SOIL SURVEY OF

Cecil County, Maryland

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

Issued December 1973

Major fieldwork for this soil survey was done in the period 1945–66. Soil names and descriptions were approved in 1967. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1967. This survey was made cooperatively by the Soil Conservation Service and the Maryland Agricultural Experiment Station. It is part of the technical assistance furnished to the Cecil Soil Conservation District.

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

HOW TO USE THIS SOIL SURVEY

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

Locating Soils

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

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

Finding and Using Information

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

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

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

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

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

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

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

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

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

Cover: Typical landscape of the Mattapex-Elsinboro-Othello association in the foreground. The higher, more rolling soils of the Glenelg-Manor-Glenville association are in the background. Courtesy of The Cecil Whig.

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UNITED STATES DEPARTMENT OF AGRICULTURE IN COOPERATION WITH MARYLAND AGRICULTURAL EXPERIMENT STATION

CECIL COUNTY is in the northeastern corner of Maryland (fig. 1). Its total area is 225,280 acres, or 352 square miles. In 1960 the population was 48,408, according to records of the U.S. Bureau of the Census.

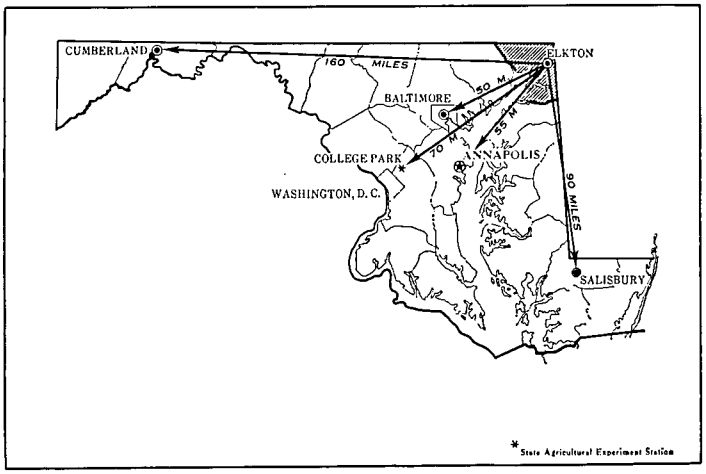

Figure 1.—Location of Cecil County in Maryland

Most counties in Maryland are larger than Cecil. The county is bounded by Pennsylvania on the north, by Delaware on the east, by Kent County along the Sassafras River on the south, and by Chesapeake Bay and the Susquehanna River on the west.

Cecil County is a rural area that is influenced by the growing northern Delaware metropolitan area. U.S. Highway No. 213 runs north and south in the county, intersecting U.S. Highway No. 40 that runs east and west as does National Interstate Highway No. 95. The inland waterway cuts across the county in the Chesapeake and Delaware Canal. The number of rural residences in the county has increased. Many of the county residents, production line employees, and business people commute to Delaware to the east and to two Department of Defense installations in Harford County to the west. Summer cottages line the 120 miles of county waterfront and marinas dot the shore. Elk Neck State Park is available for camping during the summer. Migratory waterfowl are hunted along the shores and in the fields of the county in fall and in winter.

Slightly less than 3 percent of the total area, or 6,191 acres, is suited to cultivated crops commonly grown in the area, unless special management practices are used. For the soils in this acreage, good management is all that is needed. Good management is needed on 46 percent of the acreage, or 104,435 acres. Careful management and conservation practices and structures are needed on about 20 percent of the acreage, or 45,721 acres, if that acreage is used for cultivated crops. These practices are needed to prevent damage to the soils, to soils in adjoining areas, and to crops. The soils in about 14 percent of the county, or 31,330 acres, have very severe limitations for regular use for cultivated crops. Practices needed if those areas are in crops are described in the subsection "Management by Capability Units."

About 2 percent of the county, or 4,526 acres, is better suited to intensive use for pasture than to use for cultivated crops. These areas generally occupy long, narrow strips along major streams of the county. The soils in these areas are not generally suited to cultivation, because of periodic flooding and poor internal drainage. About 7 percent of the county, or 15,708 acres, is suited to moderate use as pasture.

The farmers in the county were engaged in general farming prior to the first quarter of the twentieth century. Dairy farming has increased and wheat production has sharply decreased since that time. The acreage in corn has decreased only slightly in the past 90 years, but that in wheat has decreased about one-fourth. At one time, the acreage planted to wheat each year exceeded that planted to corn by 5,000 to 8,000 acres.

Dairy farming is the most important farm enterprise in the county. It is decreasing in importance but still accounted for about 49 percent of the value of all farm products sold in the county in 1964, according to records of the U.S. Bureau of the Census. Dairy farming is centered in the northwestern part of the county on soils of the Piedmont Plateau. Grain, as a cash crop, is the second most important farming enterprise. It is increasing in importance and accounted for about 24 percent of the value of all farm products sold in 1964. Grain is mostly grown in the southern part of the county on soils of the Coastal Plain.

Livestock and livestock products, excluding poultry and dairy products, accounted for about 12 percent of

the value of all farm products sold in 1964. Poultry products accounted for about 8 percent of the total value.

About one-third of the acreage in the county is wooded, but woodland on farms accounted for only about 13 percent of the acreage in 1959.

The soils in about 5 percent of the county, or 11,644 acres, are better suited to trees than to cultivated crops, because they are steep, rough, droughty, or eroded. The trees provide protection for the watershed and have esthetic value. Much of the remaining 3 percent of the county, or 5,725 acres, is better suited to recreational uses and as wildlife habitat than to other uses.

Climate [1]

Cecil County has a humid, continental climate with well-defined seasons. The Chesapeake Bay and its tributaries and, to a lesser degree, the Atlantic Ocean have a modifying effect on the climate, especially in moderating extreme temperatures. The climate data in table 1 are based on records at Elkton, in the east-central part of Cecil County, and are representative of the entire county.

The warmest period of the year is the last half of July, when the maximum afternoon temperatures average near 90° F. Temperatures of 90° F. or higher occur on an average of 34 days per year. The coldest period is the last of January and the beginning of February, when early morning minimum temperatures average near 22° F. The average number of days the daily minimum temperature is 32° F. or lower is 111.

[1] By WILLIAM J. MOYER, climatologist for Maryland, National Weather Service, U. S. Department of Commerce.

Freeze data, giving the average dates of the last freeze in spring and the first freeze in fall, are given in table 2. The period between the last 32° F. temperature in spring and the first in fall, defined as the growing season, averages 181 days at Elkton.

During the period 1927–1970, the annual precipitation at Elkton ranged from a low of 26.96 inches in 1930 to a high of 58.01 inches in 1945. The monthly distribution is fairly uniform throughout the year. August generally has slightly more precipitation than other months. The maximum total for any one month is 15.18 inches, which occurred in August 1955 when two hurricanes crossed Maryland. The average annual snowfall is 21 inches but there is a considerable variation from year to year, ranging from a trace in 1949–1950 to 58.8 inches in 1957–1958.

Drought may occur in any month or season but serious drought is most likely in the summer. Generally, the rainfall plus the stored soil moisture is adequate for good crop growth, but the unequal distribution of summer showers and occasional dry periods at critical stages in crop development make irrigation necessary for maximum crop growth in some years.

Thunderstorms occur on an average of about 30 days per year, and hail occurs on an average of about one to two days per year. Tornadoes are rare and have caused little damage in the past. Tropical storms or hurricanes affect the county about once a year, generally from August through October. Most of these have caused only minor damage.

Prevailing winds are from west-northwest to northwest. During May through September they become more southerly. The average annual wind speed is about 9 or

TABLE 1.—*Temperature and precipitation at Elkton in Cecil County, Md.*

[Station coordinates: 39°36′N; 75°50′W. Elevation 28 feet. Period of record 1931–60]

Month	Temperature				Precipitation				
	Average daily—		Two years in 10 will have at least 4 days with [1] —		Average total	One year in 10 will have—		Days with snow cover of at least 1.0 inch	Average depth of snow on days with snow cover of at least 1 inch
	Maximum	Minimum	Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—		
	°F.	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*	*Number*	*Inches*
January	42.4	25.1	60	10	3.46	1.9	6.3	5	2
February	44.2	24.9	60	13	2.99	1.9	4.5	5	3
March	52.8	31.4	72	19	4.19	2.1	6.3	2	3
April	64.9	40.7	82	29	3.60	1.4	6.9	0	0
May	75.7	50.8	88	39	4.25	1.4	7.7	0	0
June	84.0	59.6	94	48	3.96	1.7	7.4	0	0
July	87.9	64.5	96	55	4.35	1.0	8.0	0	0
August	86.1	62.9	95	51	5.02	1.4	9.4	0	0
September	79.7	55.9	91	42	3.56	1.0	7.1	0	0
October	68.6	44.4	84	32	3.23	1.6	6.0	0	0
November	56.1	34.6	69	24	3.55	0.8	6.4	1	3
December	44.2	26.3	60	12	3.19	1.3	5.8	3	3
Year	65.6	43.4	[2] 99	[3] 2	45.35	37.0	52.6	16	3

[1] Record, 1941–1960.
[2] Average annual highest maximum.
[3] Average annual lowest minimum.

TABLE 2.—*Probabilities of last freezing temperatures in spring and first in fall*

[Data from Elkton, Cecil County, Md., for 30-year period, 1926–1955]

Probability	Dates for given probability and temperature		
	32° or lower	24° or lower	16° or lower
Spring:			
9 years in 10 later than	April 8	March 5	February 12
3 years in 4 later than	April 13	March 14	February 20
2 years in 3 later than	April 15	March 17	February 23
1 year in 2 later than	April 20	March 24	March 1
1 year in 3 later than	April 25	March 31	March 7
1 year in 4 later than	April 27	April 3	March 10
1 year in 10 later than	May 2	April 12	March 18
Fall:			
1 year in 10 earlier than	October 5	October 28	November 20
1 year in 4 earlier than	October 11	November 4	November 28
1 year in 3 earlier than	October 13	November 7	December 1
1 year in 2 earlier than	October 18	November 12	December 7
2 years in 3 earlier than	October 23	November 17	December 13
3 years in 4 earlier than	October 25	November 20	December 16
9 years in 10 earlier than	October 31	November 27	December 24

10 miles per hour. Wind speeds may reach 50 to 60 miles per hour and even higher in severe thunderstorms, hurricanes, or intense winter storms.

How This Survey Was Made

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

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

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

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Glenelg silt loam, 0 to 3 percent slopes, is one of several phases within the Glenelg series.

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

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

Some mapping units are made up of soils of different series, or of different phases within one series. One such kind of mapping unit, called an undifferentiated group, is shown on the soil map of Cecil County.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. The name of an undifferentiated group consists of the names of the dominant soils, joined by "and." Sassafras and Aura soils, 15 to 40 percent slopes, is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Stony land is a land type in Cecil County.

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

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

On the basis of yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others, then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

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

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

Each of the nine soil associations in Cecil County is described in the following pages. The terms that describe texture, used in the title for several of the associations, apply to the surface layer. For example, in the title for association 1, the word "loamy" refers to texture of the surface layer.

1. Chester-Glenelg-Glenville Association

Deep, well drained and moderately well drained, nearly level to sloping, loamy soils derived from micaceous rock material

This association is made up of gently rolling soils in the northern part of the county. It consists of soils on ridgetops, on the sides of ridges, and on foot slopes adjacent to, in, and at the heads of drainageways. Chester soils occupy about 44 percent of the association; Glenelg soils, 40 percent; and Glenville soils, about 8 percent. The rest of the association consists of Baile, Codorus, Comus, Hatboro, and other minor soils. This association occupies about 6 percent of the county.

The Chester soils are nearly level and gently sloping and well drained. They are on broad ridgetops. The Glenelg soils generally are sloping and are on the sides of ridges below and around the Chester soils. The Glenville soils are gently sloping and moderately well drained. They are on foot slopes adjacent to and at the heads of drainageways. The minor soils are poorly drained in drainageways, and are well drained, moderately well drained, and poorly drained on flood plains.

The Chester and Glenelg soils are deep, well drained, and have moderate to high available moisture capacity. The yellowish-red Chester soils are more red, less micaceous, and deeper to soft, underlying material weathered from rock than the brown Glenelg soils. The Glenville soils have a dense layer in the lower subsoil that slows the movement of moisture and air, and retards the growth of roots. The yellowish-brown subsoil has gray mottles. The Glenville soils have moderate available moisture capacity.

Eighty percent of the association is cultivated, and 20 percent is mainly in wood draws and pasture. Some strip-housing developments front on some roads. The soils in the draws are poorly drained, the soils in pasture are moderately well drained or poorly drained, and the soils used for housing developments are well drained and moderately well drained.

Dairying is the major farm enterprise, but the growing of mushrooms and the raising of beef cattle are also important. The size of the farm and the number of milk cows are increasing, while the number of farms is decreasing.

This nearly level to sloping soil association is attractive. More individual building sites are being developed each year along the State and county roads. Housing subdivisions are increasing in number. The well-drained soils that have moderate slopes are well suited to septic systems. Drilled wells provide adequate water for household use.

2. Glenelg-Manor-Glenville Association

Deep, somewhat excessively drained to moderately well drained, gently sloping to steep, loamy soils derived from micaceous rock material

This association is made up of undulating to steep soils in the northern part of the county. It consists of soils on ridgetops and soils on foot slopes adjacent to and at the heads of drainageways. Glenelg soils occupy about 45 percent of the association; Manor soils, about 21 percent;

and Glenville soils, about 17 percent. The rest of the association consists of Baile, Comus, Codorus, Hatboro, and other minor soils. This association occupies about 20 percent of the county.

The Glenelg soils are gently sloping and sloping, deep, and well drained. Some areas are on ridgetops. The Manor soils are sloping and moderately steep to steep, and they are well drained and somewhat excessively drained. These soils are adjacent to the Glenelg soils. The Glenville soils are gently sloping and are moderately well drained. They are on foot slopes adjacent to and at heads of drainageways. Some of the minor soils are on flood plains. Other poorly drained minor soils are in drainageways.

Glenelg soils have a subsoil of strong-brown heavy silt loam that is thicker and more clayey than the subsoil in Manor soils. They are better drained than Glenville soils and are not somewhat excessively drained as are Manor soils. Glenelg soils do not have the dense hard layer in the subsoil that the Glenville soils have when dry. This layer slows movement of moisture, retards growth of roots, and causes gray mottles to form in the yellowish-brown material.

Fifty percent of the association is cultivated, 12 percent is made up of wooded areas of well-drained soils that are moderately steep to steep, 21 percent is made up of wooded areas of moderately well drained to poorly drained soils that are not steep. The remaining 17 percent of the association is used mainly for pasture (fig. 2). Moderately well drained and poorly drained soils are dominant along the sides and at the heads of draws.

Dairying is the major farm enterprise, but growing crops for market, raising beef cattle, and breeding and boarding horses are also important. Half the area or less is used for dairy farming.

This gently sloping to steep soil association is attractive. Many old stone farmhouses have been renovated in recent years and are now homes on modest country estates.

3. Neshaminy-Montalto-Legore Association

Deep, well-drained, gently sloping to steep, loamy, clayey, and stony soils derived from basic rock

This association is made up of gently sloping to steep soils on hills in the northern part of the county. Neshaminy soils occupy about 31 percent of the association; Montalto soils, about 21 percent, and Legore soils, about 12 percent. The rest of the association consists of soils of minor extent that include areas of steep and very steep Stony land, areas of Aldino and Watchung soils, and areas of moderately well drained and of poorly drained soils. This association occupies about 9 percent of the county.

The deep, well-drained Neshaminy and Montalto soils are gently sloping and sloping on ridgetops and moderately steep on sides of ridges. The Legore soils are on

Figure 2.—Contour farming on a dairy farm on Glenelg-Manor-Glenville association near Port Deposit. (Courtesy of The Cecil Whig.)

narrow, well-drained ridges and are more extensive in steeper areas than the Neshaminy and Montalto soils. The moderately well drained minor soils are at the heads of drainageways, and the poorly drained minor soils are in drainageways.

The Neshaminy soils have a subsoil that is less red and less clayey than the Montalto soils. The Neshaminy soils have a redder and thicker subsoil than the Legore soils. The Legore soils are underlain at a depth of 1½ to 2½ feet by somewhat olive-colored, sandy, disintegrated rock material.

Thirty-four percent of the association is cultivated, and 43 percent is wooded. Much of the wooded area is steep. Fifteen percent of the association is in pasture. The remaining 8 percent is used for other purposes, including right-of-ways for power transmission lines and natural gas pipelines and scattered housing developments along roadfronts.

Dairying is the major farm enterprise. One-third of the area is used for dairy farms. There are many small subsistence farms or part-time farms that raise beef cattle.

Picturesque homesites and natural recreation areas occupy a large part of wooded land in this association. A few thousand acres are used by many organizations to operate camps and hunting preserves.

4. Chrome-Conowingo Association

Deep and moderately deep, well-drained to somewhat poorly drained, gently sloping to steep, loamy soils derived from serpentine and serpentinized rock

This association is made up of gently sloping to steep soils on hilly land along the western part of the county's Pennsylvania boundary. Chrome soils occupy about 90 percent of the association and Conowingo soils about 8 percent. The rest of the association consists of Aldino, Watchung, and other minor soils. This association occupies about 1 percent of the county.

The Chrome soils are gently sloping to steep, moderately deep, and well drained. They are on narrow ridgetops and steep sides of ridges. Chrome soils have a brown or brownish subsoil that has a waxy feel. The Conowingo soils are moderately deep and moderately well drained. These soils are in depressions or sloping areas at the heads of drainageways. They have a subsoil of brown or yellowish-brown, silty clay loam. The minor soils are near the Conowingo soils at the heads and along the courses of drainageways.

Seventy percent of this association is wooded and 20 percent is cultivated. The remaining 10 percent is mainly in homesites, in right-of-ways for electric transmission lines and natural gas pipelines, quarries, and abandoned chrome mines.

The large area of woodland, the relatively sparse population, and the picturesque, gently sloping to steep terrain are factors that make large areas of this association suitable for the establishment of private camps and hunt clubs. Dairying, grain crops, and the raising of beef cattle are other uses.

The development of rural housing is limited by questionable or unsuitable characteristics of the soils for septic systems.

5. Keyport-Loamy and clayey land-Beltsville Association

Deep, well drained to moderately well drained, nearly level to steep soils that developed in old coastal plain deposits ranging from gravelly loamy sand to clay

This association is made up of rolling and hilly soils in the central part of the county. Keyport soils make up about 22 percent of the association; Loamy and clayey land, about 16 percent; and Beltsville soils, about 15 percent. The rest of the association consists of several minor soils. This association occupies about 24 percent of the county.

The Keyport soils are gently sloping, deep, and moderately well drained. They are on broad ridgetops scattered across the northern part of this association. Some areas are gently sloping and rolling and are on sides of ridges. Loamy and clayey land is deep, slowly permeable, and well drained. It occupies several large, hilly tracts on Elk Neck between Piney Creek and U.S. Highway No. 40. Many small and medium-sized areas are on the sides of and between the hills. The Beltsville soils are gently sloping, deep, and moderately well drained. They are on scattered coastal plain terrace remnants of moderate size.

The Keyport soils have a surface layer of loam and a subsoil of clay. The Beltsville soils are loamy throughout. They have a fragipan in the lower part of their subsoil. Loamy and clayey land consists of red or reddish clay mixed with yellowish, brownish, whitish, and purplish clay of the subsoil and underlying materials.

The minor soils are well drained and excessively drained, and gravelly, and are on rolling and steep hills. A few hills are sandy. These hills are surrounded by the major soils. Silty soils are on scattered coastal plain terrace remnants and a few hills. Poorly drained silty soils that have a compact layer at a depth of 2 feet are near the Beltsville soils toward the middle of broad and flat terraces. Moderately well drained and poorly drained sandy soils are in many drainageways. Extensive areas of this association have been mined for sand, gravel, and clay.

Thirty-one percent of this association is cultivated. Second- and third-growth woodland occupies 57 percent. Pasture accounts for 8 percent of the association, and the remaining 4 percent of the association is used for other purposes.

The farms in this association are mainly subsistence farms of 10 to 100 acres operated by part-time farmers.

Large tracts of this association are used for recreation, such as summer camps, private wildlife refuges, hunting preserves, state forests, and state parks. Private property along many of the public roads is being subdivided and sold for wooded homesites. The soil characteristics of this association severely limit the use of the land for housing development.

6. Sassafras-Woodstown Association

Deep, well drained to moderately well drained, gently rolling soils developed in loamy coastal plain deposits that overlie sand

This association is made up of gently sloping to hilly soils that are widely scattered in the southern part of the

county. The Sassafras soils make up about 44 percent of the association and Woodstown soils, about 31 percent. The rest of the association consists of minor soils. This association occupies about 9 percent of the county.

Sassafras soils are gently sloping and sloping, deep, and well drained. The fine sandy loams generally are at lower elevations than the sandy loams. The gravelly sandy loams are strongly sloping and moderately steep. They have a moderate available moisture capacity.

The yellowish-brown Woodstown soils are gently sloping to sloping, moderately well drained soils at the heads and along the sides of drainageways. They also occupy the center of many small, circular depressions in the area between Elkton and Chesapeake City.

The minor soils are in both moderately well drained and poorly drained depressions on flats or are near the heads of drainageways. A few large areas of fill material are adjacent to the Elk River and the Chesapeake and Delaware Canal as a result of channel dredging operations.

The water table rises in spring and late in winter to a moderate depth below the surface of the Woodstown soils. The well-drained minor soils are more silty than the Sassafras soils.

Fifty-five percent of this association is in crops, and 33 percent is in woodland. Trees are on nearly level to gently sloping, moderately well drained to poorly drained upland soils and moderately steep, well-drained soils. The remaining 12 percent of the association is mainly in pasture throughout the association.

The farms are mostly tenant-operated cash grain farms. Many subsistence, estate, and part-time, owner-operated farms exist. There are a few farms engaged in raising beef cattle, producing dairy products, growing truck crops, and horse breeding, boarding, and training.

Homesites are being developed along State and county roads. Careful selection of sites is needed. Tract-type development is not general, because onsite sewage disposal is hampered on about half the area by a seasonal high water table or slow permeability. Acres along the Chesapeake and Delaware Canal, a part of the Intracoastal Waterway, have a potential for commercial and industrial development. Several large, potential recreation or wildlife areas are on stabilized hydraulic fill adjacent to the Elk River and the Chesapeake and Delaware Canal.

7. Matapeake-Butlertown Association

Deep, nearly level to gently sloping, well drained and moderately well drained, loamy soils on the coastal plain

This association is made up of nearly level to gently sloping soils in the southern part of the county. It consists of soils on broad uplands. Matapeake soils make up 57 percent of the association and Butlertown soils, 25 percent. The rest of the association consists of minor soils. This association occupies 25 percent of the county.

The Matapeake soils are on both narrow and broad flats about 80 feet above mean sea level and between deep ravines. The Butlertown soils are toward the center of upland flats in and adjacent to low gradient drainageways. The minor soils are mostly in depressions or low gradient drainageways. Some, however, are on the sides of ravines. A wide range of textures is included. Alluvial material is on the bottoms of the ravines.

The Matapeake soils have high available moisture capacity. The Butlertown soils have a fragipan in the lower part of the subsoil that slows the movement of water and retards the growth of roots. They have high available moisture capacity. The minor soils have high available moisture capacity.

Seventy-nine percent of the association is in crops. Steep, wooded ravines account for 11 percent. The rest is evenly divided between pasture and other uses.

Corn, soybeans, barley, and wheat are the major farm enterprises, but dairying and raising beef cattle are also important. Some peas, sweet corn, tomatoes, and asparagus are grown for processing. The farms generally are operated by tenants.

The landscape is broad and expansive toward the middle of the several necks of land. Many points of land about 80 feet high, flanked by fingers of tidal water, provide picturesque sites for estates and small developments. Shore living, water sports, and winter hunting of small game, deer, and waterfowl, attract many people to the area from surrounding states.

8. Collington-Sassafras-Aura Association

Deep, well-drained, gently sloping to very steep, loamy soils on the coastal plain

This association is made up of gently sloping to very steep soils in the southern part of the county east of the Elk River. The areas are on the sides of wooded ravines and in pastures and cultivated areas next to the Matapeake-Butlertown association. Collington soils occupy about 56 percent of the association and Sassafras and Aura soils, about 39 percent. The rest of the association consists of minor soils. This association occupies about 4 percent of the county.

The Collington soils are gently sloping and moderately sloping, deep, and well drained. They are mostly on the edges of upland flats, but a few acres are on narrow ridgetops. The Collington soils have high available moisture capacity and are somewhat olive in the sandy horizon that underlies the brownish subsoil. The Sassafras and Aura soils are steep and very steep, deep, and well drained. These soils have a substratum that is brown or yellowish red and is sandy or gravelly.

Seventy-nine percent of this association is in crops, and 20 percent is in woodland. The rest of the association is in pasture or other use.

Corn, soybeans, barley, and wheat are the major farm enterprises in the area, but dairying, raising of beef cattle and sheep, and horse breeding, boarding, and training are other enterprises. The soils of this association occupy only parts of farms. Farms generally are operated by tenants, and the average size is 250 acres. Because of the size of farms, they generally are not wholly within this association.

The rolling cropland, steep woodland, and tidewater in this soil association provide picturesque homesites, few of which are developed. Hunting of small game, deer, and waterfowl by people from neighboring states is an important use of this association. The trees that grow on

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these soils are of good quality, but they are difficult to harvest because of the slope.

9. Mattapex-Elsinboro-Othello Association

Deep, well-drained to poorly drained, nearly level to sloping, loamy soils on the coastal plain and over course water-transported material on stream terraces

This association is made up of nearly level to sloping soils in the northeastern part of the county. It consists of soils on broad upland flats extending north from the head of the Elk and Northeast Rivers. Mattapex soils make up about 35 percent of the association; Elsinboro soils, about 30 percent; and Othello soils, about 20 percent. The rest of the association consists of minor soils. This association occupies about 2 percent of the county.

The Mattapex soils are nearly level to gently sloping and are moderately well drained. These soils are very silty throughout. The water table is at a moderate depth below the surface during spring and late in winter. These soils have high available moisture capacity. The Elsinboro soils are loamy and have a noticeable quantity of mica flakes in the lower part. These soils have high available moisture capacity. These soils are well drained and on ridges of low relief. The nearly level Othello soils are gray, silty, poorly drained soils in which the water table rises to and remains at the surface during winter and spring of most years. They have high available moisture capacity. Most of the minor soils in this association are subject to flooding.

Thirty percent of the land in this association is cultivated, 20 percent is in pasture, and 10 percent is wooded. The remaining acreage is used for urban and other purposes. Many of the land owners rent the cropland part of their farms to cash grain producers.

The low relief of the landscape is made more desirable for homesites by the curving tree-lined streams, a few 40-foot banks rising abruptly above the stream channel, and the existence of good transportation routes. Industry is served by highway and rail systems that cross this area. The towns of Elkton and North East and the community of Meadowview occupy large areas in this association.

Descriptions of the Soils

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

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second, detailed and in technical terms, is for scientists, engineers, and others who need to make thorough and precise studies of soils. Unless otherwise stated, the colors given in the descriptions are those of a moist soil.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Stony land, for example, does not belong to a soil series, but it is listed in alphabetic order along with the soil series.

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

The acreage and proportionate extent of each mapping unit are shown in table 3. Many of the terms used in describing soils can be found in the Glossary at the end of this survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual *(5)*.[2]

Aldino Series

The Aldino series consists of nearly level and gently sloping, loamy soils on uplands. These soils are dominantly brown and formed in material weathered from serpentine, gabbro, or similar rocks. They have a subsoil that is sticky in the upper part and that has a dense fragipan in the lower part. Grayish colors in the fragipan indicate that these soils are only moderately well drained and that they are wet and are poorly aerated for at least part of the year. The native vegetation is primarily oaks and hickory trees. Most of the acreage has been cleared and is used for crops or pasture.

