultural and industrial economy. It ranks third in Pennsylvania in agricultural production, but it also has a diversified industry. Included among its industrial products are textiles, furniture, pulp and paper, artificial teeth, earthmoving equipment, farm machinery, bakery equipment, refrigerating equipment, cement, pottery, hosiery, shipping containers, and chemicals. Agriculture also is diversified. Field crops, livestock, poultry, fruits, and truck crops are all of major importance.

Within overnight trucking distance are many of the large market centers of the East. The excellent highway system includes the Pennsylvania Turnpike, U.S. 30 (the Lincoln Highway), and Interstate 83. Three railroads, several commercial airlines, and several buslines also serve the county.

Educational and recreational facilities are good. The county has 88 elementary schools, 20 high schools, several vocational schools, a junior college, a university center, libraries, and museums. Many fraternal, business, professional, and recreational organizations are active, and also archery, riding, camping, and other sporting clubs. Small game is plentiful.

[3] LOUGHRY, F. G. QUANTITATIVE RELATIONSHIP OF SOIL MOTTLING TO NATURAL SOIL DRAINAGE PROFILES (AERATION STATUS) (Doctoral dissertation, Pennsylvania State University, 1960.)

Physiography, Bedrock, and Drainage

Most of York County is in the Piedmont province of the Appalachian Highlands. A small area is in the Blue Ridge province.

Blue Ridge province.—South Mountain, a small area of which extends into the northwestern part of York County, is in the Blue Ridge province. This area is characterized by steep slopes and narrow ridgetops. The altitude ranges up to 1,460 feet. The underlying rocks are hard, erosion-resistant quartzite, diabase, baked shale, and conglomerate.

Piedmont province.—The part of the county that is in the Piedmont province has four subdivisions: the Gettysburg Plain, the Hills, the Hanover-York Valley, and the Southeastern Upland.

The Gettysburg Plain consists of undulating to rolling, low uplands in the northern part of the county. Its surface is dissected into low ridges and hillocks that run northeast and southwest. The underlying rocks are red shale and sandstone, which are soft and easily eroded. There is no systematic drainage dissection.

The Hills includes an area of high knobs and long ridges in the northern part of the county north of the Gettysburg Plain, and also the Hellam Hills, which are in the northeastern part of the county, and the Pigeon Hills, which are in the west-central part. The slopes are long and steep or moderately steep, and the curving, sloping ridges are generally about 100 yards wide. The altitude ranges up to 1,240 feet. There has been little dissection, and the natural waterways are shallow and narrow. The underlying rocks include diabase, metabasalt, and quartzite.

The Hanover-York Valley extends southwestward across the county from the Susquehanna River, near Wrightsville, to Hanover. The valley is 2 to 4 miles wide. The slopes are nearly level to undulating except in an area near Nashville, where shale hills up to 500 feet high rise from the limestone lowlands. There is little dissection. The underlying rock is limestone, which weathers comparatively rapidly because of the dissolving action of carbonic acid in rainwater. Sinkholes have formed in the limestone, and consequently much of the valley has a karst topography.

The Southeastern Upland covers the southeastern third of the county and extends to a point 3 miles south of Hanover. The southeastern part is characterized by rather broad ridgetops and by steep hillsides along the Susquehanna River and Muddy Creek. The maximum elevation is 1,000 feet, near Yoe. In the southwestern part, the ridges are narrower and the topography is rolling. The underlying rocks are largely erosion-resistant schist and quartzite.

Climate

York County enjoys a relatively mild but humid climate. Nearby mountains protect the area from the more severe weather that occurs within 50 to 100 miles to the west and north. Since the prevailing winds are from the west, the weather disturbances that affect the county are most likely to come from the interior of the continent. The Atlantic Ocean has only a limited influence on the climate although coastal storms do, at times, affect the day to day weather. These storms are of tropical origin and sometimes are severe enough to cause flooding. Remnants of hurricanes occasionally pass near enough to produce heavy rains, but ordinarily the winds are not strong enough to cause heavy damage. In summer, winds are generally from the southwest. They bring moisture from the Gulf of Mexico into the area; consequently, the humidity is relatively high and the climate is characterized as humid continental.

Winters are relatively short. Temperatures of 32 degrees or below occur on an average of about 100 days a year. Temperatures of 10 to 20 degrees below zero are rare and of short duration.

Summers are long and warm. Temperatures reach 90 degrees or above about 25 days a year. Temperatures of 100 degrees or more are comparatively rare. The average growing season in the vicinity of York is from April 24 to October 10, or 169 days. Around Hanover, the average season is from April 26 to October 18, a total of 175 days.

Ordinarily there is plenty of rain during the growing season. Occasionally there is a period of a month or more in which less than a quarter of an inch of rain falls. The most severe dry period on record was during September and October 1947, when 38 consecutive days passed without measurable rain in the county.

Table 12 gives the monthly and annual average temperature and precipitation at York, which is in the central part of the county. There is some variation in average temperature and precipitation among different parts of the county, mostly because of differences in elevation. At York, the average annual rainfall is 40.41 inches. The total for the wettest year of record is 55.9 inches, and the total for the driest year of record is 22.93 inches. At Hanover (elevation, 600 feet) the average is 40.5 inches,

TABLE 12.—*Temperature and precipitation at York Pumping Station, York County, Pa.*

[Elevation, 390 feet]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1909)	Wettest year (1942)	Average snowfall
	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*	*Inches*
January	30.8	78	−21	3.08	1.71	2.08	9.2
February	31.7	79	−17	2.71	4.73	2.31	8.9
March	41.1	86	−5	3.28	2.79	4.66	6.1
April	51.3	94	10	3.23	2.37	1.74	1.3
May	62.0	96	26	3.72	2.13	6.99	[3]
June	70.6	103	34	3.76	2.49	7.17	0
July	74.8	107	43	4.25	.94	4.32	[3]
August	72.8	105	40	4.24	.99	9.49	0
September	66.5	101	26	3.30	.72	4.02	0
October	54.7	97	18	3.22	.70	6.56	.1
November	43.7	83	−1	2.70	.49	2.64	.8
December	33.4	70	−11	2.92	2.87	3.92	5.4
Year	52.8	107	−21	40.41	22.93	55.90	31.8

[1] Average temperature based on a 57-year record, through 1955; highest and lowest temperatures on a 53-year record, through 1952.

[2] Average precipitation based on a 68-year record, through 1955; wettest and driest years based on a 68-year record, in the period 1888–1955; snowfall based on a 49-year record, through 1952.

[3] Trace.

the total for the wettest year is 57.37, and the total for the driest year is 25.87 inches. At Harrisburg State Airport (elevation, 335 feet) the average is 36.01 inches, the total for the wettest year is 49.73 inches, and the total for the driest year is 25.52 inches.

The average annual temperature at York is 52.8 degrees. The maximum temperature that has been recorded is 107 degrees, and the minimum is −21 degrees. At Hanover, the average is 53.9 degrees, the maximum is 105 degrees, and the minimum is −10 degrees. At Harrisburg State Airport, the average is 53 degrees, the maximum that has been recorded is 102 degrees, and the minimum is −4 degrees.