In a representative profile the surface layer is about 10 inches of dark grayish-brown silt loam. The subsoil is about 11 inches thick and is brown silt loam in the upper 5 inches and yellowish-brown light silty clay loam in the lower 6 inches. The next layer, about 34 inches thick, is a firm, brown and strong-brown, silty clay loam and silt loam fragipan. The underlying material is friable, brown gravelly silt loam to a depth of about 5 feet.

Aldino soils are easy to work, but they are sometimes wet and slow to warm in spring. As a result, planting is often delayed. In places artificial drainage is needed for some crops, especially where the soil is nearly level. A drainage system is generally easy to install. These soils have high available moisture capacity, but water and roots do not readily penetrate the fragipan. Therefore, these soils dry out more quickly than similar soils that lack a fragipan. In most places Aldino soils are well supplied with magnesium, but in some areas they are low in calcium and other plant nutrients.

Aldino soils are moderately well suited to crops, but they are limited for some uses by impeded drainage and by a seasonal perched water table. These limitations apply especially to use of these soils as sites for buildings and for septic tank filter fields. Erosion is an additional hazard on sloping soils.

[2] Italic numbers in parentheses refer to Literature Cited, p. 116.

TABLE 3.—*Approximate acreage and proportionate extent of soils*

Name of mapping unit	Area	Proportionate extent	Name of mapping unit	Area	Proportionate extent
	Acres	*Percent*		*Acres*	*Percent*
Aldino silt loam, 0 to 3 percent slopes	235	0.1	Collington loam, 10 to 15 percent slopes, severely eroded	1,409	.6
Aldino silt loam, 3 to 8 percent slopes, moderately eroded	2,030	.9	Comus silt loam	671	.3
Aura gravelly sandy loam, 2 to 5 percent slopes, moderately eroded	1,376	.6	Conowingo silt loam, 3 to 15 percent slopes	171	.1
Aura gravelly sandy loam, 5 to 10 percent slopes, moderately eroded	1,276	.6	Elkton loam, 0 to 2 percent slopes	443	.2
Aura gravelly sandy loam, 10 to 15 percent slopes, moderately eroded	1,543	.7	Elkton loam, 2 to 5 percent slopes	592	.3
Baile silt loam, 0 to 3 percent slopes	2,754	1.2	Elkton silt loam, 0 to 2 percent slopes	1,981	.9
Baile silt loam, 3 to 8 percent slopes	1,772	.8	Elkton silt loam, 2 to 5 percent slopes	924	.4
Barclay silt loam, 0 to 2 percent slopes	538	.2	Elsinboro silt loam, 0 to 2 percent slopes	542	.2
Barclay silt loam, 2 to 5 percent slopes	1,063	.5	Elsinboro silt loam, 2 to 5 percent slopes, moderately eroded	965	.4
Beltsville silt loam, 0 to 2 percent slopes	1,017	.5	Elsinboro silt loam, 5 to 10 percent slopes, moderately eroded	215	.1
Beltsville silt loam, 2 to 5 percent slopes, moderately eroded	4,541	2.0	Evesboro loamy sand, 0 to 5 percent slopes	241	.1
Beltsville silt loam, 5 to 10 percent slopes, moderately eroded	2,271	1.0	Evesboro loamy sand, 5 to 15 percent slopes	425	.2
Beltsville silt loam, 5 to 10 percent slopes, severely eroded	332	.1	Evesboro loamy sand, 15 to 40 percent slopes	296	.1
Butlertown silt loam, 0 to 2 percent slopes	2,880	1.3	Fallsington sandy loam, 0 to 2 percent slopes	485	.2
Butlertown silt loam, 2 to 5 percent slopes, moderately eroded	8,367	3.7	Fallsington sandy loam, 2 to 5 percent slopes	540	.2
Butlertown silt loam, 5 to 10 percent slopes, moderately eroded	1,820	.8	Fallsington sandy loam, 5 to 10 percent slopes	372	.2
Butlertown silt loam, 5 to 10 percent slopes, severely eroded	1,104	.5	Fallsington loam, 0 to 2 percent slopes	942	.4
Butlertown silt loam, 10 to 15 percent slopes, moderately eroded	725	.3	Fallsington loam, 2 to 5 percent slopes	803	.4
Chester silt loam, 0 to 3 percent slopes	671	.3	Glenelg silt loam, 0 to 3 percent slopes	520	.2
Chester silt loam, 3 to 8 percent slopes, moderately eroded	5,881	2.6	Glenelg silt loam, 3 to 8 percent slopes, moderately eroded	14,294	6.3
Chillum silt loam, 2 to 5 percent slopes, moderately eroded	1,675	.7	Glenelg silt loam, 8 to 15 percent slopes, moderately eroded	6,314	2.8
Chillum silt loam, 5 to 10 percent slopes, moderately eroded	1,228	.5	Glenelg silt loam, 8 to 15 percent slopes, severely eroded	2,470	1.1
Chillum silt loam, 5 to 10 percent slopes, severely eroded	347	.2	Glenelg silt loam, 15 to 25 percent slopes, moderately eroded	1,126	.5
Chillum silt loam, 10 to 15 percent slopes, moderately eroded	597	.3	Glenelg silt loam, 15 to 25 percent slopes, severely eroded	820	.4
Chillum silt loam, 10 to 15 percent slopes, severely eroded	251	.1	Glenelg silt loam, 25 to 45 percent slopes	393	.2
Christiana fine sandy loam, 2 to 5 percent slopes, moderately eroded	151	.1	Glenville silt loam, 0 to 3 percent slopes	1,075	.5
Chrome silt loam, 3 to 8 percent slopes, moderately eroded	924	.4	Glenville silt loam, 3 to 8 percent slopes, moderately eroded	7,621	3.7
Chrome silt loam, 8 to 15 percent slopes, moderately eroded	448	.2	Glenville silt loam, 8 to 15 percent slopes, moderately eroded	344	.2
Chrome silt loam, 15 to 25 percent slopes, moderately eroded	261	.1	Gravel and borrow pits	486	.2
Chrome clay loam, 8 to 25 percent slopes, severely eroded	167	.1	Hatboro silt loam	3,724	1.6
Chrome clay loam, 25 to 45 percent slopes, severely eroded	241	.1	Keyport loam, 0 to 2 percent slopes	177	.1
Coastal beaches	65	(1)	Keyport loam, 2 to 5 percent slopes, moderately eroded	2,477	1.1
Clay pits	33	(1)	Keyport loam, 5 to 10 percent slopes, moderately eroded	1,482	.7
Codorus silt loam	2,154	1.0	Keyport silt loam, 0 to 2 percent slopes	708	.3
Collington sandy loam, 2 to 5 percent slopes, moderately eroded	218	.1	Keyport silt loam, 2 to 5 percent slopes, moderately eroded	3,645	1.6
Collington sandy loam, 5 to 10 percent slopes, moderately eroded	329	.1	Keyport silt loam, 5 to 10 percent slopes, moderately eroded	2,238	1.0
Collington loam, 2 to 5 percent slopes, moderately eroded	601	.3	Keyport silt loam, 10 to 15 percent slopes, moderately eroded	981	.4
Collington loam, 5 to 10 percent slopes, moderately eroded	702	.3	Keyport silty clay loam, 2 to 5 percent slopes, severely eroded	249	.1
Collington loam, 5 to 10 percent slopes, severely eroded	1,300	.6	Keyport silty clay loam, 5 to 10 percent slopes, severely eroded	450	.2
Collington loam, 10 to 15 percent slopes, moderately eroded	556	.2	Legore silt loam, 3 to 8 percent slopes, moderately eroded	516	.2
			Legore silt loam, 8 to 15 percent slopes, moderately eroded	637	.3
			Legore silt loam, 15 to 25 percent slopes, moderately eroded	380	.2
			Legore silty clay loam, 8 to 15 percent slopes, severely eroded	284	.1
			Legore silty clay loam, 15 to 45 percent slopes, severely eroded	684	.3
			Leonardtown silt loam, 0 to 2 percent slopes	713	.3
			Leonardtown silt loam, 2 to 5 percent slopes	557	.2

See footnote at end of table.

TABLE 3.—*Approximate acreage and proportionate extent of soils*—Continued

Name of mapping unit	Area	Proportionate extent	Name of mapping unit	Area	Proportionate extent
	Acres	*Percent*		*Acres*	*Percent*
Loamy and clayey land, sloping	5, 848	2. 6	Neshaminy silt loam 3 to 8 percent slopes, moderately eroded	4, 465	2. 0
Loamy and clayey land, moderately steep	1, 909	. 8	Neshaminy silt loam, 8 to 15 percent slopes, moderately eroded	1, 208	. 5
Loamy and clayey land, steep	915	. 4	Neshaminy silt loam, 15 to 25 percent slopes, moderately eroded	357	. 2
Made land, gently sloping	1, 448	. 6	Othello silt loam, 0 to 2 percent slopes	1, 290	. 6
Made land, moderately steep	702	. 3	Othello silt loam, 2 to 5 percent slopes	841	. 4
Manor loam, 3 to 8 percent slopes, moderately eroded	1, 655	. 7	Rumford loamy sand, 2 to 5 percent slopes	303	. 1
Manor loam, 8 to 15 percent slopes, moderately eroded	1, 821	. 8	Rumford loamy sand, 5 to 10 percent slopes	332	. 1
Manor loam, 8 to 15 percent slopes, severely eroded	1, 415	. 6	Rumford loamy sand, 10 to 15 percent slopes	343	. 2
Manor loam, 15 to 25 percent slopes, moderately eroded	1, 839	. 8	Sassafras sandy loam, 0 to 2 percent slopes	252	. 1
Manor loam, 15 to 25 percent slopes, severely eroded	1, 199	. 5	Sassafras sandy loam, 2 to 5 percent slopes, moderately eroded	3, 411	1. 5
Manor loam, 25 to 45 percent slopes	786	. 4	Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded	1, 895	. 8
Manor very stony loam, 3 to 25 percent slopes	251	. 1	Sassafras sandy loam, 5 to 10 percent slopes, severely eroded	975	. 4
Matapeake silt loam, 0 to 2 percent slopes	1, 681	. 7	Sassafras sandy loam, 10 to 15 percent slopes, moderately eroded	658	. 3
Matapeake silt loam, 2 to 5 percent slopes, moderately eroded	17, 742	7. 9	Sassafras sandy loam, 10 to 15 percent slopes, severely eroded	554	. 2
Matapeake silt loam, 5 to 10 percent slopes, moderately eroded	4, 081	1. 8	Sassafras fine sandy loam, 2 to 5 percent slopes, moderately eroded	561	. 2
Matapeake silt loam, 5 to 10 percent slopes, severely eroded	2, 712	1. 2	Sassafras gravelly loam, 2 to 5 percent slopes, moderately eroded	467	. 2
Matapeake silt loam, 10 to 15 percent slopes, moderately eroded	1, 726	. 8	Sassafras gravelly loam, 5 to 10 percent slopes, moderately eroded	618	. 3
Matapeake silt loam, 10 to 15 percent slopes, severely eroded	1, 235	. 5	Sassafras gravelly loam, 5 to 10 percent slopes, severely eroded	658	. 3
Matapeake silt loam, silty substratum, 0 to 2 percent slopes	1, 282	. 6	Sassafras gravelly loam, 10 to 15 percent slopes, severely eroded	1, 081	. 5
Matapeake silt loam, silty substratum, 2 to 5 percent slopes, moderately eroded	3, 108	1. 4	Sassafras and Aura soils, 15 to 40 percent slopes	7, 353	3. 3
Mattapex silt loam, 0 to 2 percent slopes	736	. 3	Stony land	1, 303	. 6
Mattapex silt loam, 2 to 5 percent slopes, moderately eroded	1, 000	. 4	Tidal marsh	1, 688	. 8
Mattapex silt loam, 5 to 10 percent slopes, moderately eroded	215	. 1	Watchung very stony silt loam	693	. 3
Mixed alluvial land	4, 336	1. 9	Woodstown sandy loam, 0 to 2 percent slopes	180	. 1
Montalto silt loam, 0 to 3 percent slopes	252	. 1	Woodstown sandy loam, 2 to 5 percent slopes, moderately eroded	2, 012	. 9
Montalto silt loam, 3 to 8 percent slopes, moderately eroded	1, 730	. 8	Woodstown sandy loam, 5 to 10 percent slopes, moderately eroded	1, 169	. 5
Montalto silt loam, 8 to 15 percent slopes, moderately eroded	369	. 2	Woodstown sandy loam, 5 to 10 percent slopes, severely eroded	595	. 3
Montalto very stony silt loam, 3 to 25 percent slopes	446	. 2	Woodstown sandy loam, 10 to 15 percent slopes	283	. 1
Montalto silty clay loam, 8 to 15 percent slopes, severely eroded	1, 136	. 5	Woodstown loam, 0 to 2 percent slopes	663	. 3
Montalto silty clay loam, 15 to 25 percent slopes, severely eroded	477	. 2	Woodstown loam, 2 to 5 percent slopes, moderately eroded	2,874	1. 3
Neshaminy silt loam, 0 to 3 percent slopes	320	. 1	Total	225, 280	100. 0

[1] Less than 0.05 percent.

Representative profile of Aldino silt loam, 0 to 3 percent slopes, in a cultivated area about 1.1 miles northwest of Kilby Corner:

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable, slightly sticky and slightly plastic; many fine roots; some fine black (10YR 2/1) concretions; medium acid; abrupt, smooth boundary.

B1—10 to 15 inches, brown (7.5YR 4/4) silt loam; weak, medium, subangular blocky structure; friable, sticky and slightly plastic; many fine roots; vesicular; some fine reddish-brown (5YR 4/4) concretions; medium acid; clear, wavy boundary.

B2t—15 to 21 inches, yellowish-brown (10YR 5/6) light silty clay loam; moderate, medium, subangular blocky structure; friable, sticky and plastic; common roots; thin discontinuous clay films; some fine reddish-brown and black concretions; vesicular; medium acid; clear, wavy boundary.

Bx1—21 to 28 inches, brown (7.5YR 4/4) silty clay loam; pale-brown (10YR 6/3) variegations; strong, coarse, prismatic and moderate, thin, platy structure; very firm, brittle, slightly sticky and slightly plastic; fine roots between prisms; continuous brown (10YR 5/3) clay films on prisms; many, fine, black concretions and few reddish-brown concretions; strongly acid; gradual, wavy boundary.

Bx2—28 to 39 inches, strong-brown (7.5YR 5/6) light silty clay loam; common, medium, prominent, light brownish-gray (10YR 6/2) mottles; strong, very coarse, prismatic and strong, thin to medium, platy structure; very firm, brittle, slightly sticky and slightly plastic; few roots;

thin, continuous, gray or light-gray (10YR 6/1) clay films on prisms; many, fine, black (10YR 2/1) concretions and few reddish-brown (5YR 4/4) concretions; medium acid; gradual, smooth boundary.

Cx—39 to 55 inches, brown (7.5YR 5/4) heavy silt loam; common, medium, distinct, light yellowish-brown (10YR 6/4) and reddish-brown (5YR 4/4) mottles in upper part of horizon; strong, very coarse, prismatic and weak, thin, platy structure; firm to somewhat friable with depth; brittle, sticky and plastic; thin pale-brown (10YR 6/3) and grayish-brown (10YR 5/2) clay or silt coats; many fine concretions; medium acid; clear, wavy boundary.

IIC2—55 to 60 inches, brown (7.5YR 4/4) gravelly silt loam; yellowish-brown (10YR 5/4) variegations; laminated; friable, slightly sticky and slightly plastic; some black (10YR 2/1) films and fine concretions; neutral.

In undisturbed areas the A1 horizon is very thin. The A2 horizon, if present, ranges from 7 to 12 inches in thickness. The B horizon ranges from silt loam to heavy silty clay loam, and the average content of clay is between 18 and 35 percent. The C horizon is loam to heavy silt loam. The unconforming IIC horizon contains fragments of rock. In most places the upper part of the solum is free of coarse fragments. The solum ranges from about 28 to 40 inches in thickness, and the depth to bedrock generally is 4 to 6 feet.

Hue centers on 10YR, but includes 7.5YR and may grade toward 2.5YR. In the A1 horizon value is 3 or 4 and chroma is 1 or 2. In the A2 horizon value is 4 or 5 and chroma is 2 or 3. Because the A1 horizon is so thin, the Ap horizon is of the same color range as the A2 horizon. Value in the B2t horizon is 5 or 6, and chroma is 3 to 6. No gray colors because of wetness are within 10 inches of the upper boundary of the B2t horizon. Matrix colors of the Bx horizon have a value of 4 to 6 and a chroma of 2 to 6. If chroma is greater than 2, mottles that have a chroma of 2 or less are in the lower part of this horizon. High-chroma mottles are also in the Bx and Cx horizons in places. Gray colors in the Cx horizon are caused by restricted aeration, are inherited from the geologic material, or are derived from either source.

The solum ranges from very strongly acid to medium acid, but acidity decreases in the C horizon. Base saturation in the lower part of the C horizon is greater than 35 percent.

In Cecil County, Aldino soils are redder in hue than the defined range for the series in places, but this does not alter the usefulness or behavior of these soils.

Aldino soils are similar to Butlertown, Beltsville, Glenville, and Leonardtown soils in that they have a fragipan in the lower part of the subsoil, but they are less acid than any of those soils. Aldino soils are not so deep over bedrock as Beltsville, Butlertown, and Leonardtown soils, and they have better drainage than Leonardtown soils. Unlike the Glenville soils, they formed in material weathered from serpentine, gabbro, or similar rocks. Aldino soils lack the high content of fine mica that is typical of Glenville soils, and they are somewhat less wet than Glenville soils.

Aldino silt loam, 0 to 3 percent slopes (AdA).—This soil has the profile described as representative of the series. It is only slightly susceptible to erosion, but the effects of moderate surface washing are apparent in a small acreage. Water can neither drain through nor readily run off the surface. Therefore, this soil quickly becomes saturated during rainy periods or during periods of snowmelt. Capability unit IIw–8; woodland suitability group 3o12.

Aldino silt loam, 3 to 8 percent slopes, moderately eroded (AdB2).—In most areas of this soil, part of the original loamy surface layer has been lost through erosion. As a result, this soil is slightly shallower over the fragipan, but the profile otherwise is similar to that described as representative of the series.

Included with this soil in mapping are some scattered areas of soils that have a partly exposed subsoil, and other areas of soils that have slopes of slightly more than 8 percent. Also included are a few areas that are cut by shallow to deep gullies.

Susceptibility to further erosion is the greatest hazard to use of this Aldino soil for crops. Management is needed that helps to control erosion. Improving drainage is also needed for some uses. Capability unit IIe–13; woodland suitability group 3o12.

Aura Series

The Aura series consists of gently sloping to moderately steep, well-drained, deep, reddish soils on higher parts of uplands of the Coastal Plain. These soils are gravelly and characteristically have a very hard, compact subsoil at depths of 15 to 25 inches. The subsoil is fairly high in clay content but low in silt content. The native vegetation is mainly scrubby hardwoods, though pines grow in places.

In a representative profile the surface layer is about 4 inches of very dark grayish-brown gravelly sandy loam. The subsurface layer is about 8 inches of brown or dark-brown gravelly sandy loam. The subsoil is about 45 inches thick. It is mostly brown gravelly sandy loam in the upper part and yellowish-red gravelly sandy clay loam in the lower part. The underlying material, to a depth of more than 6 feet, is yellowish-red gravelly sandy loam.

Aura soils are easy to work, except where erosion has removed much of the profile. The gravel in the soil is abrasive to farm implements, and the hard subsoil is difficult to work in places. Aura soils have low to moderate available moisture capacity.

These soils are suited to many uses, but use is limited by slope, restricted available moisture capacity, the high content of gravel, hardness of the subsoil that limits root penetration, and the hazard of further erosion. Aura soils are excellent sources of gravel and of clayey gravel for road fill and other construction purposes. Their firmness and good drainage make them desirable for building sites. Limited depth to the hard horizon limits usefulness of these soils as a filter field for septic tanks, especially the more strongly sloping soils.

Representative profile described in an area included with Aura gravelly sandy loam, 10 to 15 percent slopes, moderately eroded, in a wooded area about seven-eighths of a mile east-southeast of North East:

A1—0 to 4 inches, very dark grayish-brown (10YR 3/2) gravelly sandy loam; weak, very fine, granular structure; loose, friable; many fine roots; 15 to 30 percent of horizon is gravel consisting of highly weathered, rounded, cherty pebbles; very strongly acid; clear, wavy boundary.

A2—4 to 12 inches, brown or dark-brown (10YR 4/3) gravelly sandy loam; weak, fine, granular structure; loose, friable; common fine roots; 15 to 30 percent gravel; very strongly acid; clear, wavy boundary.

B1—12 to 18 inches, brown (7.5YR 5/4) gravelly sandy loam; weak, medium, subangular blocky structure; hard, friable; common roots; 25 to 30 percent gravel; very strongly acid; clear, wavy boundary.

B21t—18 to 23 inches, strong-brown (7.5YR 5/6) gravelly heavy sandy loam; weak, fine, subangular blocky structure; hard, firm; few roots; thin but distinct clay film on aggregates and pebbles; very strongly acid; clear, wavy boundary.

B22t—23 to 57 inches, yellowish-red (5YR 4/6) gravelly sandy clay loam; massive; widely spaced vertical cracks in places; very hard to extremely hard, very firm, sticky and slightly plastic; few roots in upper part of horizon;

sand grains coated with clay; distinct clay films on pebbles, becoming prominent with depth; strongly acid; clear, wavy boundary.

C—57 to 80 inches, yellowish-red (5YR 5/8) gravelly sandy loam; massive to single grain; friable to firm; no roots; strongly acid to very strongly acid.

The B2t horizon ranges from gravelly heavy sandy loam to gravelly heavy loam and gravelly sandy clay loam and has an average clay content between 18 and 30 percent. Gravel content ranges from about 15 to 40 percent in the various horizons, and commonly increases with depth. The gravel is smooth and rounded and is mainly quartz or chert. The solum ranges from about 50 to 100 inches in thickness. Depth to the very hard B22t horizon is generally between 15 to 25 inches. Bedrock is at an indefinite depth.

In the A horizon hue is 10YR or 2.5Y, value is 3 to 5, and chroma is 1 to 4. The lowest value and chroma are in the thin A1 horizon. In the upper part of the B horizon, hue is 7.5YR and ranges toward 5YR. The lower part of the B horizon is generally redder than the upper part, and it ranges from 5YR through 2.5YR. Value in these horizons ranges from 4 to 6.

In unlimed areas these soils are strongly acid to extremely acid throughout.

Aura soils are closely associated with Chillum and Christiana soils. They are also associated with areas of loamy and clayey land. Aura and Chillum soils each have a hard subsoil layer, but Chillum soils are less friable to a depth of about 3 feet and contain less silt in the upper part.

Aura gravelly sandy loam, 2 to 5 percent slopes, moderately eroded (AuB2).—In some places, even where this soil is wooded, most of the thin surface layer has been washed away. In most cleared areas, erosion has removed much of the surface layer.

Included with this soil in mapping are areas of soils that are cut by a few shallow gullies, and some small areas of soils in which the subsoil is exposed. Also included are many small areas of less sloping soils.

Because of the hazard of further erosion, this Aura soil has moderate limitations for cultivated crops. Capability unit IIs–9; woodland suitability group 3d16.

Aura gravelly sandy loam, 5 to 10 percent slopes, moderately eroded (AuC2).—Most cleared areas of this soil have lost part of the original surface layer through erosion. In all areas, even those under a cover of trees, some erosion has occurred. Shallow gullies are fairly common in cultivated areas. The hazard of further erosion severely limits use for cultivated crops. Capability unit IIIe–9; woodland suitability group 3d16.

Aura gravelly sandy loam, 10 to 15 percent slopes, moderately eroded (AuD2).—In most places this soil has lost much of the original surface layer through erosion, and some shallow gullies are present. Some soil material remains above the hard layer in the lower part of the subsoil. A profile in a noneroded area included in mapping is the one described as representative of the series.

This soil has very severe limitations for farming because of the hazard of further erosion. Capability unit IVe–7; woodland suitability group 3d16.

Baile Series

The Baile series consists of nearly level and gently sloping, poorly drained, loamy soils on the Piedmont Plateau in the northern part of the county. These soils are in upland depressions, around the heads of drainageways, and on foot slopes adjacent to minor drainageways that generally do not have a channel. These soils formed in local alluvium over material weathered from acid crystalline rock. The native vegetation is wetland hardwoods, mostly oaks and maples. Most of the acreage has been cleared for use as pasture.

In a representative profile the surface layer is about 8 inches of dark grayish-brown silt loam. Below this is a gray silt loam subsurface layer about 2 inches thick. The subsoil is about 29 inches thick. It is gray or light-gray, firm silty clay loam in the upper 17 inches and gray or light-gray, firm clay loam in the lower 12 inches. The underlying material is fine sandy loam to a depth of about 5 feet. It is friable and variegated pale olive and strong brown in the upper 9 inches and variegated pale olive, yellowish red, and pale red below.

Baile soils are hard to work. They are hard when dry and sticky when wet. These soils are generally wet and have a water table near the surface until late in spring. Water moves through these soils slowly, and draining the soils is difficult. Available moisture capacity is high.

The poor drainage, slow moisture movement, high water table, difficulty of tillage, and stones in places, severely limit use of these soils. Few areas are in cultivated crops. These soils are too wet to be used for permanent building sites, and they are not suitable for use as septic tank filter fields.

Representative profile of Baile silt loam, 3 to 8 percent slopes, in a cultivated area; one-tenth mile south of U. S. Highway No. 1 and about one mile east of Rising Sun:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; common, fine, distinct, dark reddish-brown (5YR 3/3) and gray (N 5/0) mottles; weak, fine, granular structure; friable, slightly sticky; many fine roots; very strongly acid; abrupt, smooth boundary.

A2g—8 to 10 inches, gray (N 5/0) silt loam, many, fine, distinct, weak-red (2.5YR 4/2) and reddish-brown (5YR 4/4) (5YR 4/8) mottles; moderate, medium, subangular blocky structure; tends toward platiness; friable to firm, slightly sticky and slightly plastic; many fine roots; many, fine, black (10YR 2/1) specks and concretions; common, fine, quartizite fragments; strongly acid; clear, smooth boundary.

B21tg—10 to 27 inches gray or light-gray (N 6/0) silty clay loam, many medium and coarse, prominent, strong-brown (7.5YR 5/6) mottles; moderate, coarse, prismatic and weak, coarse, blocky structure; firm, slightly sticky and slightly plastic; many fine roots; fine, almost continuous gray (N 5/0) clay films; aggregate interiors dominantly strong brown (7.5YR 5/6); fine gritty material between prisms in places; fine quartzite fragments in places; medium acid; clear, smooth boundary.

IIB22tg—27 to 39 inches gray or light gray (N 6/0) clay loam to sandy clay loam, many medium, prominent, strong-brown (7.5YR 5/6) mottles; moderate, coarse, prismatic and fine to medium, blocky structure; firm, sticky and slightly plastic; common roots, thin, continuous gray clay films; some angular quartzite fragments to 1½-inch diameter; strongly acid; abrupt, smooth boundary.

IIC1—39 to 48 inches variegated pale-olive (5Y 6/4) and strong-brown (7.5YR 5/6) fine sandy loam; massive; friable; few fine roots; gray (5Y 5/1) silt in old root channels; strongly acid; abrupt, smooth boundary.

IIC2—48 to 60 inches variegated yellowish-red (5YR 4/6), pale-olive (5Y 6/4) and pale-red (10R 6/4), highly micaceous fine sandy loam saprolite; inherent structure; very friable; no roots; strongly acid.

In undisturbed areas the A1 horizon is 3 to 6 inches thick. The B2t horizon is generally silty clay loam or clay loam, but it is heavy silt loam or fine sandy clay loam in places. The average clay content is between 25 and 35 percent. The C horizon is loam, silt loam, fine sandy loam, or light clay loam. The angular quartzite pebbles are relict from the underlying rock, or from local colluvium if on or near the surface. In a few places local colluvial boulders are on or near the surface. The solum is generally 30 to 40 inches thick. Depth to bedrock

is about 5 to 8 feet or more. Bedrock is mica schist that locally has injections of quartzite or other acid crystalline rocks.