Agriculture

Although the trend in recent years has been toward a decrease in the number of farms and in the total farm acreage, 70 percent of the area of York County is still in farms. There were 4,673 farms in the county in 1959, and the average size was 87.4 acres. In the agricultural census of 1959, the farms were classified by size as follows:

	Number
Less than 10 acres	433
10 to 49 acres	1,573
50 to 69 acres	549
70 to 99 acres	610
100 to 139 acres	683
140 to 179 acres	323
180 to 219 acres	179
220 to 259 acres	120
260 to 499 acres	168
500 to 999 acres	27
1,000 acres and over	8

The farms were classified according to main source of income as follows:

	Number
General farms	433
Field-crop farms, other than fruit or vegetable	262
Cash-grain	211
Tobacco	5
Other field crops	46
Dairy farms	798
Poultry farms	523
Livestock farms, other than dairy or poultry	571
Vegetable farms	32
Fruit farms	55
Miscellaneous and unclassified	1,737

The principal field crops are corn, wheat, oats, barley, red clover, timothy, and alfalfa. Vegetables are an important crop, especially in the southern section of the county, where 16 canneries are in operation. Mixed legume hay is the most common forage crop. Fruit, mostly peaches, is grown throughout the county. The acreage of the principal crops and the number of bearing fruit trees in York County in 1959 were as follows:

	Acres
Corn (total)	82,151
For grain	75,969
For silage	5,959
Hogged or grazed or cut for fodder	223
Small grain threshed or combined:	
Wheat	40,618
Oats	13,122
Barley	11,479
Rye	880
Soybeans for all purposes	704
Hay (total)	61,504
Alfalfa	14,500
Clover and timothy, separately or mixed	42,719
Small grain cut for hay	497
Other hay cut	3,788
Irish potatoes harvested for home use or for sale	[1] 2,720
Vegetables harvested for sale:	
Tomatoes	1,345
Green peas	1,020
Snap beans	1,393
Sweet corn	5,061
Fruit trees:	*Number*
Apple	61,584
Peach	127,587
Pear	5,602
Cherry	17,901
Plum	2,708
Grapevines	6,188

[1] Does not include acreage with less than 20 bushels harvested.

Livestock is the chief source of farm income in York County. The census of livestock in 1959 was as follows:

	Number
Cattle and calves	65,799
Milk cows	22,781
Sheep and lambs	6,473
Swine	49,367
Chickens	1,314,217
Turkeys raised	98,298

According to the 1959 census, 2,519 farms were equipped with tractors, 1,435 with pickup hay balers, 1,499 with cornpickers, 1,330 with grain combines, 909 with milking machines, 1,955 with motortrucks, and 2,484 with automobiles.

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Glossary

Aeration, soil. The process by which air and other gases are renewed in the soil. The rate at which they are renewed depends largely on the size and number of pores in the soil and on the amount of water in the pores.

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

Alluvium. Sand, mud, and other sediments deposited by streams.

Aporhyolite. A felsite whose structure shows it to have been originally vitreous, like some rhyolites.

Available moisture capacity. The amount of moisture a soil can hold that is available to roots of plants. This is approximately the amount of moisture held between one-third atmosphere and 15 atmospheres of tension.

Bedding. Arranging the surface of a field by plowing and grading to form a series of elevated beds separated by shallow ditches for drainage.

Bedrock. The solid rock underlying soils and other earthy surface formations.

Bottom land. A flood plain.

Calcareous soil. A soil that contains calcium carbonate or that is alkaline in reaction because of the presence of calcium carbonate. A soil containing enough calcium carbonate to effervesce (fizz) when treated with dilute hydrochloric acid.

Catena, soil. A group of soils, within a specific soil zone, formed from similar parent material but with unlike soil characteristics because of differences in relief or drainage.

Channery soil. A soil that contains thin, flat fragments of sandstone, limestone, or schist up to 6 inches in length along the longer axis. A single piece is called a fragment.

Clay. (1) As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. (2) As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Colluvium. Soil material and rock fragments moved by soil creep, slides, and local wash and deposited near the base of rather steep slopes.

Conglomerate. Rock fragments and pebbles cemented together by hardened clay, lime, iron oxide, or silica.

Consistence. The combination of properties of soil material that determines its resistance to crushing and its ability to be molded or changed in shape. Consistence depends mainly on the forces of attraction between soil particles. Consistence is described by such words as *loose, friable, firm, soft, plastic,* and *sticky.*

Contour farming. Plowing, planting, cultivating, and harvesting on the contour, or at right angles to the natural direction of slope.

Cover crop. A close-growing crop grown primarily for the purpose of protecting and improving the soil between periods of regular crop production. A cover crop is also grown between trees and vines in orchards and vineyards.

Cropland terrace. A ridge, 10 to 20 inches high and 15 to 30 feet wide, with gently sloping sides, a rounded crown, and a shallow channel along the upper side, constructed to control erosion by diverting surface runoff across the slope instead of permitting it to flow down the slope. It may grade toward one end or both ends. Cultivated crops can be grown on a cropland terrace.

Diabase. Diorite.

Dike, geologic. A tabular body of igneous rock that, while molten, was injected into a fissure.

Diorite. A granular, crystalline, igneous rock, commonly of acid plagioclase and hornblende, pyroxene, or biotite.

Diversion terrace. A channel that has a supporting ridge on the lower side. It is constructed across the slope to intercept runoff and to minimize erosion or to prevent excess runoff from flowing onto lower lying areas. In some areas a series of diversions similar to terraces, but with greater horizontal and vertical spacing, is constructed across the slope.

Dolomite. A rock that contains a high proportion of calcium and magnesium carbonates. Ground dolomitic limestone, containing considerable magnesium carbonate as well as calcium carbonate, is widely used as agricultural lime, especially on soils with a low content of magnesium.

Drainage terrace. A terrace having a relatively deep channel and low ridge, constructed across the slope primarily for drainage. It may be either a diversion terrace or a field terrace.

Erosion. The wearing away of the land surface by detachment and transport of soil and rock material through the action of moving water, wind, and other geological agents.

Fanglomerate. The material of an alluvial fan in which the rock fragments are only slightly waterworn.

Flood plain. Nearly level land occupying the bottom of the valley of a present stream and subject to flooding unless protected artificially.

Graded stripcropping. Growing crops in strips that are graded toward a protected waterway.

Graphitic. Containing graphite, or native carbon.

Grassed waterway. A natural or a constructed waterway, typically broad and shallow, covered with grass, that protects the soil from erosion by conducting excess surface water away from cropland.

Green-manure crop. Any crop grown for the purpose of being turned under while green or soon after maturity to improve the soil.

Gully. A steep-sided channel resulting from accelerated erosion; large enough to be an obstacle to farm machinery. (See also Rill.)

Hardpan. A cemented (indurated) or hardened soil horizon. This horizon, which may be of any texture, is compacted or cemented by iron oxide, silica, organic matter, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the soil surface, with characteristics produced by soil-forming processes. The relative positions of the several soil horizons in the soil profile and their nomenclature are given below:

Horizon A. The master horizon consisting of (1) one or more mineral horizons of maximum organic accumulation; or (2) surface or subsurface horizons that are lighter in color than the underlying horizon and have lost clay minerals, iron, and aluminum with resultant concentration of the more resistant minerals; or (3) horizons belonging to both of these categories.

Horizon B. The master horizon of altered material characterized by (1) an accumulation of clay, iron, or aluminum, with accessory organic material; or (2) blocky or prismatic structure together with other characteristics, such as stronger colors, unlike those of the A horizons or the underlying horizons of nearly unchanged material; or (3) characteristics of both these categories. Commonly, the lower limit of the B horizon corresponds to the lower limit of the solum.

Horizon C. A layer of unconsolidated material, relatively little affected by the influence of organisms and presumed to be similar in chemical, physical, and mineralogical composition to the material from which at least part of the overlying solum has developed.

Horizon D. Any stratum underlying the C horizon, or the B if no C is present, which is unlike the C, or unlike the material from which the solum has been formed.

Igneous rock. Rock that has been cooled from molten mineral material. Granite, syenite, diorite, and gabbro are common examples.

Internal drainage. The movement of water through the soil profile. The rate of movement is affected by the texture of the surface layer and subsoil and by the height of the ground water table, either permanent or perched. Relative terms for expressing internal drainage are—*none, very slow, slow, medium, rapid,* and *very rapid.*

Karst topography. Relief marked by sinks interspersed with abrupt ridges and protuberant rocks and by caverns and underground streams.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state. In engineering, a high liquid limit indicates that the soil has a high content of clay and a low capacity for carrying loads.

Metamorphic rock. Rock that has been greatly altered from its original condition by heat, pressure, and water. Igneous or sedimentary rock may be changed to metamorphic rock, or one metamorphic rock may be changed to another. Gneiss, schist, and slate are common examples.

Mottling, soil. Patches of contrasting color usually associated with poor drainage. Descriptive terms for mottles are as follows: Contrast—*faint, distinct,* and *prominent;* abundance—*few, common,* and *many;* and size—*fine, medium,* and *coarse.* The size measurements are as follows: *Fine,* commonly less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* commonly ranging between 5 and 15 millimeters (about 0.2 to 0.6 inch) along the greatest dimension;

and *coarse*, commonly more than 15 millimeters (about 0.6 inch) along the greatest dimension.

Natural drainage. Refers to conditions that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. The following relative terms are used to designate the natural drainage classes: *Very poorly drained, poorly drained, imperfectly* or *somewhat poorly drained, moderately well drained, well drained, somewhat excessively drained,* and *excessively drained.*

Parent material (soils). The horizon of weathered rock or partly weathered soil material from which the soil has formed. Horizon C of the soil profile.

Ped. An individual natural soil aggregate such as a crumb, a prism, or a block, in contrast to a *clod,* which is a mass of soil brought about by digging or other disturbance.

Permeability, soil. The quality of the soil that enables it to transmit air and water readily. Slowly permeable soils allow water and air to move so slowly that root growth may be restricted. Rapidly permeable soils transmit air and water rapidly, and are favorable for the growth of roots.

Phase, soil. That subdivision of a soil type having variations in characteristics not significant to the classification of the soil in its natural landscape but significant in use and management. The variations are chiefly in such external characteristics as relief, stoniness, or erosion.

Phyllite. A micaceous schist, intermediate between mica schist and slate.

Plastic limit. The mositure content at which a soil changes from a semisolid to a plastic state.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range in moisture content within which the soil remains plastic.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material. (See also Horizon, soil.)

Quartzite. A massive, hard, light-colored rock with a flinty sheen; a metamorphosed sandstone.

Reaction, soil. The degree of acidity or alkalinity of the soil, expressed in pH values or in words, as follows:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Relief. Elevations or inequalities of the land surface, considered collectively.

Rill. A shallow channel formed by running water. Not large enough to be an obstacle to farm machinery. (See also Gully.)

Sand. (1) Individual rock or mineral fragments having diameters ranging from 0.05 millimeter (0.002 inch) to 2.0 millimeters (0.079 inch). Sand grains consist chiefly of quartz, but they may be of any mineral composition. (2) As a soil textural class, soil that is 85 percent or more sand and not more than 10 percent clay.

Schist. Any metamorphic crystalline rock having a closely foliated structure; it splits or cleaves readily along approximately parallel lines.

Sedimentary rock. Rock composed of particles deposited from suspension in water. Principal groups of sedimentary rocks are conglomerates, from gravel; sandstones, from sand; shales, from clay; and limestones, from soft masses of calcium carbonate.

Series, soil. A group of soils that have the same profile characteristics and the same general range in color, structure, consistence, and sequence of horizons; the same general conditions of relief and drainage; and generally a common or similar origin and mode of formation. A group of soil types similar in all respects except for the texture of the surface layer.

Shale. A sedimentary rock formed by the consolidation of clay; has a finely stratified or laminated structure parallel to the bedding; composed of minerals that have been essentially unaltered since deposition.

Sill. Igneous rock that was forced into a horizontal crack or fissure while molten, then hardened in that shape.

Silt. (1) Individual mineral particles of soil that range in diameter from 0.002 millimeter to 0.05 millimeter. (2) As a textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slope, soil. The incline of the surface of a soil. It is usually expressed in percentage of slope, which equals the number of feet of fall per 100 feet of horizontal distance. The slope classes used in this report are:

	Percent		*Percent*
Nearly level	0 to 3	Hilly	15 to 25
Undulating	3 to 8	Steep	25 to 35
Rolling	8 to 15	Very steep	35+

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 soils includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying parent material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stripcropping. Growing crops in a systematic arrangement of strips, or bands. Commonly, cultivated crops and sod crops are alternated in strips to protect the soil and vegetation against running water or wind. The alternate strips are laid out approximately on the contour on erosive soils or approximately at right angles to the prevailing wind where soil blowing is a hazard.

Structure, soil. The aggregation of primary soil particles into compound particles, or clusters of primary particles, which are separated from adjoining aggregates by surfaces of weakness. Soil structure is classified according to grade, class, and type.

Grade. Distinctness of aggregation. It expresses the differential between cohesion within aggregates and adhesion between aggregates. Terms: *Structureless* (*single grain or massive*), *weak, moderate,* and *strong.*

Class. Size of aggregates. Terms: *Very fine* or *very thin, fine* or *thin, medium, coarse* or *thick,* and *very coarse* or *very thick.*

Type. Shape and arrangement of individual natural soil aggregates. Terms: *Platy, prismatic, columnar, blocky, subangular blocky, granular,* and *crumb.* (Example of soil-structure grade, class, and type: Moderate, coarse, subangular blocky.)

Subsoil. Technically, the B horizon of a soil with a distinct profile; commonly, that part of the profile below plow depth.