In the A1 horizon hue is 5Y or 2.5Y, or is neutral in color; value generally is 4, and chroma is 0, 1, or 2. The A2 horizon generally is at least one unit higher in value than the A1 or Ap horizon. In the Ap horizon hue ranges from 5Y to 10YR, value is 4 or 5, and chroma is 1 or 2. In places matrix colors in the B horizon are neutral or have a hue of 10YR, value of 5 or 6, and chroma of 0 or 1, or rarely 2. Mottles are common to abundant, medium to coarse, and distinct to prominent. They are dominantly 10YR and 7.5YR in hue, 5 in value, 6 to 8 in chroma, or rarely 4. Clay films are similar to matrix or mottles in color, or both. The C horizon is variegated, as described, or is strongly mottled with gray colors. Mottles in the B and C horizons are so coarse and so abundant that they appear to be the matrix.

In unlimed areas the profile is strongly acid to extremely acid, and acidity increases with depth.

Baile soils are similar to Elkton, Fallsington, Hatboro, Leonardtown, Othello, and Watchung soils in drainage. They have a less clayey subsoil than Elkton and Watchung soils and are more slowly permeable than Fallsington, Hatboro, and Othello soils. They lack the dense fragipan in the lower part of the subsoil, typical of Leonardtown soils. Baile soils are closely associated with Glenville and Hatboro soils. They are wetter than Glenville soils and lack the fragipan in the lower part of the subsoil that is typical of Glenville soils. Baile soils are harder to work and to drain than Hatboro soils, which are on flood plains, generally down the drainageways from Baile soils, and are sometimes flooded.

Baile silt loam, 0 to 3 percent slopes (BaA).—This is a wet soil. Included in mapping are small areas of a soil that is less acid than normal for Baile soils. Also included are small areas of soils that have a surface layer of loam or sandy loam. Other inclusions consist of few areas of a soil in which the lower part of the subsoil is more silty than normal for Baile soils and is compact and brittle, some spots where part of the original surface layer has been lost through erosion, and areas that contain a few shallow gullies.

This soil is seriously limited by wetness and poor drainage. Little of the acreage is in cultivated crops. If this soil is drained, however, it is well suited to pasture, and some areas are well suited to hay crops. Capability unit Vw–1; woodland suitability group 1w3.

Baile silt loam, 3 to 8 percent slopes (BaB).—This soil has the profile described as representative of the series. In a small acreage all of the surface layer has been lost through erosion. In scattered small areas most of the surface layer has been washed away, and the areas are cut by widely scattered gullies that are mostly shallow.

Included with this soil in mapping are some areas that are less strongly acid than normal, and some areas where the lower part of the subsoil is silty and brittle. Also included are a few areas where slope is slightly more than 8 percent.

Wetness and poor drainage are the major limitations to use of this soil, but in places erosion is a hazard because of the slope. Capability unit Vw–1; woodland suitability group 1w3.

Barclay Series

The Barclay series consists of nearly level to gently sloping, brown to olive-brown, loamy soils on uplands of the Coastal Plain in the southern part of the county. These soils have a mottled subsoil that is no finer in texture than the surface layer. They are somewhat poorly drained and are not well aerated for much of the year. The native vegetation is mixed hardwoods that tolerate wetness. Most of the areas have been cleared for use as cropland.

In a representative profile the surface layer is about 9 inches of grayish-brown silt loam. The subsurface layer is about 5 inches of light olive-brown, friable, silt loam that contains a few mottles. The subsoil is about 26 inches thick. It is friable, light olive-brown, mottled silt loam in the upper part and friable, light olive-gray, mottled silt loam in the middle part and yellowish-brown loamy sand in the lower part. The underlying material, to a depth of about 5 feet, is mostly friable sandy loam and loamy sand.

Barclay soils are easy to work at the right moisture content, but they remain wet fairly late in spring and planting of early crops is sometimes delayed. Artificial drainage is needed for many crops, and tile drains generally functional well. Available moisture capacity is high in these soils.

The chief limitations to use are seasonal wetness and somewhat poor drainage. Erosion is a hazard on the more sloping soils. These soils are too wet for building sites, and in places septic tanks do not function properly for fairly long periods.

Representative profile of Barclay silt loam, 0 to 2 percent slopes, in a cultivated area about 2 miles east of Cecilton:

Ap—0 to 9 inches, grayish brown (10YR 5/2) silt loam; weak, very fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; slightly acid (limed); abrupt, smooth boundary.

A2—9 to 14 inches, light olive-brown (2.5Y 5/4) silt loam; few, fine, faint, yellowish-brown (10YR 5/6) and light brownish-gray (2.5Y 6/2) mottles; weak, coarse, granular structure; friable, slightly sticky and slightly plastic; many fine roots; medium acid; clear, wavy boundary.

B21—14 to 21 inches, light olive-brown (2.5Y 5/4) silt loam; common, medium, faint, yellowish-brown (10YR 5/4) and light-gray (N 7/0) mottles; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; very strongly acid; clear, wavy boundary.

B22—21 to 33 inches, light olive-gray (5Y 6/2) silt loam; common, coarse, distinct, yellowish-brown (10YR 5/4) mottles; weak, thin, platy structure; friable, slightly sticky and slightly plastic; few roots; very strongly acid; clear, wavy boundary.

IIB3—33 to 40 inches, brown (7.5YR 5/4) fine sandy loam; common, coarse, prominent, gray or light-gray (5Y 6/1) mottles; weak, thin, platy structure; friable, slightly sticky and slightly plastic; very strongly acid; abrupt, wavy boundary.

IIC1—40 to 48 inches, yellowish-brown (10YR 5/4) loamy sand; single grain; loose; very strongly acid; clear, wavy boundary.

IIC2—48 to 60 inches, light yellowish-brown (10YR 6/4) light sandy loam; single grain; friable; very strongly acid.

The solum is commonly silt loam throughout, though the IIB3 horizon, where present, is coarser textured. The C horizon is dominantly sandy silt loam in the upper part. The solum is generally 36 to 50 inches thick, and depth to unconforming sandy material ranges from about 30 to 50 inches or more. Bedrock is at an indefinite depth.

In the solum matrix hues range from 10YR to 5Y and are commonly yellower with depth. In the A horizon value is 4 or 5 and chroma is 1 to 4. The lower value and chroma generally are in the A1 horizon. In the B21 horizon value is 5 or 6 and chroma is 3 or 4. This horizon always has some mottles that have a chroma of 2 or less. In the B22 horizon value is similar to that in the B21 horizon, but chroma is 1 or 2 units lower. The C horizon has intermediate chroma, as described, with or without mottles that have a low chroma, or is dominantly of low chroma and has mottles of high

chroma. In places the weak platy structure described for the lower part of the B horizon is lacking.

In unlimed areas the profile is strongly acid to extremely acid, and acidity generally increases with depth.

Barclay soils formed in silty materials on the Coastal Plain that are similar to those of the well-drained Matapeake soils, the moderately well drained Beltsville, Butlertown, and Mattapex soils, and the poorly drained Othello and Leonardtown soils.

Barclay silt loam, 0 to 2 percent slopes (BcA).—This soil has the profile described as representative of the series. In a small area, however, a small part of the surface layer has been removed by washing. Most of the material that was removed has accumulated in local low spots.

If this soil is well managed, the only limitation is wetness associated with the somewhat poor natural drainage. Capability unit IIIw–1; woodland suitability group 2w7.

Barclay silt loam, 2 to 5 percent slopes (BcB).—Because this soil has stronger slopes than Barclay silt loam, 0 to 2 percent slopes, a larger acreage has been damaged by surface wash. A few shallow gullies cut the areas. Also, silt has accumulated in places, mostly where the gullies have discharged near the base of the slopes. Included in mapping are a few areas where the mottled subsoil has been exposed by excessive washing.

Further erosion is a hazard on this soil, but improvement of internal drainage is the most important concern of management. Capability unit IIIw–1; woodland suitability group 2w7.

Beltsville Series

The Beltsville series consists of nearly level to moderately sloping, moderately well drained soils on the Coastal Plain, mostly in the central or north-central part of the county. These soils are dominantly yellowish-brown and loamy. They have a subsoil that is sticky in the upper part and is very firm to extremely firm and brittle in the lower part and does not permit the ready movement of moisture. The native vegetation is mixed hardwoods, including many white oaks and some pines. Many areas of these soils have been cleared for use for crops or pasture.

In a representative profile the surface layer is about 7 inches of yellowish-brown silt loam. The subsoil is about 39 inches thick. The upper 14 inches is yellowish-brown silt loam and the lower 25 inches is a very firm, yellowish-brown, silty clay loam and sandy clay loam fragipan. The underlying material, to a depth of about 5 feet, is stratified fine sandy loam, loamy sand, or fine sand.

Beltsville soils are fairly easy to work at the right moisture content, but they are frequently wet in spring and are late to warm. Planting of early crops is frequently delayed. Artificial drainage is needed for some uses, particularly on the more nearly level soils. Available moisture capacity is moderate. Water and roots do not readily penetrate the fragipan, and these soils dry less quickly than more permeable and porous soils.

If these soils are well managed, they are moderately well suited to crops. They are limited for some uses by slope, impeded drainage, a seasonally perched water table, very slow movement of subsoil moisture, and susceptibility to erosion. The water table and slow moisture make building sites seasonally wet and severely limit use of the soils for septic tanks for disposal of sewage effluent.

Representative profile of Beltsville silt loam, 2 to 5 percent slopes, moderately eroded, in second-growth woodland, formerly cultivated, about 2 1/3 miles west of Elkton:

Ap—0 to 7 inches, yellowish-brown (10YR 5/4) silt loam; very weak, fine, granular structure; very friable; many roots; very strongly acid; clear, smooth boundary.

B1—7 to 10 inches, yellowish-brown (10YR 5/6) silt loam; weak, thin, platy and granular structure; friable to firm, sticky and slightly plastic; common roots; very strongly acid; clear, smooth boundary.

B2t—10 to 21 inches, yellowish-brown (10YR 5/6) heavy silt loam; moderate, fine, subangular blocky structure; friable to firm, sticky and plastic; few roots; thin discontinuous clay films; very strongly acid; abrupt, smooth boundary.

Bx1—21 to 31 inches, yellowish-brown (10YR 5/4) light silty clay loam; many, medium, distinct, light gray (10YR 7/2) mottles; strong, very coarse, prismatic and weak, medium, platy structure; very firm to extremely firm, brittle, plastic and slightly sticky; continuous strong-brown (7.5YR 5/6) clay films and flows; many, fine, black (10YR 2/1) concretions; very strongly acid; clear, wavy boundary.

IIBx2—31 to 46 inches, yellowish-brown (10YR 5/4) sandy clay loam; many, common, medium, distinct, light-gray (10YR 7/1) mottles; strong, very coarse, prismatic and weak, thin, platy structure; very firm, very brittle, plastic and slightly sticky; continuous brown (10YR 5/3) and grayish-brown (10YR 5/2) clay films and flows; strongly acid; abrupt, wavy boundary.

IIC—46 to 60 inches, yellowish-brown (10YR 5/4) fine sandy loam; some thin strata of light brownish-gray (2.5Y 6/2) loamy sand or fine sand; firm, somewhat brittle, very slightly sticky and slightly plastic; very strongly acid.

In undisturbed areas a thin A1 horizon and a somewhat thicker A2 horizon are present. The Bt horizon ranges from silt loam to light silty clay loam and is more than 18 percent clay. The Bx horizon is the same texture as the Bt horizon where the soil formed in conforming material, but it is coarser textured where the soil formed in unconforming, sandier material. The C horizon is loamy or sandy, depending upon the thickness of the loamy material. A few, fine, smooth pebbles are in the profile in places. The solum ranges from about 36 to 60 inches or more in thickness. Bedrock is at an indefinite depth.

In the A horizon value ranges from 3 to 6 and chroma from 2 to 6, but the lowest value and chroma generally are in the thin A1 horizon. In the A1 and A2 horizons, hue generally is 10YR but may include 2.5Y in the A2 horizon. In the B1 and B2t horizons, value is 4 to 6 and chroma is 3 to 8. In the Bx horizon matrix values and chromas are of the same range as in the B2t horizon, but mottles that have a chroma of 2 or less are in these horizons in most places. The C horizon generally lacks mottles, but in places differences in color occur coinciding with stratification.

In unlimed areas the profile is strongly acid to extremely acid, and acidity commonly increases with depth.

Beltsville soils are similar to Aldino, Butlertown, Glenville, and Leonardtown soils in that they have a fragipan in the lower part of the subsoil. They are more strongly acid than Aldino soils and are much deeper to bedrock. Beltsville soils contain less silt than Butlertown soils and are somewhat less deep to the fragipan, and their fragipan is denser, harder, and more strongly developed than that in Butlertown soils. The Beltsville soils are deeper and are slightly better drained than the Glenville soils, and they lack the fine mica that is typical of Glenville soils. Beltsville soils are closely associated with the poorly drained Leonardtown soils and are less gray throughout. They are also associated with the well-drained Chillum soils, but unlike those soils have a well-developed fragipan.

Beltsville silt loam, 0 to 2 percent slopes (BeA).—This soil has a profile similar to that described as representative of the series, except that the surface layer is some-

what thicker and generally includes a subsurface layer even in cultivated areas. Included in mapping are a few areas that are somewhat gritty and slightly less loamy in the surface layer than this soil.

Most areas of this soil are nearly level and have not been affected by erosion, but local areas have some surface wash. Seasonal wetness, caused by slow movement of water through the lower part of the subsoil, is the main concern of management. Improvement of drainage is needed for most crops. Capability unit IIw–8; woodland suitability group 3w16.

Beltsville silt loam, 2 to 5 percent slopes, moderately eroded (BeB2).—This soil has the profile described as representative of the series. In most places much of the surface layer has been washed away.

Included with this soil in mapping are scattered spots where water has cut gullies in some places and exposed the sticky subsoil in others. Also included are some spots that have a more sandy surface layer than this soil.

The hazard of further erosion is the chief concern of management if this soil is farmed. Impeded drainage is another concern. Capability unit IIe–13; woodland suitability group 3w16.

Beltsville silt loam, 5 to 10 percent slopes, moderately eroded (BeC2).—This soil has been fairly well protected and has not been severely damaged by erosion. A few areas are cut by gullies. Included in mapping are some areas that have a somewhat sandier surface layer than this soil.

The hazard of further erosion is severe if this soil is tilled. If the soil is cultivated regularly, measures for control of erosion are needed. Drainage is needed in places, and runoff must be carefully disposed of. Capability unit IIIe–13; woodland suitability group 3w16.

Beltsville silt loam, 5 to 10 percent slopes, severely eroded (BeC3).—Much of the original surface layer of this soil has been washed away, and the areas are cut by many shallow to deep gullies. The present plow layer is brighter colored than the one in the profile described as representative of the series. It is less granular and more cloddy and sticky and is more difficult to work and to protect.

Included with this soil in mapping are some somewhat sandy spots and some scattered areas where slopes are more than 10 percent.

Use of this soil for cultivated crops is marginal. Capability unit IVe–9; woodland suitability group 3w16.

Butlertown Series

The Butlertown series consists of level to moderately sloping, moderately well drained soils on uplands in the southern, or Coastal Plain, part of the county. These soils have a little fragipan in the lower part of the subsoil. The vegetation is mixed upland hardwoods, though some pines grow in cutover areas. Almost all areas of these soils are used as cropland.

In a representative profile the surface layer is about 8 inches of dark grayish-brown silt loam. The subsoil is about 36 inches thick. The upper 20 inches is brown and yellowish-brown silt loam that is slightly sticky and plastic. The lower 16 inches is a very firm, yellowish-brown silt loam fragipan. Below this is a light brownish-gray, silt loam fragipan that is 5 inches thick. The underlying material, to a depth of more than 5 feet, is massive sandy clay loam.

Butlertown soils have a friable plow layer that is easy to work, but they are somewhat wet in spring and are a little late to warm. Planting is delayed for most very early crops. Artificial drainage is needed in places, particularly in the more nearly level areas. Tile drains generally function well in these soils. Available moisture capacity is high in these soils.

Butlertown soils are limited for some uses by seasonal wetness and impeded drainage and by the hazard of erosion in sloping areas. They are not well suited to use as building sites because of seasonal wetness, and during wet periods septic tanks in these soils do not function properly.

Representative profile of Butlertown silt loam, 0 to 2 percent slopes, in a cultivated area east of U.S. Highway No. 213, about 1 mile north of Cecilton:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable, slightly sticky and very slightly plastic; many roots; common wormholes and worm casts; slightly acid (limed); abrupt, smooth boundary.

B1—8 to 12 inches, brown (7.5YR 5/4) silt loam; weak, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; many roots; some wormholes and worm casts; slightly acid; gradual, wavy boundary.

B2t—12 to 28 inches, yellowish-brown (10YR 5/6) heavy silt loam; moderate, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; many roots; thin, continuous, dark yellowish-brown (10YR 4/4) clay films; many fine pores; slightly acid; clear, wavy boundary.

Bx—28 to 44 inches, yellowish-brown (10YR 5/6) heavy silt loam; common, fine and medium, distinct, light brownish-gray (10YR 6/2) mottles; moderate, thin and medium, platy structure; firm, brittle, slightly sticky and slightly plastic; few roots in upper part; discontinuous, prominent, dark yellowish-brown (10YR 4/4) clay films between some aggregates; some fine, very dark gray specks; medium acid; clear, irregular boundary.

C1x—44 to 49 inches, light brownish-gray (2.5Y 6/2) silt loam; many, medium, distinct, dark yellowish-brown (10YR 4/4) mottles; weak, thin, platy structure; firm, brittle, slightly sticky and slightly plastic; medium acid; abrupt, broken boundary.

C2x—49 to 59 inches, yellowish-brown (10YR 5/4) silt loam; weak, thick, platy structure; firm, brittle, slightly sticky; medium acid; gradual, wavy boundary.

IIC3—59 to 64 inches, yellowish-red (5YR 5/6) sandy clay loam; massive to weakly stratified; very firm in places, slightly sticky and slightly plastic; strongly acid.

In undisturbed areas the A1 horizon is 2 to 4 inches thick, and the A2 horizon is 4 to 8 inches thick. The B horizon ranges from silt loam to light silty clay loam. The C horizon ranges from silt loam to very fine sandy loam and generally is stratified. The unconforming IIC horizon generally is coarser textured than the other horizons. The solum ranges from 42 to 50 inches in thickness. Depth to the Bx horizon ranges from about 28 to 38 inches. Bedrock is at indefinite depth.

Hue generally is 10YR but ranges to 7.5YR in the B horizon and may be 2.5Y in the C horizon. Value in the Ap and A2 horizon is 4 to 6, and chroma is 2 to 4. In the B2t horizon value generally is 5 and chroma is 6 or 8. In the Bx horizon the matrix value is 5 or 6 and chroma is 3 to 6. Mottles in the Bx horizon have a chroma of 1 or 2. The Bx and Cx horizons are weakly to moderately expressed.

In unlimed areas the profile is medium acid to very strongly acid, and acidity increases with depth.

Butlertown soils are more strongly acid than Aldino soils, which are influenced by basic rock that is at a depth of a few feet. They contain less sand than Beltsville soils and are free of fine gravel. Also their fragipan is less hard, less dense, and more permeable than that in Beltsville soils. Butlertown soils are free of gray mottles to a greater depth and are less

micaceous throughout than Glenville soils, which are underlain by mica schist or related rocks at a depth of a few feet. They are better drained and are browner throughout than Leonardtown soils. Butlertown soils formed in the same kind of silty material as the well-drained Matapeake soils; the moderately well drained Mattapex soils, which lack a fragipan; the somewhat poorly drained Barclay soils; and the poorly drained Leonardtown and Othello soils.

Butlertown silt loam, 0 to 2 percent slopes (BuA).—This soil has the profile described as representative of the series. In places the subsoil is mottled closer to the surface than is normal for this soil.

Use of this soil for farming is limited by somewhat impeded drainage and a seasonally high water table. Locally where row crops have been grown year after year part of the surface layer has been washed away. Erosion is not a particular hazard, however, under good management that includes a suitable cropping system or an occasional cover crop. Artificial drainage benefits some crops, especially those planted early in the year. Capability unit IIw–1; woodland suitability group 2o7.

Butlertown silt loam, 2 to 5 percent slopes, moderately eroded (BuB2).—In most places this soil has lost much of its original surface layer through erosion. The hazard of further erosion is moderate.

Included with this soil in mapping are a few small areas of a severely eroded soil that contain some shallow gullies and a few deeper ones. Also included are small areas where there is an accumulation of silt on the surface as a result of surface wash. Other inclusions consist of hummocky areas that contain small sinks or wet spots, and areas where the soil is mottled closer to the surface than is normal for Butlertown soils.

In managing this soil, protection from erosion is generally more important than improving drainage. Nevertheless, some spot drainage would be beneficial in places. Capability unit IIe–16; woodland suitability group 2o7.

Butlertown silt loam, 5 to 10 percent slopes, moderately eroded (BuC2).—Except in some wooded areas, much of the original surface layer of this soil has been washed away. The areas are cut by a few shallow gullies.

Included with this soil in mapping are small areas that lack the firm, brittle layer in the lower part of the subsoil that is typical of the profile described as representative of the series. Also included are some areas where depth to brownish-gray subsoil mottles is a little less than is common for this soil.

This soil can be used for regular cultivation under good management that includes appropriate erosion control measures. The hazard of further erosion rather severely limits use for cultivated crops. Capability unit IIIe–16; woodland suitability group 2o7.

Butlertown silt loam, 5 to 10 percent slopes, severely eroded (BuC3).—Most of the surface layer of this soil has been washed away, and in places the subsoil is exposed. Some shallow and deep gullies cut the areas. Included in mapping are some areas that lack the firm, brittle layer in the lower part of the subsoil that is typical of the profile described as representative of the series.

This soil is marginal for cultivated crops, but it can be used for hay, pasture, and trees. Capability unit IVe–9; woodland suitability group 2o7.

Butlertown silt loam, 10 to 15 percent slopes, moderately eroded (BuD2).—Much of this soil is still in woodland. Included in mapping are a few areas that lack the firm, brittle subsoil that is typical of the profile described as representative of the series. Also included are areas where depth to gray subsoil mottling is less than in the representative profile, and some widely scattered, very shallow gullies.

The slope and severe hazard of further erosion severely limit use of this soil for cultivated crops. Capability unit IVe–9; woodland suitability group 2r7.

Chester Series

The Chester series consists of nearly level to gently sloping, well-drained, loamy soils on uplands in the northern, or Piedmont, part of the county. These soils formed in material weathered from micaceous schist and gneiss. The native vegetation is mixed hardwoods, generally dominated by oaks. Most of the acreage has been cleared for use as cropland.

In a representative profile the surface layer is about 7 inches of reddish-brown silt loam. Below this is 27 inches of friable yellowish-red and red silt loam underlain by 8 inches of friable loam that contains mica flakes and schist fragments. The next layer, to a depth of about 5 feet, is friable, highly micaceous, loam saprolite.

Chester soils are easy to work. They warm readily in spring, in time for all ordinary farming operations. These soils have a high available moisture capacity.

Chester soils are suited to most uses, but in places slope and erosion cause limitations. These soils are well suited as building sites, but the underlying micaceous saprolite should be considered before construction is begun. Chester soils are suitable for use as septic tank filter fields.

Representative profile of Chester silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated area about 1.3 miles west-northwest of Calvert:

Ap—0 to 7 inches, reddish-brown (5YR 4/3) silt loam; moderate, fine, granular structure; friable, slightly plastic and slightly sticky; many fine roots; some fine angular quartzite gravel; neutral (limed); abrupt, smooth boundary.

B1—7 to 13 inches, yellowish-red (5YR 4/6) silt loam; moderate, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; many fine roots; some fine angular quartzite gravel; neutral; clear, wavy boundary.

B21t—13 to 22 inches, yellowish-red (5YR 4/6) heavy silt loam; moderate, medium, subangular blocky structure; friable to firm, slightly sticky and slightly plastic; many fine roots; thin continuous clay films; neutral; gradual, wavy boundary.

B22t—22 to 34 inches, red (2.5YR 4/6) heavy silt loam; moderate, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; thin continuous clay films; some soft schist fragments; neutral; gradual, wavy boundary.

B3—34 to 42 inches, dark reddish-brown (5YR 3/4) loam; weak, coarse, blocky structure; friable; few roots; some thin clay films; many mica flakes; common soft schist fragments; medium acid; gradual, wavy boundary.

C—42 to 60 inches, brown (7.5YR 5/4), highly micaceous, loam saprolite; inherent schistose structure; friable; few roots; variegated bands of red (2.5YR 4/6); abundant soft schist fragments; medium acid to strongly acid.

In undisturbed areas the A1 horizon is 1 to 3 inches thick and the A2 horizon is 6 to 12 inches thick. The B1 horizon is heavy loam or silt loam. In places the B2t horizon is heavy loam, heavy silt loam, clay loam, or light silty clay loam and the clay content is between 18 and 35 percent. The saprolite C horizon generally is loam, but it is fine sandy loam in places. It is micaceous. Scattered fragments of schist or gneiss or of angular quartzite gravel are in some profiles, but not in sig-

nificant amounts. The solum ranges from about 30 to 44 inches in thickness, and the depth to bedrock is 5 to 10 feet or more.

In the A horizon hue ranges from 10YR to 5YR, value is 3 or 4, and chroma ranges from 2 to 4. The lowest value and chroma generally are in the thin A1 horizon. Hue in the B2t horizon ranges from 10YR to 5YR and is 2.5YR in places. The B22t horizon described in the representative profile is redder than is common for most soils of this series. In the B2t horizon value is 4 or 5 and chroma is 6 to 8. The B3 horizon is transitional in color and texture. The C horizon commonly is variegated, but one color generally dominates. The variegation is the result of microdifferentials in weathering within the saprolite and is not caused by wetness.

In most areas where lime has not been applied, these soils are strongly acid or very strongly acid and acidity increases with depth. The soil for which a profile is described as representative of the series has been heavily limed for a long time.

Chester soils are somewhat similar to Glenelg and Elsinboro soils, but they are somewhat more reddish. They are less micaceous than Glenelg soils and generally are thicker. Chester soils generally have stronger structure than Elsinboro soils, which contain coarse fragments that are waterworn, have other evidence of the action of water, and are stratified.

Chester soils are associated with the moderately well drained, seasonally wet Glenville soils and the poorly drained, generally wet Baile soils.

Chester silt loam, 0 to 3 percent slopes (CeA).—In most places the surface layer of this soil is a few inches thicker and is browner than that in the profile described as representative of the series.

Included with this soil in mapping are a few areas of soils that are slightly rilled and have some surface wash. Also included are local areas of soils that have some accumulation of silt and areas of soils that have a more clayey and redder subsoil than this soil.

This deep, well-drained, nearly level soil is one of the better soils of the county for farming and other uses. If it is reasonably well managed, it has little, if any, limitation for most uses. Capability unit I–4; woodland suitability group 2o4.

Chester silt loam, 3 to 8 percent slopes, moderately eroded (CeB2).—This soil has the profile described as representative of the series. Because of slope and consequent erosion, part of the original surface layer or plow layer is missing in most areas.

Included with this soil in mapping are a few severely eroded spots, some shallow gullies, and some local accumulations of silt.

This soil is moderately limited for row crops because of the hazard of further erosion. It is one of the more extensive soils of the county and is highly important to farming. Capability unit IIe–4; woodland suitability group 2o4.

Chillum Series

The Chillum series consists of moderately deep, gently sloping to sloping, well-drained, loamy soils on uplands of the Coastal Plain. These soils are underlain by very old loamy and in places sometimes gravelly, sediment that normally is very hard, dense, and compact. The native vegetation is mixed upland hardwoods, but pines grow in cutover areas.