Substratum. Any layer beneath the solum, or true soil.

Surface runoff. The removal of water by flow over the surface of the soil. The amount and rapidity of surface runoff are affected by the texture, structure, and porosity of the surface layer, by the vegetative covering, by the prevailing climate, and by the slope. The rate of surface runoff is expressed as follows: *Very rapid, rapid, medium, slow, very slow,* and *ponded.*

Surface soil. Technically, the A horizon; commonly, the plow layer.

Texture, soil. The relative proportions of the various size groups of individual soil grains in a mass of soil; specifically, the proportions of sand, silt, and clay. (See also Sand, Silt, and Clay.)

Tilth. The physical properties of the soil that affect the ease with which it can be cultivated or its suitability for crops; implies the presence or absence of favorable soil structure.

Topsoil. Presumably fertile soil or soil material, rich in organic matter, that is used to topdress roadbanks, parks, gardens, and lawns.

Triassic. Refers to a period of geologic time that occurred between 155 and 185 million years ago; also to geologic materials deposited during that period.

Water table. The upper surface of free ground water in a zone of saturation, except when separated from an underlying body of ground water by unsaturated material.

GUIDE TO MAPPING UNITS

[See table 8, p. 76, for approximate acreage and proportionate extent of soils; table 1, p. 18, for estimated productivity of soils; and table 5, p. 46, table 6, p. 64, and table 7, p. 72, for information on engineering properties of soils]

Map symbol	Mapping unit	Page	Capability unit		Woodland group		Building site group	
			Symbol	Page	No.	Page	No.	Page
AaA	Altavista silt loam, 0 to 3 percent slopes	79	IIw-2	11	11	35	7	43
AaB2	Altavista silt loam, 3 to 8 percent slopes, moderately eroded	80	IIe-7	11	11	35	7	43
AbA	Ashton loam, 0 to 3 percent slopes	81	I-1	9	2	33	1	41
AbB	Ashton loam, 3 to 8 percent slopes	81	IIe-2	10	2	33	1	41
AgB2	Arendtsville gravelly loam, 3 to 8 percent slopes, moderately eroded	80	IIe-3	10	1	29	1	41
AgC2	Arendtsville gravelly loam, 8 to 15 percent slopes ,moderately eroded	80	IIIe-3	12	5	33	2	41
AgD3	Arendtsville gravelly loam, 15 to 25 percent slopes, severely eroded	80	VIe-2	16	7	34	2	41
ArB	Arendtsville very stony loam, 0 to 8 percent slopes	81	VIs-1	17	1	29	3	42
ArD	Arendtsville very stony loam, 8 to 25 percent slopes	81	VIs-1	17	5	33	2	41
AtA	Athol loam and silt loam, 0 to 3 percent slopes	82	I-2	9	2	33	1	41
AtB2	Athol loam and silt loam, 3 to 8 percent slopes, moderately eroded	82	IIe-1	9	2	33	1	41
AtC2	Athol loam and silt loam, 8 to 15 percent slopes, moderately eroded	82	IIIe-1	12	6	34	2	41
AtC3	Athol loam and silt loam, 8 to 15 percent slopes, severely eroded	82	IVe-1	14	8	34	2	41
AtD2	Athol loam and silt loam, 15 to 25 percent slopes, moderately eroded	82	IVe-1	14	6	34	2	41
AtD3	Athol loam and silt loam, 15 to 25 percent slopes, severely eroded	83	VIe-1	16	8	34	2	41
AtE2	Athol loam and silt loam, 25 to 35 percent slopes, moderately eroded	83	VIe-1	16	10	34	11	45
BdA	Bedford silt loam, 0 to 3 percent slopes	83	IIw-3	11	12	35	7	43
BdB2	Bedford silt loam, 3 to 8 percent slopes, moderately eroded	84	IIe-6	11	12	35	7	43
BdB3	Bedford silt loam, 3 to 8 percent slopes, severely eroded	84	IIIe-6	13	12	35	7	43
BdC2	Bedford silt loam, 8 to 15 percent slopes, moderately eroded	84	IIIe-6	13	13	35	8	44
BdC3	Bedford silt loam, 8 to 15 percent slopes, severely eroded	84	IVe-7	15	13	35	8	44
BeA	Bermudian silt loam, 0 to 3 percent slopes	85	I-1	9	1	29	10	44
BhA	Bermudian silt loam, high bottom, 0 to 3 percent slopes	85	I-1	9	1	29	1	41
BhB	Bermudian silt loam, high bottom, 3 to 8 percent slopes	85	IIe-2	10	1	29	1	41
BmA	Birdsboro silt loam, 0 to 3 percent slopes	85	I-3	9	1	29	1	41
BmB2	Birdsboro silt loam, 3 to 8 percent slopes, moderately eroded	86	IIe-2	10	1	29	1	41
BmC2	Birdsboro silt loam, 8 to 15 percent slopes, moderately eroded	86	IIIe-2	12	5	33	2	41
Bn	Bowmansville silt loam	86	IIIw-1	13	17	35	10	44
Bo	Bowmansville silt loam, local alluvium	86	IIIw-1	13	17	35	10	44
BrB2	Brecknock channery silt loam, 3 to 8 percent slopes, moderately eroded.	87	IIe-4	10	20	36	3	42
BrC	Brecknock channery silt loam, 8 to 15 percent slopes	87	IIIe-4	13	23	37	4	42
BrC2	Brecknock channery silt loam, 8 to 15 percent slopes, moderately eroded.	87	IIIe-4	13	23	37	4	42
BrC3	Brecknock channery silt loam, 8 to 15 percent slopes, severely eroded.	87	IVe-6	15	25	37	4	42
BrD	Brecknock channery silt loam, 15 to 25 percent slopes	87	IVe-6	15	23	37	4	42
BrD2	Brecknock channery silt loam, 15 to 25 percent slopes, moderately eroded.	88	IVe-6	15	23	37	4	42
BrD3	Brecknock channery silt loam, 15 to 25 percent slopes, severely eroded.	88	VIe-3	16	25	37	4	42
BrE2	Brecknock channery silt loam, 25 to 35 percent slopes, moderately eroded.	88	VIe-3	16	27	37	11	45
BvD	Brecknock very stony silt loam, 8 to 25 percent slopes	88	VIs-3	17	23	37	4	42
BvF	Brecknock very stony silt loam, 25 to 65 percent slopes	88	VIIs-1	18	27	37	11	45
CaB2	Cardiff slaty silt loam, 3 to 8 percent slopes, moderately eroded	89	IIIe-4	13	19	36	5	43
CaC2	Cardiff slaty silt loam, 8 to 15 percent slopes, moderately eroded	89	IVe-6	15	22	36	6	43
CaC3	Cardiff slaty silt loam, 8 to 15 percent slopes, severely eroded	89	VIe-3	16	24	37	6	43
CaD2	Cardiff slaty silt loam, 15 to 25 percent slopes, moderately eroded	89	VIe-3	16	22	36	6	43
CaD3	Cardiff slaty silt loam, 15 to 25 percent slopes, severely eroded	89	VIIe-2	18	24	37	6	43
CaE3	Cardiff slaty silt loam, 25 to 35 percent slopes, severely eroded	89	VIIe-2	18	28	38	11	45
CcB3	Catoctin channery silt loam, 3 to 8 percent slopes, severely eroded	90	IVe-6	15	21	36	5	43
CcC3	Catoctin channery silt loam, 8 to 15 percent slopes, severely eroded	90	VIe-3	16	24	37	6	43
CcD3	Catoctin channery silt loam, 15 to 25 percent slopes, severely eroded	90	VIIe-1	18	24	37	6	43
ChA	Chester silt loam, 0 to 3 percent slopes	90	I-3	9	1	29	1	41
ChA2	Chester silt loam, 0 to 3 percent slopes, moderately eroded	91	IIe-2	10	1	29	1	41
ChB	Chester silt loam, 3 to 8 percent slopes	91	IIe-2	10	1	29	1	41
ChB2	Chester silt loam, 3 to 8 percent slopes, moderately eroded	91	IIe-2	10	1	29	1	41
ChB3	Chester silt loam, 3 to 8 percent slopes, severely eroded	91	IIIe-2	12	3	33	1	41
ChC2	Chester silt loam, 8 to 15 percent slopes, moderately eroded	91	IIIe-2	12	5	33	2	41
Ck	Chewacla silt loam	92	IIw-1	11	11	35	10	44
CoA	Conestoga silt loam, 0 to 3 percent slopes	92	I-2	9	2	33	1	41
CoA2	Conestoga silt loam, 0 to 3 percent slopes, moderately eroded	92	IIe-1	9	2	33	1	41
CoB2	Conestoga silt loam, 3 to 8 percent slopes, moderately eroded	93	IIe-1	9	2	33	1	41
CoB3	Conestoga silt loam, 3 to 8 percent slopes, severely eroded	93	IIIe-1	12	4	33	1	41
CoC2	Conestoga silt loam, 8 to 15 percent slopes, moderately eroded	93	IIIe-1	12	6	34	2	41
CoC3	Conestoga silt loam, 8 to 15 percent slopes, severely eroded	93	IVe-1	14	8	34	2	41
CoD3	Conestoga silt loam, 15 to 25 percent slopes, severely eroded	93	VIe-1	16	8	34	2	41