In a representative profile the surface layer is about 9 inches of dark-brown silt loam. This is underlain by a thin, friable, dark yellowish-brown, silt loam subsurface layer. The subsoil is 51 or more inches thick. The upper 25 inches is yellowish-brown heavy silt loam. At a depth of 36 inches to 6 feet or more is very dense and firm, yellowish-red loam.

Chillum soils generally are easy to work. They have moderate available moisture capacity. The lower part of the solum and the substratum generally are excellent sources of gravelly borrow material for roadbuilding and other uses.

These soils are limited for some uses because of the hardness of the lower part of the solum and the thinness of that part of the solum above the hard horizon. Erosion is a hazard in all sloping areas. Chillum soils generally are well suited as building sites, but in places slope and erosion cause limitations. They have some limitations for septic tanks because of the generally compact, gravelly substratum.

Representative profile of Chillum silt loam, 2 to 5 percent slopes, moderately eroded, in a cultivated area, about two-thirds of a mile south of Singerly:

Ap—0 to 9 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; friable, slightly sticky and very slightly plastic; many roots; strongly acid; abrupt, smooth boundary.

A2—9 to 11 inches, dark yellowish-brown (10YR 4/4) silt loam; moderate, fine, granular structure that tends toward platy (probable plowsole); friable, slightly sticky and slightly plastic; common roots; slightly acid; clear, smooth boundary.

B21t—11 to 23 inches, yellowish-brown (10YR 5/4) heavy silt loam; moderate, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; distinct dark-brown (7.5YR 4/4) clay films; slightly acid; clear, smooth boundary.

B22t—23 to 36 inches, yellowish-brown (10YR 5/6) heavy silt loam; moderate, medium, subangular blocky structure; friable to firm, sticky and slightly plastic; few roots; faint strong-brown (7.5YR 5/6) clay films; some fine, black (10YR 2/1) concretions; slightly acid; abrupt, wavy boundary.

IIB23t—36 to 60 inches, yellowish-red (5YR 4/6) loam; stratified; dense; extremely hard, very firm, slightly sticky; distinct clay films on grains and flows in stratification lines; some fine smooth pebbles that have thick, clay coats; strongly acid to very strongly acid.

In undisturbed areas an A1 horizon less than 6 inches thick is present. The conforming Bt horizon ranges from silt loam to light silty clay loam. The IIB23t horizon is abruptly coarser in texture and is slightly gravelly to very gravelly, it is characteristically extremely hard when dry and very firm to extremely firm when moist. The lower boundary of the IIB23t horizon is diffuse and indefinite, and it is seldom within 60 inches of the surface. Bedrock is at an indefinite depth.

In the A horizon hue generally is 10YR, value is 3 to 5, and chroma is 2 to 4. The A1 horizon has the lowest value. Hue in the B2t horizon generally is 7.5YR, but is 10YR' in places, and value is 4 or 5. Chroma is 4 or higher, but it is always 4 in some part of the B2t horizon. The IIB23t horizon commonly is redder than the B2t horizon. It is 7.5YR in hue, or more frequently 5YR, and in places grades toward 2.5YR. In the IIB23t horizon value is 4 to 6 and chroma is 3 to 6, or in places 8. This horizon is dominated by one color or is strongly variegated.

Structure is dominantly granular in the A horizon, and it is subangular blocky in conforming B horizons. The weak, platy structure described in the A2 horizon is faint or indefinite, and in many profiles it cannot be detected. The IIB23t is primarily stratified, but there are widely spaced cleavage lines forming gross polygons in places.

In Cecil County Chillum soils have a thicker solum than the defined range for the series.

Chillum soils are associated with Aura soils but contain more silt and are less red, particularly in the subsoil. Chillum soils have a hard underlayer unlike the Matapeake soils. They are well drained unlike the moderately well drained Beltsville and Butlertown soils.

Chillum silt loam, 2 to 5 percent slopes, moderately eroded (ChB2).—This soil has the profile described as representative of the series. In most cleared areas much of the surface layer has been washed away.

Included with this soil in mapping are a few shallow gullies and some spots where silt has accumulated on the surface. Also included are a number of small areas that are nearly level.

Even though slopes are gentle, the hazard of further erosion moderately limits use of this soil for cultivation. Capability unit IIs–7; woodland suitability group 3o10.

Chillum silt loam, 5 to 10 percent slopes, moderately eroded (ChC2).—Practically all areas of this soil have lost part of the original surface layer through erosion. Scattered gullies cut the areas, but most of them are shallow.

The slope severely limits use of this soil for cultivated crops. Intensive management is needed to keep the soil in suitable condition for safe continued use. Capability unit IIIe–7; woodland suitability group 3o10.

Chillum silt loam, 5 to 10 percent slopes, severely eroded (ChC3).—Most of the original surface layer of this soil is gone, and in places part of the subsoil is exposed. In places the hard underlayer is at a depth of only a foot or less. Some gullies have cut down to the hard layer, and a few gullies have cut into the hard layer.

This soil is very severely limited for cultivation, but it is suited to hay, pasture, or trees if good management is used. The hard underlayer is very gravelly, and in places the soil is a source of gravel. Capability unit IVe–7; woodland suitability group 3o10.

Chillum silt loam, 10 to 15 percent slopes, moderately eroded (ChD2).—More than half of the acreage of this soil is wooded. Cleared areas have been well managed and protected against erosion. A few shallow gullies cut the areas, and surface wash has accumulated in a few places.

Because of the slope, the hazard of further erosion is severe on this soil. Careful management and protective measures are needed to prevent further erosion. Capability unit IVe–7; woodland suitability group 3o10.

Chillum silt loam, 10 to 15 percent slopes, severely eroded (ChD3).—All of the original surface layer of this soil has been washed away, and in most places part of the subsoil has eroded away. The present plow layer is now yellowish-brown and sticky, is difficult to work, and tends to be cloddy. In many places depth to the hard underlayer is only a few inches, and some gullies extend down to and into this layer.

This soil is not suited to cultivated crops. It is suited to hay and grazing, or to trees planted for watershed protection and wood products. This soil is a good source of gravel and road fill. Capability unit VIIe–2; woodland suitability group 3o10.

Christiana Series

The Christiana series consists of deep, gently sloping, well-drained soils on uplands of the Coastal Plain. Native vegetation is mostly hardwoods, many of scrubby growth, but pines grow in places. Most of the areas have been cleared for use as cropland.

In a representative profile the surface layer is about 9 inches of brown or dark-brown fine sandy loam. The subsoil is 57 inches of firm red clay. The underlying material, to a depth of about 7 feet, is variegated, very firm clay.

These soils are easy to work if the plow layer is entirely within the friable surface layer, but if the subsoil is encountered its hardness when dry and stickiness and plasticity when wet make most tillage difficult. The Christiana soils have high available moisture capacity. The hazard of erosion is severe in all sloping areas. Christiana soils have a highly clayey subsoil that is very unstable, particularly when wet and when disturbed. As a result, use of these soils for building sites and for other uses is limited and even dangerous, especially in sloping areas that have been disturbed by grading and other landscaping activities.

Representative profile of Christiana fine sandy loam, 2 to 5 percent slopes, moderately eroded, in an idle area formerly cultivated, about 1½ miles south of North East:

Ap—0 to 9 inches, brown or dark-brown (7.5YR 4/4) fine sandy loam; weak, fine, granular structure; friable, slightly sticky; many fine roots; medium acid (limed); abrupt, wavy boundary.

B21t—9 to 22 inches, red (2.5YR 4/6) clay; strong, medium, blocky structure; firm, sticky and plastic; common fine roots; thin, continuous, light reddish-brown (5YR 6/3) clay films; medium acid to strongly acid; diffuse boundary.

B22t—22 to 66 inches, red (2.5YR 4/6) clay; very strong, fine to coarse, blocky structure; very firm, sticky and very plastic; few fine roots in upper part; reddish-brown (2.5YR 4/4) prominent clay films and flows; strongly acid to very strongly acid; gradual, smooth to diffuse boundary.

C—66 to 84 inches, variegated, weak red (2.5YR 4/2) to red (2.5YR 4/8), pink (7.5YR 7/4), white (N 8/0), and very pale brown (10YR 7/3) clay; massive; very firm, sticky and plastic; few, widely spaced, vertical cleavage lines; pockets of somewhat gritty clay; very strongly acid to extremely acid.

In undisturbed areas an A1 horizon generally no more than 2 inches thick and an A2 horizon up to about 6 inches thick are present. The B and C horizons generally are more than 60 percent clay and contain some fine and very fine sand but little coarser sand or silt. The solum ranges from about 60 to more than 72 inches in thickness. Its lower boundary is indefinite and difficult to place with accuracy in many profiles. Bedrock is at indefinite depth.

In the A horizon hue centers on 7.5YR but includes 5YR, and in some A1 horizons hue is 10YR. Value is 3 to 5, and chroma is 1 to 6. The thin A1 horizon generally has a value of 3 and a chroma of 1 or 2. The B2t horizon is 2.5YR or 10YR in hue, 3 to 5 in value, and 6 or 8 in chroma. The C horizon is variegated, as described, or is dominantly red or pinkish.

The Christiana soils are strongly acid to extremely acid unless they have been limed, and acidity generally increases with depth.

Christiana soils have a highly clayey subsoil similar to that of Chrome, Elkton, Keyport, Montalto, and Watchung soils. They are deeper to bedrock than Chrome soils, and they contain more clay and are more unstable than any of these soils. Christiana soils are associated with areas in the county mapped as Loamy and clayey land where much of the underlying clay is as fine and unstable as in the Christiana soils, and in places even more so.

Christiana fine sandy loam, 2 to 5 percent slopes, moderately eroded (ClB2).—This soil has the profile described as representative of the series. Most of the original plow layer has been washed away. Included in mapping are some small areas that have a somewhat more silty and less sandy surface layer than this soil. Also included are some areas where soil washed downslope has accumulated and the surface layer is thicker than that of this soil. A few areas of a more nearly level soil are also included.

The chief limitation of this soil is the hazard of further erosion if the soil is cultivated. Capability unit IIe–41; woodland suitability group 3c10.

Chrome Series

The Chrome series consists of moderately deep, gently sloping to steep, well-drained soils on uplands in the northern, or Piedmont, part of the county. These soils commonly have a loamy surface layer and a thin, clayey subsoil that has a waxy feel. They formed in residuum from serpentine and similar rocks. Bedrock is at a depth of less than 40 inches. The native vegetation is scrub hardwoods, mostly oak and hickory, though shortleaf pine and Virginia pine grow in some places.

In a representative profile the surface layer is about 4 inches of dark grayish-brown silt loam. The subsurface layer is 3 inches of friable, dark yellowish-brown heavy silt loam. The subsoil, about 7 inches thick, is brown silty clay. The underlying material is brown to yellow silty clay loam in the upper 6 inches and green silt loam that has rock structure in the lower 5 inches. Bedrock is at a depth of 25 inches.

Chrome soils should be worked within only a narrow range of moisture content, especially in eroded areas or where plowing turns up an appreciable part of the subsoil.

These soils are fairly well suited to crops, but special management is needed. The chief concerns of management are limited available moisture capacity, moderate depth to bedrock, slope, and hazard of erosion. Another concern is the imbalance of bases because of a high magnesium content. If excavated to bedrock Chrome soils make good building sites. The highly clayey subsoil lacks stability for foundations. The moderate depth to bedrock severely limits use for disposal of sewage by septic tanks.

Representative profile of Chrome silt loam described in an area of Chrome silt loam, 3 to 8 percent slopes, moderately eroded, in a wooded area about one-half mile east of Pilot:

A1—0 to 4 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; many roots; strongly acid; clear, smooth boundary.

A2—4 to 7 inches, dark yellowish-brown (10YR 4/4) heavy silt loam; weak, fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; common roots; strongly acid; clear, wavy boundary.

B2t—7 to 14 inches, brown or dark-brown (10YR 4/3) silty clay; moderate to strong, fine, blocky and subangular blocky structure; hard, firm, sticky and very plastic; waxy consistence; few roots; almost continuous clay films; strongly acid; clear, wavy boundary.

C1—14 to 20 inches, variegated brown (7.5YR 4/4) to yellow (2.5Y 8/6) silty clay loam; massive to very weak, medium, blocky structure; hard, friable, sticky and slightly plastic; few roots; strongly acid to medium acid; abrupt, wavy boundary.

C2—20 to 25 inches, green (greener than 5G 6/2) silt loam; inherent foliar structure; hard, very friable, slightly sticky; no roots; distinctive waxy feel; much very fine mica; some infiltration of olive-brown (2.5Y 4/4) silt or clay; medium acid; abrupt, irregular boundary.

R—25 inches, hard, slightly weathered mafic rock, a mixture of gabbro and serpentine; weathered surface feels like talc.

The A1 horizon is 1 to 4 inches thick and the A2 horizon generally is 3 to 6 inches thick. In severely eroded areas the plow layer is finer and stickier and generally is clay loam. The B2t horizon centers on heavy silty clay loam, but it ranges to heavy clay loam or light silty clay. It seldom is as fine textured as it appears, probably because of its waxy consistence. The C horizon is nearly as fine textured as the B2t horizon in the upper part but contains less clay with depth. Coarse fragments, generally of serpentine, range from 0 to about 35 percent in the solum, but are commonly of little significance in the plow layer. The C horizon contains more coarse fragments than the solum in places. The B2t horizon is of low volume weight, is difficult to compact, and has low maximum dry density. It has very high liquid limit, plasticity index, and optimum moisture for compaction. The B and C horizons commonly contain very finely divided mica. Thickness of the solum ranges from about 10 to 20 inches. Depth to bedrock ranges from 20 to 40 inches, but generally is between 24 and 30 inches.

In the A horizon hue generally is 10YR but ranges toward 2.5Y, value is 3 or 4, and chroma is 1 or 2. In the A2 horizon value is 4 or 5 and chroma is 3 or 4. In the B2t horizon hue generally is 10YR but ranges to 7.5YR. In the B2t horizon value and chroma are 3 or 4. The upper part of the C horizon is similar in color to that in the B2t horizon, but it is variegated and has higher value and chroma in places. The C2 horizon, where present, generally has a greenish cast.

In unlimed areas the profile is strongly acid to neutral, and acidity decreases with depth. Base saturation in the C horizon is well above 50 percent, and magnesium appears to dominate the bases in Chrome soils, at least in the C horizon.

Chrome soils overlie similar rocks in Cecil County as the Aldino, Conowingo, and Neshaminy soils. They are thinner than any of these soils and are not so deep to bedrock.

Chrome silt loam, 3 to 8 percent slopes, moderately eroded (CmB2).—This soil has a profile similar to the one described as representative of the series.

Included with this soil in mapping are small areas that have a more gritty, less silty surface layer than this soil. Also included are some gravelly spots and a few areas that have slopes of less than 3 percent.

This soil is highly erodible, and the loss of even a small part of the surface layer is important in areas where the soil is thin. Plowing to a depth of 8 to 10 inches turns up some of the sticky and very plastic subsoil, and plowing to a depth of 15 inches generally turns up and mixes all of the subsoil into the plow layer. The areas are cut by a few gullies, and some of them extend through the subsoil. Capability unit IIe–10; woodland suitability group 4c11a.

Chrome silt loam, 8 to 15 percent slopes, moderately eroded (CmC2).—This soil is a few inches shallower to bedrock than Chrome silt loam, 3 to 8 percent slopes, moderately eroded, but few if any gullies are in the areas. Included in mapping are some gravelly spots and some areas that have a more gritty, less loamy surface layer than this soil.

Slope severely limits the use of this soil for cultivated crops, because of the hazard of further erosion. Capability unit IIIe–10; woodland suitable group 4c11a.

Chrome silt loam, 15 to 25 percent slopes, moderately eroded (CmD2).—This soil is shallower to bedrock, but the profile otherwise is similar to the one described as representative of the series. Included in mapping are some gravelly spots.

The hazard of further erosion is very severe on this soil. Consequently the soil is considered marginal for safe cultivation, even under the most careful management. Wooded areas should be left wooded, and cleared areas should be kept under vegetative cover most of the time. Capability unit IVe–10; woodland suitability group 4c11b.

Chrome clay loam, 8 to 25 percent slopes, severely eroded (CnD3).—All of the original surface layer of this

soil has been removed by erosion. Also, part of the subsoil, and in places all of it, has been washed away. Gullies are fairly common, and some of them extend to bedrock. Included in mapping are some areas that have a litter of gravel on the surface that remained when the finer textured soil material washed away.

If this soil is cultivated, the plow layer or seedbed is sticky and clayey and hard to manage. Also, the hazard of continued erosion is so great that safe cultivation is not feasible. All areas of this soil should be under permanent protective cover. In places hay or pasture can be grown under good management. Capability unit VIe–3; woodland suitability group 4c11b.

Chrome clay loam, 25 to 45 percent slopes, severely eroded (CnE3).—This soil is partly covered by trees. The cover is not adequate, and the soil is seriously eroded. Included in mapping are some gravelly spots and a few areas that have slopes greater than 45 percent.

This soil is not suited to any cultivated crops or hay crops. It can be used for limited grazing under careful management. Most areas should be reestablished in a dense cover of trees, shrubs, and vines and used for watershed protection, wildlife cover, and esthetic value. Capability unit VIIe–3; woodland suitability group 4c11b.

Clay Pits

Clay pits (Cp) are the excavations left in the earth in places where clay has been mined. In most places mining has been for the very fine Cretaceous clay that is fairly common in the northern part of the Coastal Plain, just south of the Piedmont area of the county. The pits commonly are associated with gently sloping soils of the Christiana series and with some of the nearly level to sloping soils of the Keyport series. In many places these pits are within areas of Loamy and clayey land. Included in mapping are some spoil piles adjacent to the pits.

These Clay pits have no important use, except for the further mining of clay. Major reclamation would be necesary if these pits were to be used for other purposes, depending on conditions at the individual site and the proposed use. The acreage in Clay pits is increasing. Capability unit VIIIs–4; woodland suitability group not assigned.

Coastal Beaches

Coastal beaches (Co) are areas of sand along shores of the Chesapeake Bay and some major rivers in Cecil County. The beaches are smooth or somewhat hummocky and have short slopes. Some areas are too narrow to be shown on the soil map. These areas consist chiefly of incoherent loose sands that have been worked and reworked by the action of waves, tides, and wind. In most places the beaches are still subject to such action.

These beaches show no indication of soil development and generally support little, if any, vegetation. Growing in places, however, are American beachgrass, beach goldenrod, and occasional clumps of switchgrass. Some bushes and scattered trees grow on older partly stabilized areas.

The beaches have no farming value at present. Capability unit VIIIs–2; woodland suitability group not assigned.

Codorus Series

The Codorus series consists of deep loamy soils on flood plains of streams in the northern or Piedmont part of the county and in some places along streams that extend into the Coastal Plain. These soils formed in alluvium that was washed from areas of acid crystalline rock. The Codorus soils are moderately well drained to somewhat poorly drained, and they are subject to flooding. The native vegetation is mixed hardwood that tolerates seasonal wetness. Most of the acreage has been cleared for use as pasture.

In a representative profile the surface layer is brown silt loam about 10 inches thick. The subsoil below is about 24 inches thick. It is pale-brown, friable silt loam in the upper 7 inches; yellowish-brown, mottled with light brownish-gray, friable loam in the next 11 inches; and gray silty clay loam in the lower 6 inches. The underlying material is about 26 inches of light brownish-gray or gray silt loam, light silty clay loam, or loam.

Codorus soils are fairly easy to work if they are not too moist, but they generally are wet in spring and late to warm. These soils are subject to flooding, especially in spring, and planting generally is delayed. Artificial drainage is beneficial on those few acres that are cultivated and helps to lengthen the grazing period of pastures. These soils generally are not difficult to drain. They have high available moisture capacity, and water moves through them readily, though not rapidly.

Codorus soils are severely limited for use as permanent building sites and septic tank filter fields because of wetness and the risk of flooding.

Representative profile of a nearly level Codorus silt loam in a pasture just northeast of Elkton:

Ap—0 to 10 inches, brown (10YR 5/3) silt loam; weak, fine, granular structure; friable, slightly sticky and slightly plastic; many fine roots; a few fine mica flakes; medium acid (limed); clear, smooth boundary.

B1—10 to 17 inches, pale-brown (10YR 6/3) silt loam; common, fine, distinct, yellowish-brown (10YR 5/8) mottles; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; some fine black (10YR 2/1) concretions; medium acid; clear, smooth boundary.

B2—17 to 28 inches, yellowish-brown (10YR 5/4) loam that grades toward pale-brown (10YR 6/3); many, medium, distinct, light brownish-gray (2.5Y 6/2) mottles; weak, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; vesicular; micaceous; medium acid to strongly acid; clear, wavy boundary.

B3g—28 to 34 inches, gray or light-gray (10YR 6/1) light silty clay loam; common, medium, prominent, strong-brown (7.5YR 5/6) mottles; strong, coarse, prismatic structure; friable to firm, slightly sticky and slightly plastic; few roots; micaceous; some fine dark reddish-brown (5YR 3/4) concretions; strongly acid; clear, wavy boundary.

C1g—34 to 56 inches, light brownish-gray (10YR 6/2 to 2.5Y 6/2) silt loam or light silty clay loam; many, coarse, prominent, dark-brown (7.5YR 4/4) and reddish-brown (5YR 5/6 to 4/8) mottles; massive; widely spaced vertical cleavage lines in places; friable to firm, plastic and slightly sticky; gray silt or clay in old root channels; very strongly acid; clear, wavy boundary.

C2g—56 to 60 inches, gray or light-gray (N 6/0) highly micaceous loam; many, coarse, prominent brown (7.5YR 5/4 to 4/4) mottles; stratified; friable; strongly acid to very strongly acid.

The B horizon generally is silt loam but ranges from loam to light silty clay loam in texture. In places in the B3 and C horizons are pockets or thin strata of coarser material. A IIC horizon is at a depth of more than 40 inches in some profiles. This horizon consists of various kinds of water-laid material, and it commonly contains many waterworn pebbles. Depth to the gleyed B3 horizon ranges from 20 to 30 inches. The C horizon described in the representative profile is somewhat shallower than is common for soils of this series. Bedrock generally is at a depth of 6 feet to more than 20 feet, but it is at a greater and more variable depth in Coastal Plain areas.

In places the A horizon is grayer than described, especially if the A1 horizon is undisturbed. In the Ap horizon hue is 10YR or 2.5Y, value is 4 or 5, and chroma is 2 or 3. The B1 and B2 horizons are commonly 10YR in hue, but range to 7.5YR. Value in these horizons is 3 to 6, and chroma is 3 or 4. In the B3g horizon value ranges from 4 to 6, and chroma is 1 or 2. Where matrix chromas in the B horizon are 2 or higher, mottles with chromas of 0, 1, and 2 are present. In places mottles that have a high chroma are below the plow layer.

In unlimed areas the profile is medium acid to very strongly acid, and acidity increases with depth.

No other soils in the county have drainage conditions, profile characteristics, and flooding hazards similar to those of Codorus soils. These soils are on the same flood plains as the well-drained Comus soils and the poorly drained, generally very wet Hatboro soils.

Codorus silt loam (Cr).—This is the only Codorus soil mapped in the county. The areas are widespread in the northern part of the county. They are mostly small, fairly narrow strips on flood plains. Most of this soil is nearly level, but in some scattered areas slopes are more than 3 percent. The surface is somewhat irregular in places, and the outlines of former stream channels are apparent in some areas.

This soil is suited to many crops, but it is used mostly for pasture. Impeded drainage is the chief limitation where this soil can be protected against damage by flooding. In areas where the hazard of flooding is severe, the most intensive use generally is improved pasture. Use is limited chiefly to woodland or unimproved grazing in areas where the hazard of flooding is very severe. Capability unit IIw–7; woodland suitability group 1w9.

Collington Series

The Collington series consists of gently sloping to moderately sloping, well-drained, brown soils on uplands in the southern, or Coastal Plain, part of the county. These soils formed in old marine sediment that contained moderate amounts of glauconite (greensand). The native vegetation is hardwoods, dominantly oaks. Nearly all areas have been cleared for use as cropland.

In a representative profile the surface layer is about 7 inches of brown loam. The subsoil is brown heavy loam in the upper 7 inches, brown clay loam in the middle 17 inches, and dark yellowish-brown heavy loam in the lower 8 inches. The underlying material is very friable, brown light sandy loam from a depth of 39 to 44 inches and then stratified sandy clay loam to loamy sand to a depth of about 5 feet.

Collington soils are easy to work. They warm up in spring in time for all normal farming operations. These soils have moderate to high available moisture capacity. Collington soils are suited to most uses, though in places slope and erosion limit use. They are well suited to use as building sites and as disposal areas for septic tank effluent.

Representative profile of Collington loam, 2 to 5 percent slopes, moderately eroded, in a pasture about 2½ miles east-southeast of Cecilton:

Ap—0 to 7 inches, brown or dark-brown (10YR 4/3) loam; weak, fine, granular structure; friable, slightly sticky; many roots; common worm channels; neutral (limed); abrupt, smooth boundary.

B1—7 to 14 inches, brown (7.5YR 5/4) heavy loam; weak, medium, subangular blocky structure; friable, sticky and plastic; many fine roots; common worm channels; medium acid; gradual, smooth boundary.

B2t—14 to 31 inches, brown (7.5YR 4/4) to yellowish-brown (10YR 5/4) clay loam; moderate, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots in upper part; thin, continuous, reddish-brown (5YR 4/4) clay films; some black (10YR 2/1) films; common, fine, waterworn pebbles in lower part; medium acid; clear, wavy boundary.

B3—31 to 39 inches, dark yellowish-brown (10YR 4/4) heavy loam, variegated with brown (10YR 5/3) and dark brown (7.5YR 4/4); weakly stratified; friable, slightly sticky and slightly plastic; strongly acid; clear, wavy boundary.

C1—39 to 44 inches, brown or dark-brown (7.5YR 4/4) light sandy loam; stratified; very friable, slightly sticky; thin seams of dark greenish-gray (5GY 4/1) greensand or glauconite in places; strongly acid; abrupt, wavy boundary.

IIC2—44 to 60 inches, stratified olive (5Y 4/3), olive-brown (2.5Y 4/4), and olive-gray (5Y 5/2 to 4/2) sandy clay loam to loamy sand; sandy clay loam is massive, loamy sand is single grain; loose to firm, sticky and slightly plastic in finer textured parts; 10 to 30 percent glauconite; some fine smooth pebbles; strongly acid to very strongly acid.

The A horizon is loam or sandy loam, and the B horizon is heavy loam, sandy clay loam, or clay loam that has average clay content between about 25 and 35 percent. The conforming C horizon is light loamy sand to sandy loam that in places contains thin strata of clayey material or of sand. The IIC horizon varies considerably in texture within short vertical distances, showing strong evidence of stratification. Fine smooth pebbles occur in places. The solum ranges from about 28 to 40 inches in thickness. Bedrock is at indefinite depth.

Hue ranges from 7.5YR to 2.5Y in the solum and to 5Y or 5GY in the C horizon. In undisturbed areas a thin dark A1 horizon is present. In the rest of the solum, value is 3 to 5 and chroma is 3 or 4 or rarely 2. The C horizon is of about the same color range, but it generally is more olive and has a distinct greenish tinge in places.

In unlimed areas the profile is strongly acid to extremely acid, and acidity increases with depth.

No other soils of Cecil County have been significantly influenced by glauconite, and few have the greenish colors that are common in the lower part of the profile in Collington soils. Except for the influence of glauconite, Collington soils are similar in many respects to Sassafras soils.

Collington sandy loam, 2 to 5 percent slopes, moderately eroded (CsB2).—The surface layer of this soil contains less silt and clay but more sand than that in the profile described as representative of the series. It therefore is easier to work. Also, the subsoil generally is more sandy.

Included with this soil in mapping are a few areas of nearly level soil, a few shallow gullies, and small areas where the subsoil is nearly exposed.

The hazard of further erosion is moderate on this soil. In most areas part of the original surface layer has been washed away. Capability unit IIe–5; woodland suitability group 2o5.