GUIDE TO MAPPING UNITS—Continued

Map symbol	Mapping unit	Page	Capability unit		Woodland group		Building site group	
			Symbol	Page	No.	Page	No.	Page
Cp	Congaree silt loam	94	I–1	9	1	29	10	44
CrA	Croton silt loam, 0 to 3 percent slopes	94	IVw–1	16	17	35	9	44
CrA2	Croton silt loam, 0 to 3 percent slopes, moderately eroded	94	IVw–1	16	17	35	9	44
CrB	Croton silt loam, 3 to 8 percent slopes	95	IVw–1	16	17	35	9	44
CrB2	Croton silt loam, 3 to 8 percent slopes, moderately eroded	95	IVw–1	16	17	35	9	44
CvB	Croton very stony silt loam, 0 to 8 percent slopes	95	VIIs–2	19	17	35	9	44
DuA	Duffield silt loam, 0 to 3 percent slopes	95	I–2	9	2	33	1	41
DuA2	Duffield silt loam, 0 to 3 percent slopes, moderately eroded	96	IIe–1	9	2	33	1	41
DuB	Duffield silt loam, 3 to 8 percent slopes	96	IIe–1	9	2	33	1	41
DuB2	Duffield silt loam, 3 to 8 percent slopes, moderately eroded	96	IIe–1	9	2	33	1	41
DuC2	Duffield silt loam, 8 to 15 percent slopes, moderately eroded	96	IIIe–1	12	6	34	2	41
DuD2	Duffield silt loam, 15 to 25 percent slopes, moderately eroded	96	IVe–1	14	6	34	2	41
DyC3	Duffield silty clay, 8 to 15 percent slopes, severely eroded	96	IVe–1	14	8	34	2	41
EcB2	Edgemont channery loam, 3 to 8 percent slopes, moderately eroded	97	IIe–3	10	1	29	1	41
EcC2	Edgemont channery loam, 8 to 15 percent slopes, moderately eroded	97	IIIe–3	12	5	33	2	41
EcC3	Edgemont channery loam, 8 to 15 percent slopes, severely eroded	97	IVe–3	14	7	34	2	41
EcD2	Edgemont channery loam, 15 to 25 percent slopes, moderately eroded	97	IVe–3	14	5	33	2	41
EcD3	Edgemont channery loam, 15 to 25 percent slopes, severely eroded	98	VIe–2	16	7	34	2	41
EdB	Edgemont silt loam, 3 to 8 percent slopes	98	IIe–2	10	1	29	1	41
EdB2	Edgemont silt loam, 3 to 8 percent slopes, moderately eroded	98	IIe–2	10	1	29	1	41
EdB3	Edgemont silt loam, 3 to 8 percent slopes, severely eroded	98	IIIe–3	12	3	33	1	41
EdC	Edgemont silt loam, 8 to 15 percent slopes	98	IIIe–3	12	5	33	2	41
EdC2	Edgemont silt loam, 8 to 15 percent slopes, moderately eroded	98	IIIe–3	12	5	33	2	41
EdC3	Edgemont silt loam, 8 to 15 percent slopes, severely eroded	98	IVe–3	14	7	34	2	41
EdD2	Edgemont silt loam, 15 to 25 percent slopes, moderately eroded	99	IVe–3	14	5	33	2	41
EdD3	Edgemont silt loam, 15 to 25 percent slopes, severely eroded	99	VIe–2	16	7	34	2	41
EgE2	Edgemont soils, 25 to 35 percent slopes, moderately eroded	99	VIe–2	16	9	34	11	45
EhB	Edgemont very stony loam, 0 to 8 percent slopes	99	VIs–1	17	1	29	3	42
EhD	Edgemont very stony loam, 8 to 25 percent slopes	99	VIs–1	17	5	33	2	41
EhF	Edgemont very stony loam, 25 to 60 percent slopes	99	VIIs–1	18	9	34	11	45
EkA	Elioak silt loam, 0 to 3 percent slopes	100	I–3	9	1	29	1	41
EkB	Elioak silt loam, 3 to 8 percent slopes	100	IIe–2	10	1	29	1	41
EkB2	Elioak silt loam, 3 to 8 percent slopes, moderately eroded	100	IIe–2	10	1	29	1	41
EkC	Elioak silt loam, 8 to 15 percent slopes	100	IIIe–2	12	5	33	2	41
EkC2	Elioak silt loam, 8 to 15 percent slopes, moderately eroded	100	IIIe–2	12	5	33	2	41
EkC3	Elioak silt loam, 8 to 15 percent slopes, severely eroded	100	IVe–2	14	7	34	2	41
ElA	Elk silt loam, 0 to 3 percent slopes	101	I–2	9	2	33	1	41
ElB2	Elk silt loam, 3 to 8 percent slopes, moderately eroded	101	IIe–1	9	2	33	1	41
ElC2	Elk silt loam, 8 to 15 percent slopes, moderately eroded	101	IIIe–1	12	6	34	2	41
GcB	Glenelg channery silt loam, 3 to 8 percent slopes	101	IIe–2	10	1	29	3	42
GcB2	Glenelg channery silt loam, 3 to 8 percent slopes, moderately eroded	102	IIe–2	10	1	29	3	42
GcB3	Glenelg channery silt loam, 3 to 8 percent slopes, severely eroded	102	IIIe–2	12	3	33	3	42
GcC	Glenelg channery silt loam, 8 to 15 percent slopes	102	IIIe–2	12	5	33	4	42
GcC2	Glenelg channery silt loam, 8 to 15 percent slopes, moderately eroded	102	IIIe–2	12	5	33	4	42
GcC3	Glenelg channery silt loam, 8 to 15 percent slopes, severely eroded	102	IVe–2	14	7	34	4	42
GcD	Glenelg channery silt loam, 15 to 25 percent slopes	102	IVe–2	14	5	33	4	42
GcD2	Glenelg channery silt loam, 15 to 25 percent slopes, moderately eroded	102	IVe–2	14	5	33	4	42
GcD3	Glenelg channery silt loam, 15 to 25 percent slopes, severely eroded	102	VIe–3	16	7	34	4	42
GnA	Glenville silt loam, 0 to 3 percent slopes	103	IIw–2	11	11	35	7	43
GnB	Glenville silt loam, 3 to 8 percent slopes	103	IIe–7	11	11	35	7	43
GnB2	Glenville silt loam, 3 to 8 percent slopes, moderately eroded	103	IIe–7	11	11	35	7	43
Gu	Guthrie silt loam	104	IVw–1	16	18	36	9	44
HaA	Hagerstown silt loam, 0 to 3 percent slopes	104	I–2	9	2	33	1	41
HaA2	Hagerstown silt loam, 0 to 3 percent slopes, moderately eroded	105	IIe–1	9	2	33	1	41
HaB2	Hagerstown silt loam, 3 to 8 percent slopes, moderately eroded	105	IIe–1	9	2	33	1	41
HaC2	Hagerstown silt loam, 8 to 15 percent slopes, moderately eroded	105	IIIe–1	12	6	34	2	41
HaD2	Hagerstown silt loam, 15 to 25 percent slopes, moderately eroded	105	IVe–1	14	6	34	2	41
HcB3	Hagerstown silty clay, 3 to 8 percent slopes, severely eroded	105	IVe–1	14	4	33	1	41
HcC3	Hagerstown silty clay, 8 to 15 percent slopes, severely eroded	105	IVe–1	14	8	34	2	41
HdD3	Hagerstown and Duffield silty clay loams, 15 to 25 percent slopes, severely eroded.	105	VIe–1	16	8	34	2	41
HfB2	Highfield channery silt loam, 3 to 8 percent slopes, moderately eroded	106	IIe–2	10	1	29	1	41
HfC2	Highfield channery silt loam, 8 to 15 percent slopes, moderately eroded.	106	IIIe–2	12	5	33	2	41
HgB	Highfield very stony silt loam, 0 to 8 percent slopes	106	VIs–1	17	1	29	3	42
HhD	Highfield and Catoctin very stony silt loams, 8 to 25 percent slopes	106	VIs–1	17	5	33	2	41
Hn	Huntington silt loam	107	I–1	9	2	33	10	44
HuA	Huntington silt loam, local-alluvium, 0 to 3 percent slopes	107	I–1	9	2	33	10	44
HuB	Huntington silt loam, local alluvium, 3 to 8 percent slopes	107	IIe–1	9	2	33	2	41
La	Lamington silt loam	108	IIIw–2	14	17	35	9	44