Collington sandy loam, 5 to 10 percent slopes, moderately eroded (CsC2).—Areas of this soil are cut by scattered shallow gullies, but the soil has been well managed and has not been severely damaged by erosion. The hazard of further erosion is moderately severe, and good management is needed if the soil is used for continued regular cultivation. In places soil material has accumulated at the bases of slopes. Capability unit IIIe–5; woodland suitability group 2o5.

Collington loam, 2 to 5 percent slopes, moderately eroded (CtB2).—This soil has the profile described as representative of the series. In most areas much of the surface layer has been washed away. Generally, however, enough of the surface layer is left so that plowing to normal depth turns up little if any of the subsoil. Included in mapping are a few shallow gullies. Also included are a few areas where the subsoil is nearly exposed and a few areas where the soil is more nearly level than typical. Capability unit IIe–4; woodland suitability group 2o5.

Collington loam, 5 to 10 percent slopes, moderately eroded (CtC2).—The erosion hazard is more severe on this soil than on the less sloping Collington soils. Included in mapping are a few wooded areas where little soil loss has occurred. Also included are a few widely scattered shallow gullies. Capability unit IIIe–4; woodland suitability group 2o5.

Collington loam, 5 to 10 percent slopes, severely eroded (CtC3).—This soil has lost most of its original surface layer. In places the subsoil has been exposed and the areas are cut by many shallow and deep gullies. The present plow layer is loamy, but it is somewhat cloddy and granular, is a brighter brown, and is more sticky than that in less eroded Collington soils. Good management is needed to prevent further and more serious erosion on this soil. Capability unit IVe–3; woodland suitability group 2o5.

Collington loam, 10 to 15 percent slopes, moderately eroded (CtD2).—This soil has lost part of its original surface layer through erosion, and the areas are cut by a few shallow gullies. An accumulation of washed soil material is at the base of some slopes. Under any intensive use further erosion is a severe hazard on this soil, and it is necessary to keep the soil well protected. Capability unit IVe–3; woodland suitability group 2o5.

Collington loam, 10 to 15 percent slopes, severely eroded (CtD3).—Areas of this soil are cut by many gullies, and in some places the gullies cut deep into the underlying soil material. In other places the subsoil is exposed. The present plow layer consists of what was formerly the subsoil, except in a few spots.

This soil should not be used for clean-tilled crops. It should be kept under a cover of permanent vegetation. Capability unit VIe–2; woodland suitability group 2o5.

Comus Series

The Comus series consists of deep, well-drained soils on flood plains. These soils are mostly in the northern, or Piedmont, part of the county, but they extend along some streams into the Coastal Plain. They formed in alluvium washed from areas of crystalline rock material. These soils are subject to flooding during periods of heavy, extended rain or very rapid snowmelt. The native vegetation is mostly oaks and other hardwoods, but in this county most of the larger areas have been cleared for use as pasture.

In a representative profile the surface layer is about 12 inches of dark-brown silt loam. The subsoil is about 18 inches of friable silt loam that is dark yellowish-brown in the upper part and brown in the lower part. The underlying material, at a depth of 30 to 50 inches, is loose gravelly sandy loam.

Comus soils are easy to work and generally can be worked early in spring. Artificial drainage is not needed, but it is necessary in places to intercept and divert runoff from adjacent higher areas. Seasonal flooding is a hazard, but flooding generally does not last long. These soils have high available moisture capacity, and water moves through them readily.

Comus soils generally are in pasture but are also suited to corn and hay. Use for permanent building sites and for septic tanks is limited, chiefly because of the hazard of seasonal flooding.

Representative profile of Comus silt loam, in a pasture, across Elk Creek from the Elkton Water Works:

Ap—0 to 12 inches, dark-brown (10YR 4/3) silt loam; weak, fine and medium, granular structure; friable, slightly sticky and slightly plastic; many roots; many wormcasts; medium acid (limed); clear, smooth boundary.

B21—12 to 18 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, medium and coarse, granular structure; friable, slightly sticky and slightly plastic; common roots; many wormcasts; many fine smooth pebbles; medium acid; gradual, smooth boundary.

B22—18 to 30 inches, brown or dark-brown (7.5YR 4/4) heavy silt loam; weak, coarse, granular to fine, subangular blocky structure; friable, slightly sticky and slightly plastic; few roots; wormcasts in places; mica evident; medium acid; abrupt, smooth boundary.

IIC—30 to 50 inches, strong-brown (7.5YR 5/6) gravelly sandy loam; single grain; loose; few roots; micaceous; few cobblestones; medium acid.

In undisturbed areas the A1 horizon is 2 to 4 inches thick. The B2 horizon is loam, silt loam, or fine sandy loam, and shows no evidence of any clay accumulation. In places a C horizon that is similar to the B22 horizon but lacks structure is between the B22 and IIC horizons. The IIC horizon is always coarser textured than the solum. Waterworn pebbles occur throughout the profile. They are seldom of significant quantity in the plow layer and are seldom abundant, except in the IIC horizon. The solum ranges in thickness from about 24 to 40 inches. Depth to bedrock ranges from 6 to 20 feet or more. In places where the Comus soils extend into the Coastal Plain, bedrock is at an indeterminate depth.

In undisturbed areas the A1 horizon is one or two units darker in value than the B2 horizon. Hue in the Ap horizon is nearly always 10YR, value is 4 or 5, and chroma is 3 or 4. The IIC horizon can be of almost any color, but its color generally is similar to that of the B2 horizon. Locally, however, it has a higher value or chroma and faint mottles of low chroma at a depth below 40 inches.

In unlimed areas the profile generally is strongly acid, and acidity commonly increases with depth.

No other well-drained soils in Cecil County other than Comus soils are on flood plains. On the same flood plains as the Comus soils, however, are the moderately well drained, seasonally wet Codorus soils and the poorly drained, generally very wet Hatboro soils.

Comus silt loam (Cu).—This is the only Comus soil mapped in the county. It is nearly level in most areas. Included in mapping are small areas that have a slope of more than 3 percent. Seasonal flooding is a hazard, but erosion generally is not a hazard. In places some surface wash or scouring occurs during periods of high water. Natural drainage is good and, except for the occasional

flooding hazard, this soil has no particular limitation to use for farming. Capability unit I–6; woodland suitability group 1o9.

Conowingo Series

The Conowingo series consists of gently sloping to strongly sloping, moderately well drained to somewhat poorly drained, loamy soils that formed in material weathered from serpentine and similar rocks. These soils are in the extreme northwestern part of the county. They have a sticky and plastic subsoil and large amounts of exchangeable bases generally dominated by magnesium. The native vegetation is chiefly scrub white oak and other hardwoods, though Virginia pine and shortleaf pine grow in places.

In a representative profile the surface layer is about 6 inches of olive-brown silt loam. The subsurface layer is about 3 inches of brown silt loam. The subsoil is 21 inches thick. It is brown silty clay loam in the upper part and dark yellowish-brown light silty clay mottled with grayish colors in the lower part. Below this is 10 inches of firm, olive-brown mottled silty clay loam. Bedrock is at a depth of 40 inches.

Conowingo soils are sticky when too moist and hard when too dry, and plowing needs to be done at the right moisture content. These soils are moderately wet to wet in spring. They are slow to warm and to dry enough for seedbed preparation and planting, even on slopes where there is no excess surface water. These soils hold large amounts of moisture, but many plants are damaged from lack of moisture even when the soil does not appear to be thoroughly dry.

Conowingo soils erode readily even on gentle slopes. Wetness is another limitation. Because these soils are seasonally wet and unstable, they are not suitable for building sites or for the disposal of effluent from ordinary individual septic tanks.

Representative profile of Conowingo silt loam, 3 to 15 percent slopes, in a cultivated area about 0.1 mile north of Rock Springs:

Ap—0 to 6 inches, olive-brown (2.5Y 4/4) silt loam; weak, fine, granular structure; friable, sticky and slightly plastic; many roots; medium acid; abrupt, smooth boundary.

A2—6 to 9 inches, brown (10YR 4/3) silt loam; weak, thin, platy and very fine, subangular blocky structure; friable, sticky and plastic; many roots; common reddish-brown and black concretions; medium acid; clear, smooth boundary.

B21t—9 to 15 inches, brown (10YR 4/3) silty clay loam; moderate, medium, subangular blocky structure; friable to firm, sticky and plastic; many fine roots; thin, continuous, olive-brown (2.5Y 4/4) clay films; common, fine, reddish-brown (5YR 4/4) and black (10YR 2/1) concretions and black (10YR 2/1) films; slightly acid; clear, wavy boundary.

B22t—15 to 30 inches, dark yellowish-brown (10YR 4/4) light silty clay; common, fine, prominent, olive-gray (5Y 5/2) and dark grayish-brown (10YR 4/2) mottles; strong, fine to coarse, blocky and weak subangular blocky structure; firm, plastic and very sticky; roots common in upper part; thin continuous clay films; fine reddish-brown (5YR 4/4) and black (10YR 3/1) concretions in upper part; specks of greenish rock material in lower part; neutral; clear, wavy boundary.

C—30 to 40 inches, olive-brown (2.5Y 4/4) silty clay loam, variegated with grayish-brown (2.5Y 5/2); massive; firm, sticky and plastic; no roots; small angular fragments of serpentine and gabbro; mildly alkaline; abrupt, wavy boundary.

R—40 inches, fractured, but mostly unseparated serpentine and serpentinized gabbro.

In undisturbed areas the A1 horizon is less than 4 inches thick, and the A2 horizon is thicker than typical. The B2t horizon centers on silty clay loam, but it ranges to loam and clay loam or light silty clay. The average clay content generally is between 25 and 35 percent. The C horizon generally is coarser textured than the B2t horizon. Coarse fragments, chiefly of serpentine or gabbro, make up about 10 percent of the solum and generally somewhat more of the C horizon. Thickness of the solum ranges from about 24 to 40 inches, and depth to bedrock generally is between 40 and 70 inches.

Hue in the A horizon centers on 2.5Y, but it ranges to 5Y and 10YR. In the A1 horizon value is 3 or 4 and chroma is 1 or 2, and in the A2 horizon value is 4 or 5 and chroma is 3, 4, or, rarely, 6. Matrix hues in the B horizon generally are 10YR, but they become yellower with depth in places. The B21t horizon generally is not mottled, but mottles that have a chroma of 2 or less are in the B22t horizon at a depth of less than 10 inches of the upper boundary of the B21t horizon. In places mottles that have a high chroma are in the B22t horizon. Some profiles have a B3 horizon that is gleyed. In the C horizon the color range is about the same as in the B2t horizon. This horizon commonly is variegated and is mottled. Textures of all horizons generally are not so fine as they appear to be in the field.

Reaction ranges from strongly acid to mildly alkaline, and acidity decreases with depth. Base saturation ranges from about 50 to more than 80 percent.

Conowingo soils formed over rocks similar to those which underlie Aldino, Chrome, and, in part, Neshaminy soils. The Chrome and Neshaminy soils are well drained. The Conowingo soils are similar to the moderately well drained Aldino soils but lack a fragipan in the lower part of the subsoil.

Conowingo silt loam, 3 to 15 percent slopes (CwC).—This is the only Conowingo soil mapped in the county. Most areas of this soil are not significantly eroded, because they have remained under a cover of trees or grass. Only small areas are cultivated.

Included with this soil in mapping are a few areas of a nearly level soil. Also included are stony spots that are shown on the soil map by the symbol for stones.

Seasonal wetness seriously limits use of this soil. Controlling erosion is the most important concern of management if this soil is tilled. Capability unit IIIe–13; woodland suitability group 3w12.

Elkton Series

The Elkton series consists of poorly drained, nearly level and gently sloping soils on upland flats in the southern, or Coastal Plain, part of the county. These soils have a loamy surface layer and a clayey subsoil. Water moves slowly through the subsoil. Elkton soils formed in fine-textured old marine sediment. The native vegetation is chiefly such wetland hardwoods as oak, swamp maple, and gum, but pond pines grow in a few places. Many areas have been cleared for crops or pasture.

In a representative profile the surface layer is about 3 inches of grayish-brown silt loam and the subsurface layer is about 4 inches of gray silt loam. The subsoil is about 41 inches thick. It is olive-gray silty clay loam in the upper part and dark-gray silty clay in the lower part. The underlying material, to a depth of about 5 feet, is firm, gray silty clay loam.

The Elkton soils are difficult to work except at the right moisture content, and they should not be worked

when the water table is near the surface. Artificial drainage is needed for most uses, particularly to lower the water table in spring so that farming operations can start, and to drain off excess water during wet periods. Drainage is difficult because water moves very slowly through the clay or silty clay subsoil. Ditches generally are more satisfactory than tile drains, and the ditches must be closely spaced. The Elkton soils have high available moisture capacity.

Elkton soils are limited in use by poor natural drainage, a high water table, and the difficulty of providing artificial drainage. They are too wet for building sites, and they are too wet and too slowly permeable for sewage disposal by septic tanks.

Representative profile of Elkton silt loam, 0 to 2 percent slopes, in a wooded area about 1 mile south of Chesapeake City and 1 mile west of U. S. Highway No. 213:

A1—0 to 3 inches, grayish-brown (2.5Y 5/2) silt loam; common, fine, faint, light yellowish-brown (2.5Y 6/4) mottles; weak, very fine, granular structure; friable; many roots; very strongly acid; clear, smooth boundary.

A2g—3 to 7 inches, gray or light-gray (10YR 6/1) silt loam; many medium, prominent, strong-brown (7.5YR 5/8) and light olive-brown (2.5Y 5/4) mottles; weak, fine, subangular blocky structure that tends toward platy; slightly hard, friable, slightly sticky and slightly plastic; common roots; very strongly acid; clear, wavy boundary.

B21tg—7 to 14 inches, olive-gray (5Y 4/2) silty clay loam; many medium, prominent, brown or dark-brown (7.5YR 4/4) mottles; weak, medium, subangular blocky structure; hard, firm, sticky and plastic; few roots; thin clay films; extremely acid; clear, wavy boundary.

B22tg—14 to 48 inches, dark-gray (5Y 4/1) silty clay; common, fine, prominent, yellowish-red (5YR 5/8) mottles; moderate, medium, prismatic and coarse, blocky structure; hard, firm, sticky and very plastic; few roots in upper part; none below; thin clay films in pores and on prism faces; extremely acid; clear, smooth boundary.

Cg—48 to 60 inches, gray (5Y 5/1) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; massive; hard, firm, sticky and plastic; very strongly acid to extremely acid.

The A horizon ranges from silt loam to loam in texture. Texture of the B2t horizon centers on silty clay, but it ranges to clay loam or clay in places. The average clay content in the B2t horizon generally is more than 40 percent. The C horizon is of conforming silty material or of unconforming sandy material (IIC). Generally no pebbles or other coarse fragments are in Elkton soils. The solum generally ranges from 30 to 40 inches in thickness, but in some profiles the solum is much thicker. Bedrock is at an indefinite depth.

Hue throughout the profile is 10YR or yellower, and in some horizons it is neutral. In the A1 horizon value is 3 to 5 and chroma is 0 to 2. All other horizons have a matrix value of 4 to 7 and a chroma of 0 to 2 or, rarely, 3. Mottles in the solum range from faint to prominent in hue of 5YR or yellower and generally have a chroma of 4 to 8.

In unlimed areas the profile is strongly acid to extremely acid, and acidity generally increases with depth.

Elkton soils are similar to the Baile, Fallsington, Hatboro, Leonardtown, Othello, and Watchung soils in drainage. They have a fine-textured, clayey subsoil similar to that of the Watchung soils. Elkton soils are less permeable than Baile, Fallsington, Hatboro, and Othello soils. Their permeability is similar to that of Leonardtown soils, but those soils have a hardpan in the lower part of the subsoil. Elkton soils are deeper to bedrock than Watchung soils and are less acid than those soils. They formed in the same kind of old sediment as the well-drained Christiana soils and the moderately well drained Keyport soils.

Elkton loam, 0 to 2 percent slopes (ElA).—This soil has a profile similar to that described as representative of the series, except that the surface layer contains less silt and somewhat more sand. Included in mapping are some scattered shallow washes or small gullies and a few areas that have more sand in the surface layer than is normal for this soil.

This soil is easier to work and somewhat easier to drain than the Elkton silt loams. It also generally is ready for cultivation a little earlier in spring. The chief limitation is wetness. Capability unit IIIw–9; woodland suitability group 3w13.

Elkton loam, 2 to 5 percent slopes (ElB).—This soil has lost part of its original surface layer in some areas, and shallow gullies are present in a few places. Included in mapping are small areas that have a surface layer that is sandier than normal and some areas that have slopes of slightly more than 5 percent.

The hazard of erosion is slight to moderate on this soil. The main limitation is wetness. Capability unit IIIw–9; woodland suitability group 3w13.

Elkton silt loam, 0 to 2 percent slopes (EmA).—This soil has the profile described as representative of the series. Included in mapping are a few local washes and some spots where silt has accumulated. Also included are small areas that have a very dark gray to black surface layer that generally is thin and is mixed with the subsoil if plowed. Capability unit IIIw–9; woodland suitability group 3w13.

Elkton silt loam, 2 to 5 percent slopes (EmB).—In many places this soil has lost part of the original surface layer through erosion. Included in mapping are a few gullies, a few areas that have a slope of more than 5 percent, and spots where the surface layer is darker colored than is normal for this soil.

The hazard of erosion is slight to moderate on this soil. Wetness and the need for drainage are the most important concerns of management. Capability unit IIIw–9; woodland suitability group 3w13.

Elsinboro Series

The Elsinboro series consists of deep, well-drained, nearly level to moderately sloping soils on terraces above the flood plains of some major streams of the county. These soils are in the Piedmont part of the county and along major waterways in the Coastal Plain. They formed in old alluvium, and they generally contain considerable fine mica flakes. The native vegetation is mostly oaks and a mixture of other hardwoods. Most areas have been cleared for use as cropland.

In a representative profile the surface layer is about 10 inches of brown or dark-brown silt loam. The subsurface layer is about 5 inches of dark-brown light silt loam. The subsoil is firm light silty clay loam that is strong brown in the upper 11 inches and yellowish red in the lower 13 inches. The underlying material, to a depth of about 5 feet, is red, highly micaceous gravelly sandy loam.

Elsinboro soils are easy to work. They warm quickly in spring and are ready for all normal farming operations. These soils have high available moisture capacity.

Elsinboro soils are suited to most uses, but they are limited by slope and the hazard of erosion in places. These soils are close to streams, but they are not subject to flooding. Elsinboro soils are suited as building sites and for sewage disposal by septic tanks, but the limitation of

slope should be considered. Filter fields from septic tanks can cause water pollution if they drain into nearby streams.

Representative profile of the Elsinboro silt loam, 0 to 2 percent slopes, in a cultivated area east of State Route 316 and south of State Route 277:

Ap—0 to 10 inches, brown or dark-brown (10YR 4/3) silt loam; weak, fine and medium, granular structure; slightly hard, friable, slightly sticky but nonplastic; many roots; about 2 percent fine waterworn gravel; slightly acid to neutral (limed); abrupt, smooth boundary.

A2—10 to 15 inches, dark-brown (7.5YR 4/4) light silt loam; weak, medium and coarse granular structure; moderately hard, friable, slightly sticky and slightly plastic; many roots; traces of mica; about 2 percent fine, waterworn gravel; slightly acid; gradual, smooth boundary.

B21t—15 to 26 inches, strong-brown (7.5YR 5/6) light silty clay loam; weak, medium, blocky and subangular blocky structure; hard, friable to firm, plastic and slightly sticky; many roots; distinct clay films; common mica flakes; about 3 percent fine waterworn gravel; medium acid; gradual, smooth boundary.

B22t—26 to 39 inches, yellowish-red (5YR 4/6) light silty clay loam; moderate, medium, blocky and subangular blocky structure; hard, firm, sticky and plastic; few fine roots; distinct, strong-brown (7.5YR 5/6) clay films and flows; many mica flakes; 5 to 10 percent fine waterworn gravel; strongly acid to medium acid; abrupt, wavy boundary.

IIC—39 to 60 inches, red (2.5YR 4/6), highly micaceous gravelly sandy loam; massive but stratified; very friable, slightly sticky; 15 to 25 percent waterworn gravel, mostly less than 1 inch in diameter; strongly acid to very strongly acid.

The B2t horizon generally is light silty clay loam, but it is clay loam in part. A conforming C horizon occurs in places, but an unconforming IIC horizon of abruptly coarser texture is common. Some waterworn gravel, mostly quartzite, commonly is in all profiles. The solum ranges from about 28 to 40 inches in thickness. Depth to bedrock ranges from 6 to 20 feet or more. In places where Elsinboro soils extend into the Coastal Plain, bedrock is at an indeterminate depth.

In the A horizon hue is 10YR or 7.5YR. In the A1 and Ap horizons, value generally is 4 and chroma is 2 or 3. In the A2 horizon value is 4 to 6 and chroma generally is 4. In the B2t horizon hue is 7.5YR to 5YR and is frequently redder in the lower part. In the B2t horizon value is 4 or 5 and chroma is 6 to 8. The C horizon is variegated or is uniform in color.

In unlimed areas the profile is strongly acid to very strongly acid, and acidity generally increases with depth.

Elsinboro soils are similar to Chester soils, but they have weaker structure and horizonation and a somewhat less clayey B2t horizon that is less sticky and plastic. Also they generally have more mica in the solum. Elsinboro soils are similar to Chester soils, but they contain waterworn, coarse fragments and have other evidences of waterworking and stratification that are lacking in Chester soils. The Elsinboro soils are similar to the Glenelg soils but are more micaceous than those soils.

Elsinboro silt loam, 0 to 2 percent slopes (EoA).—This soil has the profile described as representative of the series. In some places surface washing has occurred and in some spots soil has accumulated, but in most places this soil has not been affected by erosion.

This soil has little if any limitation for farming or for many other uses. Capability unit I–4; woodland suitability group 2o5.

Elsinboro silt loam, 2 to 5 percent slopes, moderately eroded (EoB2).—This soil has lost a part of the original surface layer in most areas, and a few areas are cut by shallow gullies. Included in mapping are a few areas where most of the surface layer has been removed by erosion, and plowing turns up subsoil material.

The hazard of further erosion is moderate if this soil is cultivated year after year. Capability unit IIe–4; woodland suitability group 2o5.

Elsinboro silt loam, 5 to 10 percent slopes, moderately eroded (EoC2).—This soil is limited for cultivated crops by present erosion and the hazard of further erosion. Included in mapping are a few areas where the subsoil is almost completely exposed and some scattered shallow gullies. Also included are some areas where the slope is greater than 10 percent. Capability unit IIIe–4; woodland suitability group 2o5.

Evesboro Series

The Evesboro series consists of very deep, excessively drained, nearly level to moderately steep soils of the uplands in the Coastal Plain part of the county. These soils are sandy, but the underlying material is even more sandy. Evesboro soils formed mainly in old sand dunes. The native vegetation is chiefly scrub hardwoods, but pines grow in places. A few acres are used for cropland or pasture.

In a representative profile the surface layer is about 4 inches of brown loamy sand. The subsoil, about 30 inches thick, is yellowish-brown loamy sand. It is underlain by yellowish-brown sand at a depth between 34 and 60 inches.

Evesboro soils are easy to work and can be worked throughout a wide range of moisture content. They are probably the first soils in the county to warm in spring. Some of the earliest crops, particularly garden and truck crops, can be planted on these soils. Evesboro soils are very low in available moisture capacity and in natural plant nutrients. Crops on these soils require supplemental irrigation in seasons of short moisture supply, and they respond very well. Large amounts of fertilizer are needed for most crops.

The Evesboro soils are fairly well suited to many field and truck crops, but most of the acreage is wooded. Cultivated areas are subject to soil blowing if the surface becomes dry and lacks a cover of protective vegetation. These soils make dry building sites. The soils are loose, however. They are suitable for septic tanks, but effluent liquids generally move rapidly through these soils and are a pollution hazard to wells, streams, and downslope areas, particularly on strong slopes.

Representative profile of Evesboro loamy sand, 0 to 5 percent slopes, in a wooded area on Nottingham Road about 2 miles northwest of U. S. Highway No. 40:

A1—0 to 4 inches, brown (10YR 5/3) loamy sand; single grain; loose; many roots; strongly acid; clear, smooth boundary.

B—4 to 34 inches, yellowish-brown (10YR 5/6) loamy sand; single grain; loose; many roots to a depth of about 24 inches, fewer below; sand grains coated; medium acid to strongly acid; clear, smooth boundary.

C—34 to 60 inches, yellowish-brown (10YR 5/4) sand; single grain; loose; few roots in upper part; strongly acid.

The A and B horizons are loamy sand. The C horizon is sand that contains fine quartzose gravel in places. The A and B horizons are about 24 to 42 inches in combined thickness, but they generally range between 24 and 30 inches in thickness. Bedrock is at an indefinite depth.

Hue generally is 10YR throughout the profile but it is 2.5Y in places. In the A horizon value is 3 to 6 and chroma is 2 to 4. The thin A1 horizon has the lowest value and chroma. In the B horizon value is 5 or 6 and chroma is 6 or, in places,

8. The C horizon is similar in color to the B horizon but is more variable in value and chroma.

In unlimed areas the profile generally is strongly acid to extremely acid, and acidity commonly increases with depth.

The Evesboro soils are similar to the Rumford soils in the surface layer, but they lack the somewhat finer textured subsoil typical of the Rumford soils.

Evesboro loamy sand, 0 to 5 percent slopes (EvB).—This soil has the profile described as representative of the series. Included in mapping are spots of soil that are somewhat finer textured in the lower part of the subsoil and hold more moisture than this soil.

This soil is severely limited for cultivation by sandiness and droughtiness. Under special management, however, this soil can be used for truck crops, particularly those that generally are planted early. The hazard of erosion is slight, but soil blowing can damage tender seedlings. Capability unit IVs–1; woodland suitability group 3s14a.

Evesboro loamy sand, 5 to 15 percent slopes (EvD).—This soil is seldom used for cultivated crops, because of the erosion hazard and other limitations. It should be kept under permanent vegetation. Included in mapping are a few areas of soil that is finer textured than this soil in the lower part of the subsoil.

This soil can be used for orchards, for limited production of hay crops, or for limited grazing, if a suitable cover of close-growing plants is kept on the areas. Capability unit VIIs–1; woodland suitability group 3s14a.

Evesboro loamy sand, 15 to 40 percent slopes (EvE).—This droughty soil is on side slopes of sandy ridges. Included in mapping are some shallow gullies and many deep, caving sand gullies.

This soil should be kept under trees, shrubs, vines, and other permanent vegetation. The plants help to protect the watershed and to prevent damage to nearby areas by blown or washed sand. This soil is too steep for farming. Capability unit VIIs–1; woodland suitability group 3s14b.

Fallsington Series

The Fallsington series consists of nearly level to moderately sloping, poorly drained soils on upland flats and at the heads of drainageways in the southern, or Coastal Plain, part of the county. These soils formed in old sandy sediment that contained considerable silt and clay. The native vegetation is mostly such wetland hardwoods as oak, holly, birch, and swamp maple. Much of the acreage has been cleared for crops or pasture.

In a representative profile the surface layer is about 11 inches of dark grayish-brown loam. The subsurface layer is about 5 inches of light brownish-gray loam. The subsoil, about 20 inches thick, is gray or light-gray, friable sandy loam. Below this is about 19 inches of loose, olive-gray sand or loamy sand.

Fallsington soils are easy to work except when they are too wet. Farm operations are delayed in spring until the water table is sufficiently lowered. Because water moves readily through these soils, they are not difficult to drain if adequate outlets are available. Tile drains generally work better than ditches in these soils. Ditches tend to cave in and fill with sand, especially if they penetrate into the loose sandy material beneath the solum. These soils have moderate to high available moisture capacity.

Fallsington soils are suited to many crops, but wetness, lack of natural drainage, and fluctuations in the water table limit use. Also, erosion is a hazard on the stronger slopes. Fallsington soils are not suited as building sites. They are severely limited by wetness for septic tanks and many other nonfarm uses.

Representative profile of Fallsington loam, 0 to 2 percent slopes, in a cultivated area west of U. S. Highway No. 213, about 0.6 mile north of Cecilton:

Ap—0 to 11 inches, dark grayish-brown (10YR 4/2) loam; common, fine, prominent, reddish-brown (5YR 4/4) mottles; weak, fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; slightly acid (limed); abrupt, wavy boundary.

A2—11 to 16 inches, light brownish-gray (2.5Y 6/2) loam; common, fine, prominent, yellowish-red (5YR 5/6) mottles; weak, coarse, granular structure; friable, slightly sticky and very slightly plastic; many fine roots; very dark grayish-brown (10YR 3/2) material in root channels and wormholes; common fine pores; slightly acid; clear, wavy boundary.

B21tg—16 to 26 inches, gray or light-gray (5Y 6/1) heavy sandy loam; many, coarse, prominent, yellowish-brown (10YR 5/6) mottles; weak, coarse, subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; clay bridges between sand grains, thin clay films in pores and on aggregates; medium acid; gradual, wavy boundary.

B22tg—26 to 36 inches, gray or light-gray (5Y 6/1) sandy loam; many, coarse, prominent, brownish-yellow (10YR 6/6) mottles; weak, coarse, subangular blocky structure; friable, very slightly sticky; few roots; clay bridges between sand grains; thin clay films in pores and channels; very strongly acid; clear, wavy boundary.

Cg—36 to 55 inches, olive-gray (5Y 5/2) sand or loamy sand; horizontal bands of light yellowish-brown (2.5Y 6/4); single grain; loose; very strongly acid.

The A horizon is loam or sandy loam. The B2t horizon ranges from sandy loam to loam or sandy clay loam and the clay content generally is between 18 and 25 percent. The C horizon is coarser in texture than the B horizon, and it ranges from sand to light sandy loam. A few, fine, smooth pebbles are present in places. Thickness of the solum ranges from about 24 to 38 inches. Bedrock is at an indefinite depth.

Matrix colors throughout the profile range from 10YR through 5Y in hue or are neutral. In the A horizon value is 3 to 5 and chroma is 1 to 3. The lowest values and chromas are in the A1 horizon, which generally is less than 4 inches thick. In the B and C horizons, matrix value is 4 to 6 and chroma is 0, 1, or 2. Mottles generally are prominent, but they are not always present. Their hue is 2.5Y to 5YR and their chroma is 4 to 8.

In unlimed areas the profile is strongly acid to extremely acid, and acidity commonly increases with depth.

Fallsington soils are similar to the poorly drained, dominantly gray Baile, Elkton, Hatboro, Leonardtown, Othello, and Watchung soils. They have a coarser-textured, more permeable subsoil than Baile, Elkton, Othello, and Watchung soils. Fallsington soils lack the mica typical of Hatboro soils and the very silty, very dense, tough fragipan of Leonardtown soils. They formed in the same kind of material as the well-drained Sassafras soils and the moderately well drained, seasonally wet Woodstown soils.

Fallsington sandy loam, 0 to 2 percent slopes (FaA).—The surface layer of this soil is more sandy and less loamy than that in the representative profile. It also generally is a little lighter in color and contains somewhat less organic matter.

This soil is severely limited by poor drainage and a seasonally high water table, and artificial drainage is needed for most uses. It is easy to drain if adequate outlets are available. Erosion is not a hazard on this soil. Capability unit IIIw–6; woodland suitability group 2w7.

Fallsington sandy loam, 2 to 5 percent slopes (FaB).—Because of the slope, erosion is a moderate hazard on this soil. Part of the surface layer has been removed in some areas, and some shallow gullies are present. In places the surface is somewhat hummocky, and water accumulates in small depressions between the hummocks. An accumulation of sandy material washed from upper parts of the slopes is near the base of some slopes. Even though there is some hazard of erosion, drainage improvement is the most important concern of management. Capability unit IIIw–6; woodland suitability group 2w7.

Fallsington sandy loam, 5 to 10 percent slopes (FaC).—This soil is chiefly in wet seepage areas below areas of higher, better drained soils. In areas not protected by vegetation, part of the surface layer is gone and some shallow gullies and a few deep gullies cut the areas.

Included with this soil in mapping are a few areas that have a plow layer that contains less sand and more silt than is common for this soil. Also included are areas that have a slope of more than 10 percent.

Artificial drainage is required for many crops, but on the stronger slopes controlling erosion is the most critical concern of management. Capability unit IIIe–36; woodland suitability group 2w7.

Fallsington loam, 0 to 2 percent slopes (FmA).—This soil has the profile described as representative of the series. It is the most extensive Fallsington soil in the county and is of considerable importance in farming.

This soil is not so easy to work or to drain as Fallsington sandy loam, 0 to 2 percent slopes. Under good management little or no erosion generally occurs, but a few areas have had some surface wash and contain some spots of soil accumulation. Capability unit IIIw–7; woodland suitability group 2w7.

Fallsington loam, 2 to 5 percent slopes (FmB).—About one-eighth of the total area of this soil is somewhat eroded. In places the areas are cut by gullies, and a few of the gullies cut deep into the loose sandy layer underlying the subsoil. Also soil material, mostly from discharge from the gullies, has accumulated in small areas.

On this gently sloping soil controlling erosion is important, but the improvement of drainage is the most important concern of management. Capability unit IIIw–7; woodland suitability group 2w7.

Glenelg Series

The Glenelg series consists of deep, well-drained, nearly level to moderately steep soils on uplands in the northern, or Piedmont, part of the county. The native vegetation is mixed hardwoods, dominantly oaks. These are the most extensive soils on the Piedmont uplands of the county, and they are important for farming and for other uses.

In a representative profile the surface layer is very thin, very dark grayish-brown silt loam. The subsurface layer is about 7 inches of yellowish-brown, very friable silt loam. The subsoil is 16 inches of strong-brown, friable silt loam. The underlying material, to a depth of about 50 inches, is silt loam saprolite. It is yellowish-red in the upper 6 inches and pink and red in the lower 20 inches.

Glenelg soils are easy to work. They warm soon enough in spring for all normal farming operations. These soils have moderate to high available moisture capacity.

These soils are suited to most uses. The chief limitations are slope and erosion. Glenelg soils are suited as building sites and to use as septic tank filter fields, though slope limits these uses in some areas.

Representative profile of Glenelg silt loam, 8 to 15 percent slopes, moderately eroded, in a wooded area, about one-fourth mile southwest of Principio:

A1—0 to 1 inch, very dark grayish-brown (2.5Y 3/2) silt loam; weak, fine, granular structure; soft, very friable; many roots; strongly acid; abrupt, smooth boundary.

A2—1 to 8 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, granular structure; soft, very friable; many roots; very strongly acid; clear, smooth boundary.

B21t—8 to 16 inches, strong-brown (7.5YR 5/6) heavy silt loam; moderate, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common roots; thin clay films, mostly in pores and root channels; many mica flakes; very strongly acid; gradual, smooth boundary.

B22t—16 to 24 inches, strong-brown (7.5YR 5/6) heavy silt loam; moderate to strong, medium, subangular blocky structure; slightly hard, friable, sticky and plastic; few roots; distinct discontinuous clay films; much fine mica; very strongly acid; clear, smooth boundary.

C1—24 to 30 inches, yellowish-red (5YR 5/6) silt loam saprolite; inherent laminar structure; soft, very friable; few roots; abundant fine mica; very strongly acid; clear, smooth boundary.

C2—30 to 50 inches, pink (7.5YR 7/4) and red (2.5YR 4/6), banded loam saprolite; inherent laminar structure; loose to very friable, slightly sticky; highly micaceous; very strongly acid.

The A horizon is silt loam that is close to the boundary between loam and silt loam. The B2 horizon is heavy loam, heavy silt loam, or light silty clay loam. The C horizon generally is loam, but it includes fine sandy loam. Chips or channers of schist are in some profiles, but not in significant amounts. Scattered angular fragments of quartzite occur in places. The solum ranges from about 18 to 40 inches in thickness. Depth to bedrock ranges from about 4 to 10 feet.

In the A horizon hue generally is 10YR, but it can be 7.5YR. Value is 3 to 5 and chroma is 2 to 4. In the A1 horizon value and chroma are lower than in the A2 horizon. In the B horizon hue is centered on 7.5YR, but approaches 10YR or 5YR; value is 4 or 5; and chroma generally is 6 or 8. The C horizon is of single hue or is variegated. Variegation is inherent and is not an indication of wetness.

In unlimed areas the profile is strongly acid to very strongly acid, and acidity generally increases with depth.

Glenelg soils generally have a thinner solum than Chester soils and a more well-developed subsoil than Elsinboro soils. They are similar to Manor soils, which lack the finer-textured subsoil typical of Glenelg soils. Glenelg soils are associated with the moderately well drained Glenville soils that have a fragipan and the poorly drained, wet Baile soils.

Glenelg silt loam, 0 to 3 percent slopes (GeA).—This soil is suited to most uses if it is well managed. Included in mapping are a few areas where the surface layer has been washed away and where normal plowing turns up part of the subsoil. Capability unit I–4; woodland suitability group 2o4.

Glenelg silt loam, 3 to 8 percent slopes, moderately eroded (GeB2).—This soil probably is the most important soil for farming (fig. 3) and other uses in the county. In most cleared areas part of the original surface layer has been washed away. Few areas of this soil are protected by trees.

Included with this soil in mapping are widely scattered, small areas where erosion has removed most of the surface layer and the areas are cut by few shallow gullies and deeper gullies, or both. Also included are some spots

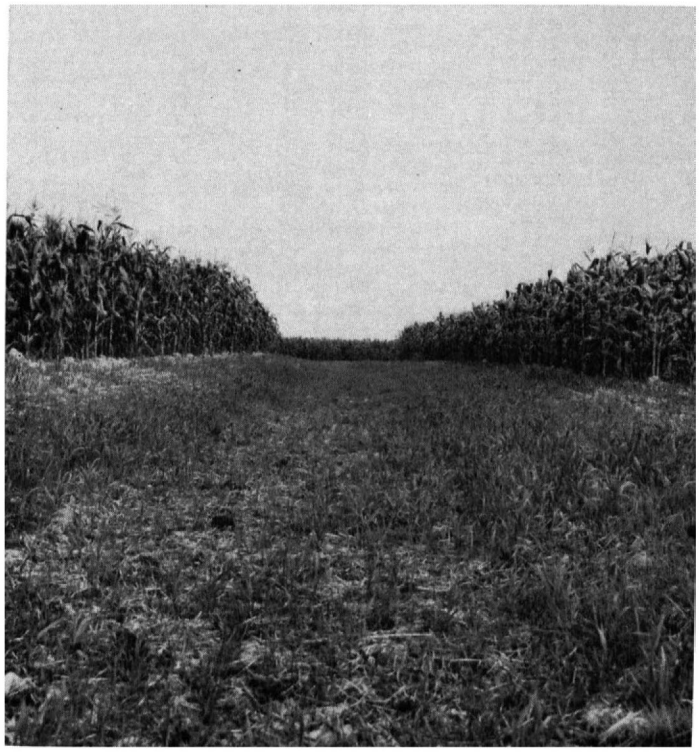

Figure 3.—**Corn growing on Glenelg silt loam, 3 to 8 percent slopes, moderately eroded. The sodded waterway that runs through the center of this field helps to safely dispose of excess runoff.**

where silty material has accumulated near the base of slopes or in slight depressions.

This soil is moderately limited for use because of the hazard of erosion in cultivated areas or in areas not protected from erosion. Capability unit IIe–4; woodland suitability group 2o4.

Glenelg silt loam, 8 to 15 percent slopes, moderately eroded (GeC2).—This soil has the profile described as representative of the series. In areas that have been cleared and used for crops, much of the original surface layer has been removed by erosion. Even in wooded areas depth to the highly micaceous substratum is less than in the more gently sloping Glenelg soils. Included in mapping are a few scattered shallow gullies that are crossable by most farm equipment. Also included are some areas that have a deeper and less micaceous profile than the soil in the profile described as representative of the series, and some areas where the subsoil contains more clay and is redder than in that soil. Capability unit IIIe–4; woodland suitability group 2o4.

Glenelg silt loam, 8 to 15 percent slopes, severely eroded (GeC3).—Most of the original surface layer of this soil has been washed away, and the present plow layer consists mostly of material formerly in the subsoil. It is stronger brown in color, more sticky, more blocky or cloddy, and less granular than the plow layer in uneroded or moderately eroded Glenelg soils. In some places part of the subsoil has been washed away, and the areas are cut by few to many shallow and deep gullies.

Included with this soil in mapping are some areas where the profile is deeper and less micaceous than the one described as representative of the series. Also included are a few spots that have a redder and more clayey subsoil.

Even under good management this soil has severe limitations for regular cultivation because of slope and the hazard of further erosion. This soil is better suited to long-term hay, permanent pasture, or orchards, where the cover of sod or other crops is adequate, than it is to cultivated crops. Capability unit IVe–3; woodland suitability group 2o4.

Glenelg silt loam, 15 to 25 percent slopes, moderately eroded (GeD2).—Most areas of this soil remain wooded, and some areas have been cleared for a relatively short time or have been carefully protected, or both. Consequently, the soil still retains most of the original surface layer and few shallow gullies are present.

Included with this soil in mapping are a few small areas where the profile is deeper than that described as representative of the series. In part of these areas the subsoil is redder and more clayey and sticky than typical.

This soil is marginal for regular cultivation, because the level of management required is not practical to apply. If a protective cover is kept on the areas, this soil can be safely used for other purposes. Capability unit IVe–3; woodland suitability group 2r4.

Glenelg silt loam, 15 to 25 percent slopes, severely eroded (GeD3).—In most places the surface layer of this soil has been washed away and some gullies are present. In other places the gullies are deep and are generally close together. Included in mapping are a few spots where a more sticky and more red subsoil than that in the profile described as representative of the series is exposed.

This soil is not suited to any regular cultivation, even under the most intensive management. It is necessary to protect this soil from erosion at all times. This soil is suitable for controlled grazing and limited production of hay crops, but a cover of sod, shrubs, vines, or trees must be kept on the areas. Capability unit VIe–2; woodland suitability group 2r4.

Glenelg silt loam, 25 to 45 percent slopes (GeE).—Most of this soil remains in trees and therefore is not seriously affected by erosion. A few cleared spots have been washed and cut by gullies, and some of the gullies are fairly deep.

This soil is not suited to farming, except for limited grazing or production of hay crops. The areas should remain in trees for watershed protection and esthetic benefits. Capability unit VIe–2; woodland suitability group 2r4.

Glenville Series

The Glenville series consists of dominantly brown, nearly level to moderately sloping, moderately well drained, loamy soils in upland depressions and around the heads and upper parts of drainageways. These soils are in the northern, or Piedmont, part of the county. They formed in material weathered from acid crystalline rocks. The subsoil is wet and poorly aerated for much of the year. The native vegetation is mostly oaks, but yellow-poplar and maples grow in places. Most of the area is cleared and used for crops and pasture.

In a representative profile the surface layer is 7 inches of brown or dark-brown silt loam. The subsurface layer is about 5 inches of yellowish-brown, friable silt loam.

Below this is about 10 inches of yellowish-brown heavy silt loam. Then, at a depth between 22 and 40 inches, is a very firm, yellowish-brown heavy silt loam fragipan. The next layer, to a depth of about 55 inches, is gray sandy clay loam.

Glenville soils are fairly easy to work at the right moisture content, but they are wet in some areas in spring and are slow to warm. Planting is generally delayed. Artificial drainage is needed for some crops. These soils have moderate available moisture capacity, but movement of water through the soils is limited by the fragipan.

Glenville soils are limited for some uses by seasonal wetness, impeded drainage and movement of water, limited depth to which roots can penetrate easily, and the hazard of erosion on areas of more sloping soils. These soils are not suitable as building sites or for sewage disposal by septic tanks because of seasonal wetness.

Representative profile of Glenville silt loam, 0 to 3 percent slopes, in a pastured are about 0.4 mile west of Farmington, north of State Route 269:

Ap—0 to 7 inches, brown or dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; friable, slightly sticky and slightly plastic; many roots; medium acid (limed); abrupt, smooth boundary.

A2—7 to 12 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, granular structure that tends toward platiness; friable, slightly sticky and slightly plastic; common roots; mica flakes and angular quartzite gravel in places; strongly acid; clear, smooth boundary.

B21t—12 to 18 inches, yellowish-brown (10YR 5/6) heavy silt loam, faint dark-brown (7.5YR 4/4) and strong-brown (7.5YR 5/8) variegations; weak, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; faint clay films; fine black (10YR 2/1) concretions in places; common mica flakes; very strongly acid; clear, smooth boundary.

B22t—18 to 22 inches, yellowish-brown (10YR 5/8) heavy silt loam; many medium, distinct, gray (10YR 6/1) to light brownish-gray (2.5Y 6/2) mottles; weak, medium, blocky and subangular blocky structure; friable, slightly sticky and slightly plastic; fairly common roots; light brownish-gray (2.5Y 6/2) clay films; common mica flakes; fine black (10YR 2/1) concretions in places; very strongly acid; gradual, smooth boundary.

Bx—22 to 40 inches, yellowish-brown (10YR 5/6) heavy silt loam; many, medium, prominent, gray or light-gray (10YR 6/1) mottles; moderate, coarse, prismatic and coarse, blocky structure; hard, very firm, sticky and slightly plastic; few fine roots between prisms; prominent clay films and flows; many mica flakes; few, fine, black (10YR 2/1) concretions and angular quartzite gravel in places; ¼ to 6 inches in diameter; very strongly acid; clear, wavy boundary.

IICg—40 to 55 inches, gray or light-gray (N 6/0) sandy clay loam; many, medium, prominent, strong-brown (7.5YR 5/6) mottles; massive; firm, slightly sticky and slightly plastic; common quartzite fragments; very strongly acid.

In wooded areas a thin A1 horizon is present. The B2t and Bx horizons are light silty clay loam or heavy silt loam, but the C horizon is more variable in texture. Schist and quartzite fragments occur in places, but they generally are not abundant. Colluvial gravel or stones are on or near the surface in places. The solum ranges from 40 to 48 inches in thickness. Depth to bedrock ranges from 5 to 10 feet or more.

The A1 horizon, if present, is dark grayish brown. Hues throughout the solum generally are 10YR, but in places are 2.5Y or rarely 1.5YR. In the B horizon the matrix ranges from 5 to 7 in value and from 4 to 8 in chroma. The hue, value, and chroma of the mottles range from N 6/0 to 5YR 4/4 or 5/6. Mottles that have a chroma of 2 or less are within the upper 10 inches of the B2t horizon. The C horizon is gray and has mottles that have a high chroma, as described, or colors of high chroma and mottles of low chroma.

In unlimed areas the profile is strongly acid to very strongly acid, and acidity commonly increases with depth.

Glenville soils are similar to Aldino, Beltsville, and Butlertown soils and the poorly drained Leonardtown soils in having a fragipan. They are more acid than Aldino soils, contain less silt than Aldino and Butlertown soils, and are shallower to bedrock than Butlertown soils. Glenville soils are not so wet and poorly drained as Baile soils, which occur in similar places and formed in the same kind of material.

Glenville silt loam, 0 to 3 percent slopes (GnA).—This soil has the profile described as representative of the series. In small areas some of the surface layer has been washed away, a few shallow gullies are present, and silt has accumulated in spots.

This soil is limited for crops and other uses by seasonal wetness and by water that moves slowly through the fragipan. Improvement of drainage is the chief concern of management. Capability unit IIw–3; woodland suitability group 2w12.

Glenville silt loam, 3 to 8 percent slopes, moderately eroded (GnB2).—In most places part of the original surface layer of this soil is gone. The present surface layer is thinner than that in the representative profile, and plowing to normal depth turns up subsoil in places. Gullies cut some areas, but most of them are shallow. In scattered spots the subsoil is nearly exposed, and in other areas silt has accumulated at the base of slopes.

Improvement of drainage is needed for some uses, but the control of erosion generally is the most critical concern in management of this soil. Capability unit IIe–13; woodland suitability group 2w12.

Glenville silt loam, 8 to 15 percent slopes, moderately eroded (GnC2).—This soil is cut by some gullies, a few of which are deep. Included in mapping are a few areas where slopes are more than 15 percent. Intensive erosion control is required if this soil is cultivated. Many areas are used for pasture. Capability unit IIIe–13; woodland suitability group 2w12.

Gravel and Borrow Pits

Gravel and borrow pits (Gv) consist of areas where the soils have been removed to obtain gravel, sand, or fill material for road construction and other uses. Most large gravel pits are associated with the gently sloping to moderately steep Aura and Sassafras soils in the northern part of the Coastal Plain in the county. Borrow pits are more generally distributed in the county.

These pits have no farming uses at present, and intensive reclamation is needed before they could be used satisfactorily for farming. Capability unit VIIIs–4; woodland suitability group not assigned.

Hatboro Series

The Hatboro series consists of deep, wet, loamy soils of the northern, or Piedmont, part of the county. These soils are on flood plains, some of which extend into the Coastal Plain. They formed in material washed from areas of micaceous rock. These soils are subject to flooding. The native vegetation is such wetland hardwoods as willow and alder. Most of the areas are used for pasture.

In a representative profile the surface layer is about 5 inches of dark grayish-brown silt loam. The subsoil is about 44 inches of silt loam. It is dark grayish brown in

the upper part and mostly gray in the lower part. The underlying material is about 5 inches of gray sandy loam.

Hatboro soils are fairly easy to work at the right moisture content, but they commonly are too wet to work until late in spring. This delays plowing and planting. These soils are subject to flooding after heavy rains or a sudden thaw.

Artificial drainage is needed if Hatboro soils are used intensively. Drainage also increases the grazing period on pastures. Water moves readily, but not rapidly, through these soils. These soils have severe limitations for use as building sites because of wetness and the hazard of flooding. They are not suitable for septic tanks.

Representative profile of Hatboro silt loam, in a nearly level grazed area just northeast of Elkton:

A1—0 to 5 inches, dark grayish-brown (2.5Y 4/2) silt loam; common, fine, prominent, reddish-brown (5YR 4/4) mottles; weak, fine, granular structure that grades toward very thin platy; friable, slightly sticky; many roots; mica flakes evident; strongly acid; clear, smooth boundary.

B1g—5 to 21 inches, dark grayish-brown (10YR 4/2) silt loam; many, fine to coarse, prominent, dusky-red (10R 3/4) mottles; weak, medium, subangular blocky structure; friable, sticky and slightly plastic; common roots; moderately micaceous; fine black (10YR 2/1) concretions in places; strongly acid; clear, wavy boundary.

B2g—21 to 31 inches, variegated grayish-brown (2.5Y 5/2) to light-gray (10YR 6/1) silt loam; many, fine to coarse, prominent, yellowish-brown (10YR 5/4) and dark-red (2.5YR 3/6 to 10R 3/6) mottles; very weak, medium, prismatic structure; friable, slightly sticky and slightly plastic; few roots; some fine black (10YR 2/1) concretions; moderately micaceous; strongly acid to very strongly acid; clear, wavy boundary.

B3g—31 to 49 inches, gray or light-gray (N 6/0) silt loam; many, coarse, prominent, strong-brown (7.5YR 5/6) mottles; blocky structure, some widely spaced vertical fractures; firm, sticky and plastic; a few roots in upper part; some gray silt in vertical cracks; very micaceous; very strongly acid; clear, wavy boundary.

IIC2g—49 to 54 inches, gray (N 5/0) sandy loam; many, coarse, distinct, yellowish-brown (10YR 5/4) mottles; stratified; friable; strongly acid to very strongly acid.

The B horizon ranges from loam to light silty clay loam, and uniformity of texture with depth is variable. The IIC2g horizon is variable in texture, but is almost always coarser than the B horizon. Some waterworn pebbles are found in the profile, but they are not common except locally in IIC horizon. The depth to the unconforming IIC horizon generally is 36 to 50 inches. Unconforming bedrock is at 6 to 20 feet or more in places.

Matrix hues in the solum are 10YR or yellower. In the A horizon value is 3 to 5 and chroma is 1 to 3. The lowest value and chroma generally is in the very thin A1 horizon. The mottles described in the A1 horizon are lacking in some areas. In the B horizon matrix values are 4, 5, or 6 and matrix chromas are 0, 1, or 2. Mottles generally are 10YR or redder in hue, and both value and chroma are 3 to 6. Mottles are gray in places. In the C horizon hue generally is 5Y, value is 4 to 6, and chroma is 0 to 2 or neutral. Mottles of contrasting color are present in the C horizon in places. In places structure in the B and C horizons is apparently platy, but this is commonly the result of stratification.

In unlimed areas the profile is strongly acid to extremely acid, and acidity commonly increases with depth.

No other soils on the flood plains of the county are so wet and poorly drained as Hatboro soils. On the same flood plains as Hatboro soils are the moderately well drained to somewhat poorly drained Codorus soils and the well-drained Comus soils.

Hatboro silt loam (Ha).—This is the only Hatboro soil mapped in the county. It is in low areas and in depressions within the Piedmont flood plains. Most of this soil is nearly level, but in a few scattered acres slopes are stronger. Included in mapping are a few spots that are eroded or scoured.

If the soil is artificially drained and protected from flooding, it is well suited to corn, some hay crops, and improved pasture. Where the hazard of flooding is severe, use is limited chiefly to grazing or to woodland. Capability unit IIIw–7; woodland suitability group 3w3.

Keyport Series

The Keyport series consists of deep, nearly level to moderately sloping, moderately well drained soils on uplands of the Coastal Plain part of the county. These soils formed in old deposits of clay or silty clay. Water moves slowly through the subsoil, and poor aeration in this layer for at least part of the year is indicated by some grayish mottling. The native vegetation is mixed hardwoods. More than half of the acreage has been cleared for use as cropland.

In a representative profile the surface layer is about 8 inches of olive-brown loam. The subsoil is about 32 inches thick. It is yellowish-brown silty clay loam in the upper 10 inches; yellowish-red, firm silty clay in the next 8 inches and reddish-brown, firm silty clay in the lower 14 inches. The underlying material is about 20 inches of very firm, red silty clay.

In most places Keyport soils are easy to work at the right moisture content, but in severely eroded areas the plow layer is sticky and plastic when wet and hard and cloddy when dry. Artificial drainage is needed for some crops, particularly in nearly level areas. Tile drains do not function well in some areas because of the slowly permeable subsoil. These soils have high available moisture capacity.

Keyport soils are limited for use by impeded drainage, slow movement of water through the soils, slope, and the hazard of erosion. Sites for permanent buildings are affected by seasonal wetness and by plasticity of the subsoil. Use of the soils for disposal of sewage by septic tanks is severely limited.

Representative profile of Keyport loam, 5 to 10 percent slopes, moderately eroded, in a cultivated area, west of State Route 272 about 1 mile south of North East:

Ap—0 to 8 inches, olive-brown (2.5Y 4/4) loam; weak, fine, granular structure; friable; many roots; strongly acid; abrupt, smooth boundary.

B21t—8 to 18 inches, yellowish-brown (10YR 5/8) silty clay loam, variegated strong brown (7.5YR 5/6) in lower part; weak, fine, subangular blocky structure; friable to firm, sticky and plastic; common roots; faint clay films of olive brown (2.5Y 4/4); strongly acid; gradual, irregular boundary.

B22t—18 to 26 inches, yellowish-red (5YR 5/6) silty clay, variegated strong brown (7.5YR 5/6) and yellowish-brown (10YR 5/4); weak, fine, blocky structure; firm, sticky and plastic; few roots; strong-brown (7.5YR 5/6) clay films; strongly acid to very strongly acid; clear, irregular boundary.

IIB23t—26 to 40 inches, reddish-brown (5YR 4/4) silty clay, variegated red (2.5YR 4/6) and light yellowish-brown (10YR 6/4); many coarse, prominent, light-gray (10YR 7/1) mottles; strong, medium, blocky structure; very firm, plastic and very sticky; distinct yellowish-red (5YR 4/8) clay films; very strongly acid; clear, wavy boundary.

IIC—40 to 60 inches, red (2.5YR 4/6) silty clay; massive; blocky cleavage; very firm, very sticky and very plastic;

some yellowish-red (5YR 4/8) fine material between blocks; very strongly acid.