GUIDE TO MAPPING UNITS—Continued

Map symbol	Mapping unit	Page	Capability unit		Woodland group		Building site group	
			Symbol	Page	No.	Page	No.	Page
LcB2	Lansdale channery loam, 3 to 8 percent slopes, moderately eroded	109	IIe–4	10	1	29	3	42
LcC2	Lansdale channery loam, 8 to 15 percent slopes, moderately eroded	109	IIIe–4	13	5	33	4	42
LcC3	Lansdale channery loam, 8 to 15 percent slopes, severely eroded	109	IVe–4	15	7	34	4	42
LcD2	Lansdale channery loam, 15 to 25 percent slopes, moderately eroded	109	IVe–4	15	5	33	4	42
LdA2	Lansdale loam, 0 to 3 percent slopes, moderately eroded	108	IIs–1	12	1	29	3	42
LdB2	Lansdale loam, 3 to 8 percent slopes, moderately eroded	109	IIe–4	10	1	29	3	42
LdB3	Lansdale loam, 3 to 8 percent slopes, severely eroded	109	IIIe–4	13	3	33	3	42
LdC3	Lansdale loam, 8 to 15 percent slopes, severely eroded	109	IVe–4	15	7	34	4	42
Le	Lawrence silt loam	110	IIIw–2	14	16	35	9	44
LfC3	Legore clay loam, 8 to 15 percent slopes, severely eroded	111	IVe–5	15	25	37	6	43
LfD3	Legore clay loam, 15 to 25 percent slopes, severely eroded	111	VIIe–1	18	25	37	6	43
LfE3	Legore clay loam, 25 to 35 percent slopes, severely eroded	111	VIIe–2	18	29	38	11	45
LgB2	Legore silt loam, 3 to 8 percent slopes, moderately eroded	111	IIIe–4	13	20	36	3	42
LgB3	Legore silt loam, 3 to 8 percent slopes, severely eroded	111	IVe–5	15	20	36	3	42
LgD2	Legore silt loam, 15 to 25 percent slopes, moderately eroded	111	VIe–3	16	23	37	6	43
LhA	Lehigh channery silt loam, 0 to 3 percent slopes	112	IIIw–2	14	15	35	7	43
LhB	Lehigh channery silt loam, 3 to 8 percent slopes	112	IIIw–2	14	11	35	7	43
LhB2	Lehigh channery silt loam, 3 to 8 percent slopes, moderately eroded	112	IIIw–2	14	11	35	7	43
LhB3	Lehigh channery silt loam, 3 to 8 percent slopes, severely eroded	112	IVe–7	15	11	35	7	43
LhC	Lehigh channery silt loam, 8 to 15 percent slopes	112	IIIe–6	13	13	35	8	44
LhC2	Lehigh channery silt loam, 8 to 15 percent slopes, moderately eroded	113	IIIe–6	13	13	35	8	44
LhC3	Lehigh channery silt loam, 8 to 15 percent slopes, severely eroded	113	IVe–7	15	14	35	8	44
LhD2	Lehigh channery silt loam, 15 to 25 percent slopes, moderately eroded	113	IVe–7	15	13	35	8	44
LhE3	Lehigh channery silt loam, 15 to 25 percent slopes, severely eroded	113	VIe–4	17	14	35	8	44
LlB	Lehigh very stony silt loam, 0 to 8 percent slopes	113	VIs–2	17	11	35	7	43
LlD	Lehigh very stony silt loam, 8 to 25 percent slopes	113	VIs–2	17	13	35	8	44
LmB	Lewisberry sandy loam, 3 to 8 percent slopes	114	IIs–2	12	1	29	1	41
LmB2	Lewisberry sandy loam, 3 to 8 percent slopes, moderately eroded	114	IIs–2	12	3	33	1	41
LmC	Lewisberry sandy loam, 8 to 15 percent slopes	114	IIIe–3	12	5	33	2	41
LmC2	Lewisberry sandy loam, 8 to 15 percent slopes, moderately eroded	114	IIIe–3	12	7	34	2	41
LmD2	Lewisberry sandy loam, 15 to 25 percent slopes, moderately eroded	114	IVe–2	14	5	33	2	41
LmE2	Lewisberry sandy loam, 25 to 45 percent slopes, moderately eroded	115	VIIe–1	18	26	37	11	45
LnD	Lewisberry and Lansdale very stony loams, 8 to 25 percent slopes	115	VIs–1	17	5	33	2	41
LrF	Lewisberry and Lansdale very stony sandy loams, 26 to 60 percent slopes.	115	VIIs–1	18	9	34	11	45
Ls	Lindside silt loam	115	IIw–1	11	12	35	10	44
Ma	Made land, Duffield and Conestoga materials	115	-------	------	2	33	1	41
MdB	Made land, Penn and Lansdale materials, gently sloping	115	-------	------	1	29	5	43
MdD	Made land, Penn and Lansdale materials, strongly sloping	115	-------	------	5	33	6	43
Me	Made land, Wheeling and Sciotoville materials	116	-------	------	1	29	1	41
MfB	Manor channery loam, 3 to 8 percent slopes	116	IIIe–4	13	19	36	5	43
MfB2	Manor channery loam, 3 to 8 percent slopes, moderately eroded	116	IIIe–4	13	19	36	5	43
MfB3	Manor channery loam, 3 to 8 percent slopes, severely eroded	116	IVe–4	15	21	36	5	43
MfC	Manor channery loam, 8 to 15 percent slopes	116	IVe–4	15	22	36	6	43
MfC2	Manor channery loam, 8 to 15 percent slopes, moderately eroded	116	IVe–4	15	22	36	6	43
MfC3	Manor channery loam, 8 to 15 percent slopes, severely eroded	117	VIe–3	16	24	37	6	43
MfD	Manor channery loam, 15 to 25 percent slopes	117	VIe–3	16	22	36	6	43
MfD2	Manor channery loam, 15 to 25 percent slopes, moderately eroded	117	VIe–3	16	22	36	6	43
MfD3	Manor channery loam, 15 to 25 percent slopes, severely eroded	117	VIIe–1	18	24	37	6	43
MfE	Manor channery loam, 25 to 45 percent slopes	117	VIIe–1	18	26	37	11	45
MfE2	Manor channery loam, 25 to 45 percent slopes, moderately eroded	117	VIIe–2	18	26	37	11	45
MfE3	Manor channery loam, 25 to 45 percent slopes, severely eroded	117	VIIe–2	18	28	38	11	45
MfF	Manor channery loam, 45 to 60 percent slopes	118	VIIe–2	18	26	37	11	45
MgB	Manor very stony loam, 0 to 8 percent slopes	118	VIs–3	17	19	36	5	43
MgD2	Manor very stony loam, 8 to 25 percent slopes, moderately eroded	118	VIs–3	17	22	36	6	43
MgF2	Manor very stony loam, 25 to 75 percent slopes, moderately eroded	118	VIIs–1	18	26	37	11	45
Mm	Melvin silt loam	118	IIIw–1	13	18	36	10	44
MnB2	Montalto channery silt loam, 3 to 8 percent slopes, moderately eroded	119	IIe–1	9	2	33	1	41
MnC2	Montalto channery silt loam, 8 to 15 percent slopes, moderately eroded.	119	IIIe–1	12	6	34	2	41
MnD2	Montalto channery silt loam, 15 to 25 percent slopes, moderately eroded.	119	IVe–1	14	6	34	2	41
MoC3	Montalto channery silty clay loam, 8 to 15 percent slopes, severely eroded.	119	IVe–1	14	8	34	2	41
MsD	Montalto extremely stony silt loam, 8 to 25 percent slopes	120	VIIs–1	18	6	34	11	45
MsF	Montalto extremely stony silt loam, 25 to 60 percent slopes	120	VIIs–1	18	10	34	11	45
MtB	Montalto very stony silt loam, 3 to 8 percent slopes	120	VIs–1	17	2	33	3	42
MtD	Montalto very stony silt loam, 8 to 25 percent slopes	120	VIs–1	17	6	34	2	41
MtF	Montalto very stony silt loam, 25 to 60 percent slopes	120	VIIs–1	18	10	34	11	45
MuA	Mount Lucas silt loam, 0 to 3 percent slopes	121	IIw–3	11	16	35	7	43
MuB	Mount Lucas silt loam, 3 to 8 percent slopes	121	IIe–6	11	12	35	7	43
MuB2	Mount Lucas silt loam, 3 to 8 percent slopes, moderately eroded	121	IIe–6	11	12	35	7	43

GUIDE TO MAPPING UNITS—Continued

Map symbol	Mapping unit	Page	Capability unit		Woodland group		Building site group	
			Symbol	Page	No.	Page	No.	Page
MvB	Mount Lucas very stony silt loam, 0 to 8 slopes	121	VIs–2	17	12	35	7	43
MwA	Murrill gravelly loam, 0 to 3 percent slopes	122	I–2	9	2	33	1	41
MwB	Murrill gravelly loam, 3 to 8 percent slopes	122	IIe–1	9	2	33	1	41
MwB2	Murrill gravelly loam, 3 to 8 percent slopes, moderately eroded	122	IIe–1	9	2	33	1	41
MwC2	Murrill gravelly loam, 8 to 15 percent slopes, moderately eroded	122	IIIe–1	12	6	34	2	41
MwC3	Murrlll gravelly loam, 8 to 15 percent slopes, severely eroded	122	IVe–1	14	8	34	2	41
MxB	Murrill very stony loam, 0 to 8 percent slopes	123	VIs–1	17	2	33	3	42
MxD	Murrill very stony loam, 8 to 25 percent slopes	123	VIs–1	17	6	34	2	41
PeB2	Penn loam, 3 to 8 percent slopes, moderately eroded	124	IIe–4	10	19	36	5	43
PeB3	Penn loam, 3 to 8 percent slopes, severely eroded	125	IIIe–4	13	21	36	5	43
PeC2	Penn loam, 8 to 15 percent slopes, moderately eroded	125	IIIe–4	13	22	36	6	43
PeC3	Penn loam, 8 to 15 percent slopes, severely eroded	125	IVe–4	15	24	37	6	43
PfB3	Penn shaly silt loam, 3 to 8 percent slopes, severely eroded	125	VIs–3	17	21	36	5	43
PfC3	Penn shaly silt loam, 8 to 15 percent slopes, severely eroded	125	VIs–3	17	24	37	6	43
PfD3	Penn shaly silt loam, 15 to 25 percent slopes, severely eroded	125	VIIe–2	18	24	37	6	43
PgA2	Penn silt loam, 0 to 3 percent slopes, moderately eroded	123	IIs–1	12	19	36	5	43
PgB	Penn silt loam, 3 to 8 percent slopes	123	IIe–4	10	19	36	5	43
PgB2	Penn silt loam, 3 to 8 percent slopes, moderately eroded	123	IIe–4	10	19	36	5	43
PgB3	Penn silt loam, 3 to 8 percent slopes, severely eroded	124	IIIe–4	13	21	36	5	43
PgC	Penn silt loam, 8 to 15 percent slopes	124	IIIe–4	13	22	36	6	43
PgC2	Penn silt loam, 8 to 15 percent slopes, moderately eroded	124	IIIe–4	13	22	36	6	43
PgC3	Penn silt loam, 8 to 15 percent slopes, severely eroded	124	IVe–4	15	24	37	6	43
PgD	Penn silt loam, 15 to 25 percent slopes	124	IVe–4	15	22	36	6	43
PgD2	Penn silt loam, 15 to 25 percent slopes, moderately eroded	124	IVe–4	15	22	36	6	43
PhD3	Penn soils, 15 to 25 percent slopes, severely eroded	125	VIe–3	16	24	37	6	43
PhE3	Penn soils, 25 to 35 percent slopes, severely eroded	125	VIIe–2	18	28	38	11	45
PhF3	Penn soils, 35 to 60 percent slopes, severely eroded	126	VIIe–2	18	28	38	11	45
PmB	Penn very stony loam, 0 to 8 percent slopes	126	VIs–3	17	19	36	5	43
PmD	Penn very stony loam, 8 to 25 percent slopes	126	VIs–3	17	22	36	6	43
PmF	Penn very stony loam, 25 to 60 percent slopes	126	VIIs–1	18	26	37	11	45
PnA	Penn-Lansdale loams, 0 to 3 percent slopes	126	IIs–1	12	19	36	5	43
PnB2	Penn-Lansadle loams, 3 to 8 percent slopes, moderately eroded	126	IIe–4	10	19	36	5	43
PnB3	Penn-Lansdale loams, 3 to 8 percent slopes, severely eroded	126	IIIe–4	13	21	36	5	43
PnC2	Penn-Lansdale loams, 8 to 15 percent slopes, moderately eroded	126	IIIe–4	13	22	36	6	43
PnC3	Penn-Lansdale loams, 8 to 15 percent slopes, severely eroded	127	IVe–4	15	24	37	6	43
PnD3	Penn-Lansdale loams, 15 to 25 percent slopes, severely eroded	127	VIe–3	16	24	37	6	43
PrB2	Penn and Readington shaly silt loams, 3 to 8 percent slopes, moderately eroded.	127	IIIe–4	13	15	35	7	43
PrB3	Penn and Readington shaly silt loams, 3 to 8 percent slopes, severely eroded.	127	IVe–4	15	15	35	5	43
PrC3	Penn and Readington shaly silt loams, 8 to 15 percent slopes, severely eroded.	127	VIs–3	17	14	35	8	44
PsB2	Pequea silt loam, 3 to 8 percent slopes, moderately eroded	128	IIe–5	10	20	36	3	42
PsC2	Pequea silt loam, 8 to 15 percent slopes, moderately eroded	128	IIIe–5	13	23	37	6	43
PsC3	Pequea silt loam, 8 to 15 percent slopes, severely eroded	128	IVe–5	15	25	37	6	43
PsD3	Pequea silt loam, 15 to 25 percent slopes, severely eroded	128	VIe–1	16	25	37	6	43
PsE2	Pequea silt loam, 25 to 35 percent slopes, moderately eroded	128	VIe–1	16	27	37	11	45
RaA	Raritan silt loam, 0 to 3 percent slopes	129	IIw–2	11	11	35	7	43
RaB2	Raritan silt loam, 3 to 8 percent slopes, moderately eroded	129	IIe–7	11	11	35	7	43
RdA	Readington silt loam, 0 to 3 percent slopes	129	IIw–2	11	11	35	7	43
RdB	Readington silt loam, 3 to 8 percent slopes	130	IIe–7	11	11	35	7	43
RdB2	Readington silt loam, 3 to 8 percent slopes, moderately eroded	130	IIe–7	11	11	35	7	43
Ro	Rowland silt loam	130	IIw–1	11	11	35	10	44
ScA	Sciotoville silt loam, 0 to 3 percent slopes	131	IIw–2	11	11	35	7	43
ScB	Sciotoville silt loam, 3 to 8 percent slopes	131	IIe–7	11	11	35	7	43
SsC3	Steinsburg channery loam, 8 to 15 percent slopes, severely eroded	131	VIe–3	16	24	37	6	43
SsD3	Steinsburg channery loam, 15 to 25 percent slopes, severely eroded	132	VIIe–2	18	24	37	6	43
SsE2	Steinsburg channery loam, 25 to 35 percent slopes, moderately eroded.	132	VIIe–2	18	26	37	11	45
SsE3	Steinsburg channery loam, 25 to 35 percent slopes, severely eroded	132	VIIe–2	18	28	38	11	45
WaA	Watchung silt loam, 0 to 3 percent slopes	132	Vw–1	16	18	36	9	44
WaB	Watchung silt loam, 3 to 5 percent slopes	133	Vw–1	16	18	36	9	44
WcB	Watchung very stony silt loam, 0 to 8 percent slopes	133	VIIs–2	19	18	36	9	44
Wd	Wehadkee silt loam	133	IIIw–1	13	17	35	10	44
We	Wehadkee silt loam, local alluvium, 3 to 8 percent slopes	133	IIIw–1	13	17	35	10	44
WgB2	Wheeling silt loam, 3 to 8 percent slopes, moderately eroded	134	IIe–2	10	1	29	1	41
WgC2	Wheeling silt loam, 8 to 15 percent slopes, moderately eroded	134	IIIe–2	12	5	33	2	41
WhB2	Whiteford silt loam, 3 to 8 percent slopes, moderately eroded	134	IIe–2	10	1	29	1	41
WhC2	Whiteford silt loam, 8 to 15 percent slopes, moderately eroded	135	IIIe–2	12	5	33	2	41
WkA	Wickham silt loam, 0 to 3 percent slopes	135	I–3	9	1	29	1	41
WkB2	Wickham silt loam, 3 to 8 percent slopes, moderately eroded	135	IIe–2	10	1	29	1	41
Wo	Worsham silt loam	136	Vw–1	16	17	35	9	44

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