In undisturbed areas the A1 horizon is 2 to 4 inches thick, and the A2 horizon is 6 to 8 inches thick. The Ap horizon generally is loam or silt loam but is silty clay loam in severely eroded areas. The B2t horizon ranges from silty clay loam to clay in texture and generally is more than 40 percent clay. The C horizon is as fine as the B horizon in places. but it lacks structure and clay films. In many places where the C horizon is as fine as the B horizon, the C horizon is older, more highly oxidized clay, than as described. In other places the C horizon is somewhat sandy and is generally less red than described as representative of the profile. The solum ranges from about 36 to more than 50 inches in thickness, and its lower boundary is diffuse and difficult to determine in places. Bedrock is at indefinite depth.

Matrix hues in the A horizon and in the upper part of the B horizon generally are 10YR or yellower. In the A horizon value is 3 to 5 and chroma is 1 to 4. The lower value and chroma are in the A1 horizon. In the lower part of the B horizon, matrix hues are dominantly 10YR, but they can be 7.5YR, and where the underlying clays are Cretaceous, the lower part of the B horizon is as red as 5YR. In the B horizon matrix value is 5 or 6 or, rarely, 4, and chroma is 6 or 8, rarely, 4. Some mottles that have a chroma of 2 or less are in the Bt horizon at a depth between 10 and 20 inches. The C horizon is redder in hue than the matrix of the B horizon in places. The C horizon in some profiles contains mottles that have high contrast and low chroma.

In unlimed areas the Keyport soils are strongly acid to extremely acid and increase in acidity with depth.

Keyport soils are similar to Mattapex and Woodstown soils, but those soils lack the fine clay or silty clay subsoil of the Keyport soils and water does not move so slowly through them. The Keyport soils are on the same or similar sediment as the well-drained Christiana soils and the poorly drained Elkton soils.

Keyport loam, 0 to 2 percent slopes (KeA).—The surface layer of this soil is more than 9 inches thick, but the profile otherwise is similar to that described as representative of the series. Included in mapping are a few areas that are slightly eroded.

The most important concern of management on this soil is the improvement of surface and internal drainage. Erosion is only a slight hazard on this nearly level soil. Capability unit IIw–8; woodland suitability group 3w13.

Keyport loam, 2 to 5 percent slopes, moderately eroded (KeB2).—This soil is cut by a few shallow gullies. Included in mapping are a few acres that have a surface layer that is sandier than that in this soil and is easier to work. The control of erosion is the most important concern of management, but internal drainage needs to be improved for some uses. Capability unit IIe–13; woodland suitability group 3w13.

Keyport loam, 5 to 10 percent slopes, moderately eroded (KeC2).—This soil has the profile described as representative of the series. Part of the original loam surface layer is gone, and deep plowing turns up yellowish-brown, sticky subsoil in places. The areas are cut by some shallow gullies, and in some spots soil has accumulated. Included in mapping are many areas where the surface layer is more sandy than that in this soil.

The use of this soil for crops is limited because of slopes that increase the hazard of erosion. Good management practices are needed if this soil is cultivated regularly. Capability unit IIIe–13; woodland suitability group 3w13.

Keyport silt loam, 0 to 2 percent slopes (KpA).—This soil has a surface layer that is high in silt and contains little sand. The solum is thicker in some places than that in the profile described as representative of the series, and the B2t horizon has a higher content of clay.

Included with this soil in mapping are a few areas that have a browner, stickier subsoil than that in the profile described as representative of the series, and some spots where rounded and angular gravel is present. Also included are a few areas where the soil has lost part of its original surface layer.

This soil is more difficult to work and to drain than the Keyport loams and it is not ready for planting as soon. Some minor surface washing has occurred locally, but improvement of drainage is the chief concern of management. Capability unit IIw–8; woodland suitability group 3w13.

Keyport silt loam, 2 to 5 percent slopes, moderately eroded (KpB2).—This soil has lost part of the original silt loam surface layer in most areas. Scattered gullies cut some areas, but few of them are deep. In places spots of accumulated silt are on foot slopes. The light-gray mottling in the subsoil is a few inches nearer the surface in most places than in the profile described as representative of the series.

Included with this soil in mapping are spots where little or no mottling occurs in the subsoil. Also included are some small gravelly areas.

Controlling erosion is the main concern of management on this, but improvement of drainage is necessary for some uses. Capability unit IIe–13; woodland suitability group 3w13.

Keyport silt loam, 5 to 10 percent slopes, moderately eroded (KpC2).—This soil has lost enough of the original silt loam surface layer that deep plowing turns up sticky, clayey subsoil material in places. Included in mapping are spots that have more gray mottling in the subsoil than is common and some that have little or no mottling. Also included are some small gravelly areas. Capability unit IIIe–13; woodland suitability group 3w13.

Keyport silt loam, 10 to 15 percent slopes, moderately eroded (KpD2).—Most areas of this soil have a cover of trees. The areas should remain under trees, pasture, close-growing hay crops, or other cover. Included in mapping are some gravelly spots and some small areas that have little subsoil mottling. Also included are some areas that have a surface layer that is sandier than that in this soil.

The hazard of further erosion is severe on this soil. Consequently, this soil is not suitable for cultivation, but is suited to grazing or to hay crops. Capability unit VIe–2; woodland suitability group 3w13.

Keyport silty clay loam, 2 to 5 percent slopes, severely eroded (KsB3).—Most of the original surface layer of this soil has been washed away. Gullies are common, and some of them cut fairly deep into the silty clay in the lower part of the subsoil. Plowing to normal depth forms a plow layer of yellowish-brown, sticky and plastic silty clay loam that is difficult to work. Subsoil mottling is nearer the surface than normal. Less moisture is stored because the surface layer takes in water more slowly than that in less eroded soils of the series, and the soil becomes hard, crusty, and fairly droughty during prolonged dry periods.

This soil is limited by the hazards of droughtiness and further erosion. It is marginal for cultivated crops, and is better suited to such less intensive uses as grazing or

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hay crops. Capability unit IVe–9; woodland suitability group 3w13.

Keyport silty clay loam, 5 to 10 percent slopes, severely eroded (KsC3).—This soil has lost much of its original surface layer. Gullies are common and generally are deep. In some areas gravel is scattered on the surface.

This soil is not suited to cultivated crops because of wetness and the very severe hazard of further erosion. Under good management this soil is suited to grazing or to hay crops. All areas need a permanent cover of plants to protect the soil from erosion. Capability unit VIe–2; woodland suitability group 3w13.

Legore Series

The Legore series consists of gently sloping to moderately steep, well-drained, loamy soils on uplands in the northern, or Piedmont, part of the county. These soils formed in material weathered from such dark-colored basic rocks as diabase. They have a moderately thick solum and are deep to bedrock. Legore soils are high in natural bases, such as calcium. The native vegetation is mixed hardwoods, dominantly oaks. About half the acreage is cleared for use as pasture or cropland.

In a representative profile the surface layer is about 8 inches of brown or dark-brown silt loam. The subsoil, about 14 inches thick, is heavy silt loam or silty clay loam in the upper part and heavy loam in the lower part. Below this is 4 inches of variegated loam saprolite. The underlying material, to a depth of about 60 inches, is olive-brown, fine sandy loam saprolite.

Legore soils are easy to work at the right moisture content but are sticky when wet, particularly in eroded areas where the plow layer consists mainly of material formerly in the subsoil. These soils, however, do not need artificial drainage. They have moderate to high available moisture capacity.

The main limitations of these soils are slope and the hazard of erosion. These soils are well suited as building sites. Slope limits use for septic tanks.

Representative profile of Legore silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated area about 1½ miles northeast of Kilby Corner:

Ap—0 to 8 inches, brown or dark-brown (7.5YR 4/4) silt loam; weak, fine, granular structure; friable, slightly sticky and slightly plastic; many fine roots; neutral; abrupt, smooth boundary.

B21t—8 to 18 inches, brown or dark-brown (7.5YR 4/4) heavy silt loam or silty clay loam; moderate, fine, blocky structure; friable to firm, sticky and plastic; many fine roots; thin, continuous, reddish-brown (5YR 4/3) clay films; neutral; gradual, wavy boundary.

B22t—18 to 22 inches, brown or dark-brown (7.5YR 4/4) heavy loam; moderate, fine, blocky structure; friable, slightly sticky; common roots; thin, continuous, reddish-brown (5YR 4/4) clay films; neutral; abrupt, wavy boundary.

C1—22 to 26 inches, variegated dark reddish-brown (5YR 3/4), reddish-brown (5YR 4/4), strong-brown (7.5YR 5/8), and brownish-yellow (10YR 6/6) loam saprolite; structure of original rock; friable, slightly sticky; few roots; neutral; clear, wavy boundary.

C2—26 to 60 inches, olive-brown (2.5Y 4/4) fine sandy loam saprolite; structure of original rock; loose; few roots in upper part; neutral.

In undisturbed areas a thin, very dark brown to dark reddish-brown A1 horizon is present. The A horizon commonly is silt loam, but it is silty clay loam in severely eroded areas. The B2t horizon generally is silty clay loam or clay loam but is somewhat coarser in places. The clay content of the B2t horizon generally is between 18 and 35 percent. Coarse fragments of diabase or other basic rocks that range from gravel to stones in size are in the profile in places, but the larger sizes are seldom near the surface. The solum ranges from about 20 to 34 inches in thickness. Depth to hard bedrock generally is between 5 and 10 feet.

Throughout the solum hue centers on 7.5YR but includes 5YR and ranges to 10YR. In the A horizon value and chroma are 2 to 4. The thin A1 horizon has a value of 2 or 3. Value in the B horizon is 4 or 5 and chroma is 3 or 4 or 6 in a small part. The C horizon generally is variegated in part and in places the value and chroma are higher than in the solum, but parts of the C horizon are more uniform in color.

In unlimed areas the profile is medium acid to neutral, acidity decreases with depth, and base saturation generally is very high.

Legore soils are deeper to bedrock than Chrome soils, and they have a coarser textured, more stable subsoil. Legore soils formed in rock material similar to that in which Neshaminy and Montalto soils formed, but they have a thinner solum. The Legore soils are not so red as the Montalto soils and have less clay in the B horizon.

Legore silt loam, 3 to 8 percent slopes, moderately eroded (LeB2).—This soil has the profile described as representative of the series. Depth to decomposed rock material is 34 inches or less and any loss of soil through erosion is serious.

Included with this soil in mapping are some gravelly areas, some severely eroded spots, and a few areas where the soil is nearly level.

Fairly intensive conservation measures are required to keep soil losses within reasonable limits wherever the soil is cultivated. Capability unit IIe–10; woodland suitability group 2o4.

Legore silt loam, 8 to 15 percent slopes, moderately eroded (LeC2).—Some areas of this soil remain in trees, and the cleared areas are well protected. Consequently, soil losses are not yet severe. Included in mapping are a few areas that are gravelly and a few places cut by shallow gullies.

The hazard of further erosion is severe on this soil, and any loss of soil is critical. Special conservation measures are needed to protect this soil if it is used for regular cultivation. Capability unit IIIe–10; woodland suitability group 2o4.

Legore silt loam, 15 to 25 percent slopes, moderately eroded (LeD2).—The hazard of further erosion is severe on this soil. Included in mapping are some gravelly spots and a few shallow gullies. If this soil is cleared and cultivated, intensive management is needed to help control erosion. The soil is marginal for regular cultivation, however, even under intensive management. It is better suited to hay, pasture, or orchards that have adequate ground cover. Capability unit IVe–10; woodland suitability group 2r4.

Legore silty clay loam, 8 to 15 percent slopes, severely eroded (LgC3).—The hazard of further erosion on this soil is severe. Included in mapping are gravelly spots and many shallow to deep gullies. This soil is marginal for regular cultivation. Capability unit IVe–10; woodland suitability group 2o4.

Legore silty clay loam, 15 to 45 percent slopes, severely eroded (LgE3).—The solum of this soil is thinner than the one in the profile described as representative of the series. In many places most of the solum has been removed by erosion, and the plow layer is almost entirely

subsoil. Many areas are cut by gullies, and small areas are gravelly. Included in mapping are several steep, wooded areas that have been less severely affected by erosion than this soil. Use of this soil for cultivated crops generally is impractical. Capability unit VIIe–3; woodland suitability group 2r4.

Leonardtown Series

The Leonardtown series consists of dominantly gray, nearly level to gently sloping, poorly drained, loamy soils in the northern part of the county. These soils formed in silty Coastal Plain sediment, and they have a hard, dense fragipan. The native vegetation is chiefly wetland hardwoods.

In a representative profile the surface layer is about 6 inches of grayish-brown silt loam. The subsoil is about 29 inches thick. The upper 5 inches is light-gray heavy silt loam. The middle 6 inches is very firm, light brownish-gray silty clay loam and the lower 17 inches is a light-gray and yellowish-brown silty clay loam fragipan. The underlying material, to a depth of about 50 inches, is firm, yellowish-brown gravelly loam.

The Leonardtown soils are easy to work at intermediate moisture content if plowing is not too deep. The surface layer is difficult to work if too wet or too dry. It generally is less than 8 inches thick, even in uneroded areas, and deep plowing turns up the plastic and sticky, nongranular upper part of the subsoil. Roots cannot readily penetrate the fragipan for moisture, and moisture moves very slowly through the fragipan. As a result the soils are likely to dry out above the fragipan in hot, dry weather.

These soils require drainage and the removal of excess surface water in wet weather. These moisture relationships, as well as the fragipan, are important factors in management. Leonardtown soils make very wet building sites. They are not suitable for the disposal of sewage effluent from individual septic tanks.

Representative profile of Leonardtown silt loam, 0 to 2 percent slopes, in an idle area about 0.8 mile northeast of Pleasant Hill:

Ap—0 to 6 inches, grayish-brown (2.5Y 5/2) silt loam; weak, very fine, granular structure; friable, slightly sticky and slightly plastic; common roots; very strongly acid; abrupt, smooth boundary.

B2tg—6 to 11 inches, light-gray (2.5Y 7/2) heavy silt loam; many coarse, distinct, light yellowish-brown (10YR 6/4) mottles; very weak, medium, platy structure; friable to firm, plastic and slightly sticky; common roots; thin clay films in places; few, fine, brown (10YR 4/3) concretions; very strongly acid; clear, wavy boundary.

Bx1—11 to 17 inches, light brownish-gray (2.5Y 6/2), light silty clay loam; many, coarse, prominent, strong-brown (7.5YR 5/6) mottles; strong, coarse, prismatic and weak, thin, platy structure; very firm, brittle, plastic and slightly sticky; few roots; thin continuous clay films; very strongly acid; clear, wavy boundary.

Bx2—17 to 34 inches, light-gray (2.5Y 7/2), light silty clay loam; many, coarse, prominent, brown or dark-brown (7.5YR 4/4) mottles; strong, very coarse, prismatic and weak, medium, platy structure; very firm, brittle, plastic and slightly sticky; distinct, continuous, gray (5Y 5/1) clay films on prisms; very strongly acid; clear, wavy boundary.

IIC1x—34 to 39 inches, yellowish-brown (10YR 5/4), gravelly light silty clay loam; many, coarse, distinct, yellowish-brown (10YR 5/8) mottles and medium, grayish-brown (2.5Y 5/2) mottles; medium, very coarse, prismatic structure and weak, medium, platy structure; firm, brittle, slightly sticky and slightly plastic; thin clay films in places; very strongly acid; clear, wavy boundary.

IIC2—39 to 50 inches, yellowish-brown (10YR 5/4), gravelly heavy loam; common, coarse, distinct, gray or light-gray (10YR 6/1) mottles; moderate, medium, subangular blocky structure; firm, sticky and plastic; patchy clay films; very strongly acid.

The B2tg horizon ranges from heavy loam to heavy silt loam or light silty clay loam in texture. The Bx horizon is finer textured than the B2tg horizon. The unconforming IIC horizon ranges from sandy loam to heavy loam, or to silty clay loam in part. The IIC1x horizon is nearly as dense, tough, and compact as the Bx horizon, but it lacks the distinct to prominent clay films of the Bx2 horizon and is gravelly in places. Thickness of the solum ranges from about 30 to 40 inches. Bedrock is at a depth of a few feet in some places, but it generally is at a great depth.

Matrix hues throughout the solum are 2.5Y or neutral, but they are more variable in the unconforming IIC horizon. In the A horizon value is 3 to 6 and chroma is 0 to 4. The lower value and chroma generally are in the very thin undisturbed A1 horizon. Matrix value in the B and C horizons is mostly 5 or 6, or rarely 7, and chroma is 0, 1, or 1 in conforming horizons. The chroma is highly variable in unconforming horizons. Mottles have a hue of 2.5Y, 10YR, or 7.5YR; value of 4 to 7; and chroma of 1 to 8.

In unlimed areas the profile is strongly acid to extremely acid, and acidity commonly increases with depth.

Leonardtown soils are similar to the better drained Aldino, Beltsville, Butlertown, and Glenville soils in having a fragipan. They are similar in color and drainage to Elkton and Othello soils, but those soils lack a fragipan. Leonardtown soils formed in material similar to that of the well-drained Chillum soils and the moderately well drained Beltsville soils.

Leonardtown silt loam, 0 to 2 percent slopes (LoA).—This soil has the profile described as representative of the series. In some deeply plowed areas the plow layer is stickier and less granular than in the representative profile. Included in mapping are a few moderately eroded spots.

Wetness and lack of good natural drainage are the chief limitations to use of this soil. Capability unit IVw–3; woodland suitability group 3w13.

Leonardtown silt loam, 2 to 5 percent slopes (LoB).—This gently sloping soil is subject to erosion. In a few places a part of the surface layer is missing, and in spots the subsoil is exposed or penetrated by shallow gullies. Included in mapping are a few areas where slope is slightly more than 5 percent.

This soil is limited by the hazard of erosion. The need for drainage, however, is a more important concern of management because of the slow movement of moisture through the soil. Capability unit IVw–3; woodland suitability group 3w13.

Loamy and Clayey Land

These miscellaneous land types consist chiefly of old clay deposits in the upper parts of the Coastal Plain that have a mantle chiefly of sandy loam, loam, or silt loam. Both the mantle and the underlying clay vary widely within short distances.

The loamy surface mantle ranges in color from gray through yellow and brown to almost red and in thickness from very thin to several feet. It is underlain by clay. In a few places the underlying material contains a small amount of sand. The clay is almost any color or mixture of colors and includes red, purplish red, gray, yellow,

brown, pink, and white. The clay is very plastic and sticky and is very unstable. Cuts into the material are difficult to stabilize, and the clay frequently slides, slumps, or flows down the surface of the cut and onto roads or other areas below (fig. 4). Stability is even poorer if the clay has been disturbed by land leveling or filling.

This land type has variable, but generally low, available moisture capacity, and it is very low in plant nutrients. Other limitations are slope and the hazard of erosion. Most areas are idle, wooded, or in residential developments.

Figure 4.—Cut through Loamy and clayey land, showing slumping and erosion of the unstable dry substratum.

This unstable land type has properties that make it unsuitable and in a few places dangerous for some uses, especially if it has been disturbed. The clay flows, slumps, or slides when wet, particularly under pressure or load. It squeezes out from below building foundations, and this causes footings or basements to crack and settle. In places buildings have been severely damaged. Banks and fills of this material are likely to collapse and cause severe and expensive property damage and injury and death to people.

Loamy and clayey land, sloping (LyC).—This land type has slopes that range up to about 10 percent. A small acreage is suitable for farming. It can be used for various crops, but crop growth is not very good. Erosion control is needed for all crops. The kind of conservation measures to use, however, needs to be determined on the site in each particular field. Capability unit IVe–3; woodland suitability group 3c16a.

Loamy and clayey land, moderately steep (LyD).—This land type has slopes that range from about 10 to 15 percent. The hazard of erosion is severe, and the areas should be kept under a protective cover of vegetation most of the time. Some areas can be used for hay or for limited grazing. Capability unit VIe–2; woodland suitability group 3c16b.

Loamy and clayey land, steep (LyE).—This land type has slopes ranging from about 15 to 50 percent. It is too erodible and too unstable for farming or for a number of nonfarm uses. Areas in trees should remain in trees, and cleared areas should be kept under a protective cover of vegetation. Capability unit VIIe–2; woodland suitability group 3c16b.

Made Land

This land type consists of areas where the soil material has been disturbed or so modified by grading or filling that it cannot be classified. Most of these areas have been built up with fill material or are areas from which the soil material has been removed by leveling and other mechanical means. The areas include some tracts where garbage and other refuse have been dumped and buried.

Made land, gently sloping (MaB).—This land type consists of all areas of fill and other soil material modified by man that were left at slopes of less than about 10 percent. Much of the material is hydraulic fill that is pumped into areas behind bulkheads from the Chesapeake and Delaware Canal and from other bodies of water. It consists of sand, clay, gravel, muck, shells, and other miscellaneous materials that are not always uniformly mixed. The gentle slopes permit fairly easy manipulation and treatment. Some areas are being used as sites for industrial buildings or other buildings. Capability unit and woodland suitability group not assigned.

Made land, moderately steep (MaD).—These areas of Made land are mostly spoil material obtained from work on the Chesapeake and Delaware Canal and left at slopes ranging from about 10 to more than 40 percent. The material is mostly sand, clay, and gravel that is not uniformly mixed. Some slopes are fairly smooth, but others are rough and irregular. Little of this land is used for any purpose, and it generally is too steep and rough for

any use without intensive reclamation and stabilization. Capability unit and woodland suitability group not assigned.

Manor Series

The Manor series consists of gently sloping to moderately steep, well-drained to somewhat excessively drained soils on uplands in the Piedmont part of the county. These soils formed in highly micaceous material weathered in place from the underlying mica schist and granitic bedrock. The native vegetation is hardwoods, generally dominated by oaks. Pines grow in some places. Most of the acreage has been cleared and is used for crops and pasture.

In a representative profile the surface layer is about 8 inches of very dark grayish-brown and brown loam. The subsoil is about 11 inches of friable, brown loam. The underlying material, to a depth of about 6 feet, is variegated loam saprolite.

Manor soils are easy to work and warm quickly in spring. They have moderate available moisture capacity, but they generally supply moisture well because the thick underlying material can store large amounts of moisture. No impediment to the rise of moisture or to the deep penetration of roots prevents the use of this moisture by plants.

The main limitations of these soils are slope and erosion, but a slight limitation is caused by lack of available moisture. These highly micaceous soils are readily eroded and need special protection in some areas. They are well suited as building sites and are suitable for septic tanks.

Representative profile of Manor loam, 3 to 8 percent slopes, moderately eroded, in an idle but formerly cultivated area about 4 miles west of Rising Sun and north of U. S. Highway No. 1:

Ap1—0 to 2 inches, very dark grayish-brown (10YR 3/2) loam; weak, fine, granular structure; friable, slightly sticky; many fine roots; very strongly acid; clear, smooth boundary.

Ap2—2 to 8 inches, brown (10YR 4/3) loam; weak, fine, granular structure; friable, slightly sticky; many fine roots; strongly acid; clear, smooth boundary.

B2—8 to 19 inches, brown (7.5YR 5/4) loam; very weak, fine, subangular blocky and moderate, medium, granular structure; friable, slightly sticky and very slightly plastic; common roots; faintly variegated with reddish-brown (5YR 5/4); abundant mica flakes; some soft, weathered schist fragments; strongly acid; clear, wavy boundary.

C—19 to 72 inches, variegated brownish-yellow (10YR 6/6), light olive-brown (2.5Y 5/4) and black (N 2/0) saprolite of loam texture; inherent, laminar or schistose structure; very friable; few roots in upper portion; some yellowish-red (5YR 4/8 and 5/8) streaks parallel to laminations; strongly acid.

The profile generally is loam throughout, but the C horizon is fine sandy loam in places. Soft, weathered schist or hard quartzite fragments occur in places, but are seldom abundant. The solum ranges from about 15 to 24 inches in thickness. Depth to schist or granite bedrock is about 6 to 10 feet or more.

In the A horizon hue is 10YR or 7.5YR, value is 3 to 5, and chroma is 2 to 4. Horizons that have a value of 3 are very thin. In the B horizon hue is 7.5YR or 5YR, value is 4 or 5, and chroma is 4 to 8. The saprolite C horizon may have bands or variegations of almost any color. Variegations in color are not due to any degree of wetness, but they are inherent in the weathered rock material.

In unlimed areas the profile is strongly acid to very strongly acid.

No other soils of the county are similar to Manor soils, particularly in depth and ease of penetration of the subsoil and underlying material. Manor soils are associated with other soils that formed in material from micaceous rock, such as the Chester, Glenelg, and Glenville soils. Unlike Manor soils, all of these soils have a subsoil that is finer in texture than the surface layer. Manor soils differ from Glenville soils in being well drained.

Manor loam, 3 to 8 percent slopes, moderately eroded (MlB2).—This soil has the profile described as representative of the series. This micaceous soil is especially susceptible to erosion. Included in mapping are a few acres that are eroded into the subsoil and a few mostly shallow gullies. Also included are some gravelly areas and some spots that have more coarse and gritty underlying material than in the profile described as representative of the series. Other inclusions consist of small areas of nearly level soils at the crests of some slopes. The hazard of erosion is the main concern of management. Capability unit IIe–25; woodland suitability group 2o11.

Manor loam, 8 to 15 percent slopes, moderately eroded (MlC2).—If cultivated this soil is subject to severe erosion. Included with this soil in mapping are some gravelly areas and areas that have a coarser, grittier C horizon. Also included are scattered shallow gullies, that can be crossed by most tillage implements. This soil has few, if any, very deep gullies. Controlling erosion is the main concern of management. Capabilty unit IIIe–25; woodland suitability group 2r11.

Manor loam, 8 to 15 percent slopes, severely eroded (MlC3).—This soil has little, if any, of the original surface layer left. The subsoil is exposed in many places, and the plow layer consists chiefly of subsoil material. Included with this soil in mapping are few to many gullies. Some of them are deep and extend into the even more easily eroded underlying material or C horizon. Also included are gravelly areas and spots that have a gritty, coarse C horizon. The gravel is mainly on the surface of this soil because most of the finer material has been washed away. The gravel is mostly angular, very hard quartzite that is very abrasive to tillage implements.

This soil is marginal or critical for cultivated crops because of slope and erosion. Only under the best management can an occasional row crop be grown. This soil is better suited to pasture, hay crops, or orchards in which the surface of the soil is kept under a close vegetative cover. Capability unit IVe–25; woodland suitability group 2r11.

Manor loam, 15 to 25 percent slopes, moderately eroded (MlD2).—This soil is not badly damaged by erosion, because there is woodland cover on most areas. If this soil is used for crops, the hazard of erosion is severe. It is better suited to hay, pasture, orchards, or woods. Included with this soil in mapping are some gravelly areas and areas that have a coarser, grittier C horizon. Capability unit IVe–25; woodland suitability group 2r11.

Manor loam, 15 to 25 percent slopes, severely eroded (MlD3).—This soil is similar to Manor loam, 8 to 15 percent slopes, severely eroded, but the steeper slopes cause greater limitations for use. Included with this soil in mapping are areas that have considerable hard quartzite gravel on the surface. If grazing is controlled, this soil can be used for limited hay crops and some pasture. Some areas can be used for sodded orchards. Capability unit VIe–3; woodland suitability group 2r11.

Manor loam, 25 to 45 percent slopes (MlE).—This steep soil is not severely eroded in some places, because the areas are wooded. In less extensive areas that have been cleared, erosion is severe. Included with this soil in mapping are a few acres that have slopes of more than 45 percent. Also included are some gravelly spots.

This soil is not suited to cultivation, and any grazing must be carefully controlled to prevent damage to sod and severe erosion. Soil loss from these areas is especially damaging to other soils that are downslope or on waterways. Capability unit VIIe–3; woodland suitability group 2r11.

Manor very stony loam, 3 to 25 percent slopes (MmD).—This soil has stones of mica schist, granite, or hard quartzite. Many of these stones are on or very near the surface. Cleared areas are suited to hay or grazing, but if mowing or other machines are to be used, stone removal is needed in places. This soil is better suited to woods than to cultivated crops or pasture. Some areas are used for parks or other recreational uses, or they are used as wildlife habitat. Capability unit VIs–3; woodland suitability group 2r11.

Matapeake Series

The Matapeake series consists of nearly level to moderately sloping, well-drained, loamy soils that are on uplands of the southern, or Coastal Plain, part of the county. These soils formed in sediment high in silt. The native vegetation is primarily mixed hardwoods, generally dominated by oaks. Most of the acreage has been cleared for use as cropland.

In a representative profile the surface layer is about 8 inches of dark grayish-brown silt loam. Below this is a brown, friable, silt loam subsurface layer about 4 inches thick. The subsoil is about 25 inches of brown, yellowish-brown, and strong-brown silt loam and loam. The underlying material is yellowish-red sandy loam to a depth of 48 inches and is strong-brown loamy sand to a depth of about 60 inches.

Matapeake soils are easy to work and warm early in spring. These soils have a high available moisture capacity.

Matapeake soils are suited to most uses. They are especially suited to leafy truck crops, and to asparagus, because the surface layer contains little sand. These soils are well suited as building sites and generally are suitable for septic tank filter fields. Strongly sloping areas have some limitation for these uses.

Representative profile of Matapeake silt loam, 0 to 2 percent slopes, in a cultivated area about one-half mile northwest of the intersection of Sandy Branch Road and Church Road, at Warwick:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; many roots; medium acid (limed); abrupt, wavy boundary.

A2—8 to 12 inches, brown (10YR 4/3) silt loam; weak, medium, granular structure; friable, slightly sticky and slightly plastic; common roots; many fine pores; common wormholes and wormcasts; medium acid; clear, wavy boundary.

B21t—12 to 20 inches, brown or dark-brown (7.5YR 4/4) heavy silt loam; moderate, medium, subangular blocky structure; friable to firm, slightly sticky and slightly plastic; common roots; thin discontinuous clay films; many fine pores; slightly acid; clear, wavy boundary.

B22t—20 to 30 inches, yellowish-brown (10YR 5/4) heavy silt loam; moderate, fine and medium, subangular blocky structure; friable to firm, slightly sticky and slightly plastic; common roots; thin continuous clay films; common fine pores; slightly acid to medium acid; clear, wavy boundary.

B23t—30 to 37 inches, strong-brown (7.5YR 5/6) heavy loam; high in silt, low in clay; moderate, fine, subangular blocky structure; firm, slightly sticky and slightly plastic; few roots; thin continuous clay films; few, fine, smooth pebbles; slightly acid to medium acid; abrupt, wavy boundary.

IIC1—37 to 48 inches, yellowish-red (5YR 5/8) sandy loam; massive; friable to firm; no roots; strongly acid; gradual, smooth boundary.

IIC2—48 to 60 inches, strong-brown (7.5YR 5/8) loamy sand; single grain; loose to very friable; no roots; very strongly acid.

In undisturbed areas the A1 horizon is 1 to 4 inches thick and the A2 horizon is thicker than that described as representative of the series. The B2t horizon ranges from heavy loam or silt loam to light silty clay loam, and the lower part contains considerable sand in places. In a few places a conforming C horizon of silt loam texture is above the IIC horizon. The IIC horizon is always dominated by sand, and in places contains fine smooth pebbles. The solum ranges from about 28 to 40 inches in thickness. Bedrock is at an indefinite depth.

In the A horizon hue is 10YR or 2.5Y, value is 3 to 6, and chroma is 2 to 4. The lowest value is in the A1 horizon. In a few places value is 6 in the A2 horizon. In the B2t horizon hue is 10YR or 7.5YR, value is 4 to 8, and chroma is 4 to 8. The C horizon is yellower or redder in hue than the B2t horizon and is variegated or streaked in some areas.

In unlimed areas the profile is strongly acid to extremely acid, and acidity generally increases with depth.

Matapeake soils are similar to Butlertown and Chillum soils. They are better drained than the moderately well drained Butlertown soils. Matapeake soils are deeper than Chillum soils that are less than 40 inches deep to a hard, compact lower subsoil that is sandy or gravelly, or both.

Matapeake silt loam, 0 to 2 percent slopes (MnA).—This soil has the profile described as representative of the series. Included in mapping are many areas that have not been well managed. In these areas minor surface washing has occurred and a few shallow gullies are present. Also included are places that contain local accumulations of silt.

If this soil is well managed, it is suited to most uses. It can be cultivated continuously and is one of the better soils of the county for most uses. Capability unit I–4; woodland suitability group 3o10.

Matapeake silt loam, 2 to 5 percent slopes, moderately eroded (MnB2).—This soil has lost part of the original surface layer. In most places plowing to normal depth turns up nearly all of the surface and subsurface layers. This soil is undulating to slightly hummocky. Included in mapping are some widely scattered, severely eroded areas that are cut by shallow gullies in places and a few, deeper gullies. Also included are depressional areas that contain an accumulation of silty material.

Slope is a moderate limitation on this soil. If this soil is well managed, it can be cultivated regularly. Capability unit IIe–4; woodland suitability group 3o10.

Matapeake silt loam, 5 to 10 percent slopes, moderately eroded (MnC2).—The hazard of further erosion is severe on this soil, unless it is well managed. Because of slope this soil needs more intensive management than similar soils that are less sloping. If this soil is adequately managed, it can be cultivated regularly. Included in mapping are a few areas that contin shallow

gullies and some areas where silt has accumulated. Capability unit IIIe–4; woodland suitability group 3o10.

Matapeake silt loam, 5 to 10 percent slopes, severely eroded (MnC3).—In most places severe erosion has washed away most of the original surface layer of this soil. Also a few to many gullies have formed. A few of the gullies are deep and in places penetrate the underlying sandy material. The present plow layer is browner and less gray, less granular and more blocky, and more difficult to maintain in good tilth than that in less eroded Matapeake soils.

Included with this soil in mapping are small areas that are deeper than normal to the underlying sand.

This soil is not suited to cultivated crops. It is limited by the severe hazard of further erosion. Intensive management is needed for continued use of this soil. Capability unit IVe–3; woodland suitability group 3o10.

Matapeake silt loam, 10 to 15 percent slopes, moderately eroded (MnD2).—Most areas of this soil have lost part of the original surface layer, and a few gullies are present. In some small wooded areas the soil is only slightly affected by erosion. Included in mapping are areas where the soil is deep to an underlying sand substratum.

This soil is suited to limited or part-time cultivation if it is well managed. Capability unit IVe–3; woodland suitability group 3o10.

Matapeake silt loam, 10 to 15 percent slopes, severely eroded (MnD3).—This soil has lost much of its original surface layer through erosion, but the profile otherwise is similar to the one described as representative of the series. Because of the slope this soil is subject to further erosion if it is cultivated. This soil is better suited to hay, pasture, orchards that have a cover of sod, other trees, and to wildlife habitat. Capability unit VIe–2; woodland suitability group 3o10.

Matapeake silt loam, silty substratum, 0 to 2 percent slopes (MoA).—This soil is more than 40 inches deep to underlying sand or gravel. It holds moisture and plant nutrients well. Included in mapping are a few areas that have lost part of the surface layer.

This soil has almost no limitations. It is well suited to crops, especially to leafy truck crops because the surface layer contains little sand. Capability unit I–4; woodland suitability group 3o10.

Matapeake silt loam, silty substratum, 2 to 5 percent slopes, moderately eroded (MoB2).—This soil is important for farming. In most areas part of the surface layer has been washed away. Deep plowing turns up subsoil material in spots, and a few shallow gullies cut the areas. The hazard of further erosion is moderate. Capability unit IIe–4; woodland suitability group 3o10.

Mattapex Series

The Mattapex series consists of deep, nearly level to moderately sloping, moderately well drained, loamy soils that formed in silty material laid down on older, coarser sediment. The native vegetation is mostly oaks and other hardwoods that tolerate wetness. Most of the acreage has been cleared for use as cropland.

In a representative profile the surface layer is about 10 inches of grayish-brown silt loam. Below this is a yellowish-brown silt loam subsurface layer about 4 inches thick. The subsoil is about 17 inches of silt loam. It is yellowish-brown in the upper part and dark yellowish-brown in the lower part. The underlying material is strong-brown silt loam to a depth of 64 inches and is very pale brown fine sandy clay loam to a depth of 75 inches.

Mattapex soils are fairly easy to work, but they generally warm up too late in spring for early crops. Artificial drainage is needed for some crops, particularly on the more level areas. If adequate outlets are available, these soils are fairly easy to drain with ditches or tile drains. Ditches should not penetrate into the sandy material beneath the solum. These soils have high available moisture capacity.

The seasonal wetness and impeded drainage limit the use of these soils for building sites and as septic tank filter fields. Erosion is a hazard on sloping areas.

Representative profile of Mattapex silt loam, 2 to 5 percent slopes, moderately eroded, in a cultivated area about 2 miles northwest of Elkton:

Ap—0 to 10 inches, grayish-brown (10YR 5/2) silt loam; weak, medium, granular structure; friable, slightly sticky and slightly plastic; many roots; medium acid (limed); abrupt, wavy boundary.

A2—10 to 14 inches, yellowish-brown (10YR 5/4) silt loam; weak, coarse, granular structure; friable, slightly sticky and slightly plastic; common roots; medium acid; gradual, smooth boundary.

B21t—14 to 24 inches, yellowish-brown (10YR 5/6) heavy silt loam; weak, medium, subangular blocky structure that grades toward weak platy; friable to firm, plastic and slightly sticky; few roots; thin discontinuous clay films; brownish-gray silt in old root channels; strongly acid; clear, smooth boundary.

B22t—24 to 31 inches, dark yellowish-brown (10YR 4/4) heavy silt loam; many, medium, distinct, light brownish-gray (2.5Y 6/2) mottles; weak, medium, platy and fine, subangular blocky structure; friable to firm, plastic and slightly sticky; few roots; many fine pores; clay films in pores and on some aggregates; very strongly acid; clear, smooth boundary.

IIC1—31 to 64 inches, strong-brown (7.5YR 5/8) light silt loam or heavy loam; common, coarse, distinct, light brownish-gray (2.5Y 6/2) mottles; stratified firm, slightly sticky and slightly plastic; common mica flakes; very strongly acid; gradual, smooth boundary.

IIC2—64 to 75 inches, very pale brown (10YR 7/3) fine sandy clay loam; few, medium, faint, light yellowish-brown (10YR 6/4) mottles; massive; friable, slightly sticky and slightly plastic; very strongly acid.

In undisturbed areas there is a thin, dark A1 horizon and an A2 horizon thicker than that described as representative of the series. The B2t horizon is heavy silt loam or light silty clay loam and is generally more than 18 percent clay. The IIC horizon is distinctly more sandy than the solum. Fine smooth pebbles occur in places in the solum, but they are commonly only in the IIC horizon. The solum ranges from about 24 to 40 inches in thickness. Bedrock is at an indefinite depth.

Matrix hues center on 10YR but include 2.5Y and range to 7.5YR in places. In the A horizon value is 3 to 5 and chroma is 1 to 4. The lower value and chroma is in the A1 horizon. Matrix value in the B horizon is 4 to 5, and matrix chroma is 3 to 6, and a chroma of less than 6 generally is in some part of the B2t horizon. Mottling is of high or low chroma, but no mottling that has a chroma of 2 or less occurs in the upper 10 inches of the B2t horizon. Some grayish mottling is present, however, within the second 10 inches of this horizon. The C horizon is mottled in places and the mottles are of low or high chroma.

In unlimed areas the profile is strongly acid to extremely acid, and acidity increases with depth.

Mattapex soils are similar to Keyport and Woodstown soils. They have a clay or silty clay subsoil that is more slowly permeable than that in Keyport soils. Mattapex soils have a less sandy subsoil than Woodstown soils. They formed in the same silty material as the well drained Matapeake soils, the moderately well drained Butlertown soils that have a fragipan, and the poorly drained Othello soils.

Mattapex silt loam, 0 to 2 percent slopes (MpA).—Erosion has removed part of the surface layer of this soil in a few areas. Included in mapping are small areas in the northern part of the Coastal Plain that are micaceous in the lower part of the subsoil and in the substratum. Also included are a few spots where surface wash has occurred or where silt has accumulated. Other included spots have gray mottles nearer the surface than in the profile described as representative of the series.

Drainage improvement is needed for most crops on this soil. Impeded drainage is the only serious limitation on this soil. Capability unit IIw–1; woodland suitability group 3o13.

Mattapex silt loam, 2 to 5 percent slopes, moderately eroded (MpB2).—This soil has the profile described as representative of the series. Some areas have a few shallow gullies and a few deeper gullies. In other areas silt has accumulated, and in still other areas the subsoil is nearly exposed. Controlling erosion is the main concern of management. Runoff is rapid because water does not penetrate readily into this soil. If this soil is not well protected runoff causes further erosion. Where this soil is used intensively for farming, drainage needs to be improved in places. Capability unit IIe–16; woodland suitability group 3o13.

Mattapex silt loam, 5 to 10 percent slopes, moderately eroded (MpC2).—Erosion has removed part of the original surface layer in most areas of this soil. In a few areas the subsoil is exposed, mostly in shallow gullies. Included in mapping are some areas that are underlain by micaceous material and a few areas that have slopes of more than 10 percent.

Intensive management is needed to help prevent erosion if this soil is cultivated continuously. Improvement of drainage is needed for some crops, but this is less important for less intensive uses. Capability unit IIIe–16; woodland suitability group 3o13.

Mixed Alluvial Land

Mixed alluvial land (Mr) consists of mixed and variable soil material on flood plains of small streams. The material is of varied origin and texture. It consists of material washed mostly from the Coastal Plain, but partly from the Piedmont uplands. The material ranges from fine gravel to clay. Some areas have a loamy surface layer, and others have an almost black, highly organic surface layer. Included in mapping are some small areas of muck. In most areas drainage is poor.

This land is very wet in wet periods, and ranges from wet to dry in dry periods. Most areas are subject to fairly frequent flooding unless adequate preventive measures are used.

Mixed alluvial land is not suited to cultivated crops. If wetness is controlled large areas are suited to pasture and to limited use for hay crops. If wetness is not controlled, this land is most commonly used for trees that tolerate wetness and as wildlife shelter. It is also useful for some kinds of recreation. Capability unit VIw–1; woodland suitability group 2w7.

Montalto Series

The Montalto series consists of nearly level to moderately sloping, well-drained, brown, loamy soils on uplands in the northern, or Piedmont, part of the county. These soils formed in material weathered in place from dark-colored basic rocks, such as gabbro and diorite. They have a fine-textured, sticky and plastic subsoil. These soils are fairly high in basic natural plant nutrients, especially calcium. The native vegetation is mixed hardwoods. Most of the acreage has been cleared for cultivation.

In a representative profile the surface layer is about 7 inches of brown or dark-brown silt loam. The subsoil is dark red and is about 35 inches thick. It is light silty clay loam in the upper part, silty clay in the middle, and clay in the lower part. Below this is 6 inches of red silt loam. The underlying material, to a depth of about 62 inches, is yellowish-red loam saprolite.

In most places Montalto soils are easy to work at the right moisture content. In severely eroded areas the plow layer is more sticky than the one in the profile described as representative of the series and should not be worked when slightly wet. The available moisture capacity is high in these soils.

Montalto soils are suited to most crops and to most other uses. The main limitations for farming are slope and erosion. Montalto soils are well suited as building sites. They are suited to sewage disposal by septic tank, but filter fields need to be larger than for most soils because effluent moves through, and is absorbed slowly by, these soils. Slope is a limitation for this use.

Representative profile of Montalto silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated area about 2½ miles northwest of Rising Sun:

Ap—0 to 7 inches, brown or dark-brown (7.5YR 4/4) silt loam; weak, fine, granular structure; friable, slightly sticky; many fine and medium roots; some gravel fragments; medium acid; abrupt, smooth boundary.

B1—7 to 11 inches, dark-red (2.5YR 3/6) light silty clay loam; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; many roots; some gravel fragments; many worm channels; strongly acid; clear, smooth boundary.

B21t—11 to 27 inches, dark-red (2.5YR 3/6) silty clay; moderate, medium, blocky and subangular blocky structure; firm, sticky, and plastic; common roots; thin distinct clay films; few hypersthene and norite gabbro fragments; some worm channels; strongly acid; clear, smooth boundary.

B22t—27 to 42 inches, dark-red (2.5YR 3/6) clay; moderate, medium, subangular blocky structure; firm, sticky and plastic; few roots; continuous prominent clay films and some prominent black (10YR 2/1) films; few hypersthene and norite gabbro cobblestones; medium acid; clear, smooth boundary.

C1—42 to 48 inches, red (2.5YR 4/6) silt loam; massive to very weak, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few roots; some black (10YR 2/1) films and stains; few stones; medium acid to slightly acid; gradual, smooth boundary.

C2—48 to 62 inches, yellowish-red (5YR 4/6) saprolite of loam texture; massive; very friable; some prominent black (10 YR 2/1) stains; few stones; medium acid to slightly acid.

The natural A1 horizon is thin. Normal plow layers are silt loam, but in severely eroded areas the Ap horizon includes enough of the upper part of the B horizon to make it silty clay loam. The B2t horizon ranges from heavy silty clay loam to clay and generally is more than 35 percent clay. The C horizon generally is not so fine in texture as the B2t horizon. Coarse fragments of diabase or similar rocks that range from gravel to stone in size, are present in places. Some areas are very stony. The solum ranges from about 40 to 60 inches in thickness. Depth to bedrock ranges from about 5 to 12 feet.

In the A horizon hue is 7.5YR, value is 3 or 4 or rarely 5, and chroma is 2 to 4. The lowest value is in the A1 horizon. Hue in the B2t horizon centers on 2.5YR but includes 10R and 5YR, value is 3 or 4, and chroma is 4 to 8. The C horizon is variable in color, but generally is less red in hue than the B2t horizon.

In unlimed areas the profile is medium acid to strongly acid, but acidity normally decreases with depth and approaches neutral close to bedrock.

Montalto soils are similar to Christiana and Neshaminy soils. They are less strongly acid and have lower clay content than Christiana soils. Montalto soils are redder than Neshaminy soils, which are less than 35 percent clay in the B2t horizon. Montalto soils formed in residuum from the same kinds of rock as the thinner, browner, less clayey Legore soils and the poorly drained, very wet Watchung soils.

Montalto silt loam, 0 to 3 percent slopes (MtA).—This nearly level soil is only slightly eroded. The surface layer is thicker than the one in the profile described as representative of the series. A subsurface layer generally is present between the plow layer and the subsoil. This silt loam subsurface layer ranges up to 6 inches in thickness and is a lighter brown than the plow layer. Included in mapping are some gravelly areas. Also included are some small spots of surface wash and of silt accumulation. This soil is suited to most uses. If this soil is well managed, it can be cultivated year after year. Capability unit I–4; woodland suitability group 2c4a.

Montalto silt loam, 3 to 8 percent slopes, moderately eroded (MtB2).—This soil has the profile described as representative of the series. The plow layer is thin, indicating that at least some of the surface layer has been removed. In places deep plowing turns up some of the dark-red subsoil. Included in mapping are some gravelly areas, a few areas that have a severely eroded surface layer, and some areas that are cut by shallow gullies. This soil is suited to crops. It can be cultivated regularly, under good management. Capability unit IIe–4; woodland suitability group 2c4a.

Montalto silt loam, 8 to 15 percent slopes, moderately eroded (MtC2).—This soil has lost much of the original surface layer in most places, and a few shallow gullies are present. Included in mapping are some gravelly areas that do not significantly affect farming operations. This soil is suited to cultivation. If it is cultivated regularly intensive management is needed to protect the soil from further erosion. Capability unit IIIe–4; woodland suitability group 2c4a.

Montalto very stony silt loam, 3 to 25 percent slopes (MvD).—This soil has a profile similar to that described as representative of the series, but enough stones and boulders are present to make conventional cultivation impractical. The stones and boulders also limit or modify other uses. They are mostly such dark, basic rocks as gabbro and diorite, but quartzite is present in places. Included in mapping are a few areas where slopes are more than 25 percent. If the stones are removed this soil is suited to permanent pasture or hay, but is better suited to woodland, wildlife habitat, and recreational uses. Capability unit VIs–3; woodland suitability group 2c4b.

Montalto silty clay loam, 8 to 15 percent slopes, severely eroded (MyC3).—This soil has lost most of the original surface layer, and plowing turns up large amounts of subsoil material. The plow layer is red or dark red, has blocky structure rather than granular, and is sticky and difficult to work. The areas are cut by many gullies, and some areas are gravelly. Included in mapping are a few areas of less clayey and less sticky soils.

This soil is not suited to crops. It is suited to hay, pasture, or sodded orchards. Capability unit IVe–3; woodland suitability group 2c4a.

Montalto silty clay loam, 15 to 25 percent slopes, severely eroded (MyD3).—Except for more gullies this soil is similar to Montalto silty clay loam, 8 to 15 percent slopes, severely eroded. Included in mapping are a few areas of less clayey and less sticky soils. Slope and gullies severely limit the use of this soil for cultivated crops. Under good management this soil can be used for hay or pasture and some areas can be used for sodded orchards. Otherwise this soil should be kept under a cover of trees, vines, shrubs, or sod for watershed protection, wildlife habitat, woodland, or esthetic uses. Capability unit VIe–2; woodland suitability group 2c4b.

Neshaminy Series

The Neshaminy series consists of nearly level to strongly sloping, well-drained, loamy soils in the northern, or Piedmont, part of the county. These soils formed in material weathered in place, mainly from mixed basic and acidic rocks. They have a sticky, clayey subsoil. They are fairly high in basic natural plant nutrients, such as calcium. The native vegetation is mixed hardwoods, generally dominated by oaks. Most of the acreage has been cleared for use as cropland.

In a representative profile the surface layer is about 9 inches of dark grayish-brown silt loam. The subsoil consists of about 14 inches of brown or dark-brown light silty clay loam and about 17 inches of yellowish-red clay. The underlying material, to a depth of 60 inches, is dark-red clay. Bedrock is at a depth of 60 inches.

Neshaminy soils are easy to work and have a high available moisture capacity. They are suited to most crops and other uses, but in places slope and erosion are limitations. Slope is the chief limitation of these soils for use as building sites and for septic tanks.

Representative profile of Neshaminy silt loam, 3 to 8 percent slopes, moderately eroded, in a cultivated area about 1 mile north of Pilot:

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

B21t—9 to 23 inches, brown or dark-brown (7.5YR 4/4) light silty clay loam; strong, medium, blocky structure; friable to firm, plastic and moderately sticky; common roots; distinct to prominent clay films; slightly acid; gradual, wavy boundary.

B22t—23 to 40 inches, yellow-red (5YR 4/8) clay; strong, medium and coarse, blocky structure; firm, sticky and plastic; few roots; prominent clay films; slightly acid to neutral; gradual, smooth boundary.

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C—40 to 60 inches, dark-red (2.5YR 3/6) clay; massive; friable to firm, sticky and plastic; neutral; abrupt, irregular boundary.
R—60 inches, hard, serpentinized gabbro.

The B2t horizon centers on silty clay loam and is between 25 and 35 percent clay, but some profiles have a subhorizon that is a little less than 25 percent clay or a little more than 35 percent clay. The profile described as representative of the series is more clayey in the B22t and C horizons than is normal for the series. The C horizon generally is of silt loam, but it is somewhat finer textured, and has inherent structure in places. Angular pebbles and a few stones consisting of quartzite, acid crystalline rock, or basic rock occur throughout the profile. The solum ranges from about 40 to more than 50 inches in thickness. Depth to bedrock generally is 5 to 10 feet. The bedrock consists of semibasic rocks or of mixed rocks such as gneiss, granitized schist, granodiorite, gabbro, diabase, and similar rocks, and in places serpentine.

In the A horizon hue is 10YR or 7.5YR, value is 3 to 5, and chroma is 2 to 4. Hue in the thin A1 horizon generally has the lowest value. Hue in the B2t horizon centers on 5YR, but it includes 7.5YR and ranges toward 2.5YR. Redness of hue frequently increases with depth, with the reddest hues in the lowest parts. Value in the B2t horizon ranges from 3 to 5, and chroma ranges from 3 to 8. The C horizon is one color or variegated, and it is redder or yellower than the B22t horizon.

In unlimed areas the profile is medium acid to strongly acid. Acidity commonly decreases with depth, and the C horizon is commonly near neutral and has high base saturation.

Neshaminy soil is less acid, more sticky, generally more reddish, and higher in natural plant nutrients than Chester soils. They are less clayey and sticky and less red than Montalto soils. Neshaminy soils are the only soils in the county that formed in a mixture of material from acidic and basic rocks.

Neshaminy silt loam, 0 to 3 percent slopes (NeA).—The surface layer of this soil is thicker than that in the profile described as representative of the series. It generally includes a few inches of brown or yellowish-brown silt loam between the plow layer and the subsoil.

If this soil is well managed, it is suited to farming. It has few limitations. Capability unit I–4; woodland suitability group 2o4.

Neshaminy silt loam, 3 to 8 percent slopes, moderately eroded (NeB2).—This soil has the profile described as representative of the series. Erosion has removed part of the original surface layer from most areas but not enough to seriously limit the use of the soil if it is well managed. Included with this soil in mapping are small severely eroded areas and areas that contain some shallow gullies. Also included are areas that contain spots of silt accumulation.

In places erosion is a moderate hazard because of slope; however, there is no other important limitation for use or suitability. If this soil is well managed, it can be cultivated regularly. Capability unit IIe–4; woodland suitability group 2o4.

Neshaminy silt loam, 8 to 15 percent slopes, moderately eroded (NeC2).—Erosion has removed much of the original surface layer of this soil. A few shallow gullies and spots of silt accumulation are present. Intensive management is needed to protect this soil from erosion if it is cultivated regularly. Capability unit IIIe–4; woodland suitability group 2o4.

Neshaminy silt loam, 15 to 25 percent slopes, moderately eroded (NeD2).—This soil is steep enough to make it marginal for regular cultivation. It has not yet been badly damaged by erosion, chiefly because most areas are wooded. This soil is better suited to hay, pasture, or orchards than to more intensive uses. Included in mapping are some shallow gullies. Capability unit IVe–3; woodland suitability group 2r4.

Othello Series

The Othello series consists of nearly level to gently sloping, poorly drained, loamy soils on upland flats in the Coastal Plain part of the county. These soils formed in silty material underlain by coarser sediment. They have a mottled subsoil. The native vegetation is wetland hardwoods, mostly oaks, sweetgum, blackgum, holly, and swamp maple. Most of the acreage has been cleared and is used for crops and pasture.

In a representative profile the surface layer is about 6 inches of olive-gray silt loam. Below this is a subsurface layer of olive silt loam, about 9 inches thick. The subsoil consists of about 21 inches of gray silt loam. The underlying material is gray silt loam to a depth of 46 inches and is olive-yellow loam to a depth of about 58 inches.

Othello soils are easy to work. Drainage generally is not too difficult because water moves through the subsoil fairly readily. Tile or ditches can be used, but ditches should not penetrate the sandy material beneath these soils. Othello soils have high available moisture capacity.

Othello soils have limitations of poor drainage and high seasonal water table. They are not suitable for building sites. Sewage disposal by septic tank is impractical because of wetness.

Representative profile of Othello silt loam, 2 to 5 percent slopes, in a pasture east of State Route 280, about 3½ miles north of Elkton:

Ap—0 to 6 inches, olive-gray (5Y 5/2) silt loam; common, fine, faint, reddish-gray (5YR 5/2) mottles; weak, fine, granular structure, slight tendency toward platiness; friable, many roots; medium acid (limed); abrupt, smooth boundary.
A2—6 to 15 inches, olive (5Y 5/3) silt loam; many, medium, distinct, light-gray (N 7/0) and yellowish-red (5YR 4/6) mottles; weak, fine, granular and very fine, blocky structure; friable, sticky and slightly plastic; many roots; strongly acid; clear, wavy boundary.
B21tg—15 to 26 inches, gray (5Y 5/1), heavy silt loam; few, coarse, prominent, yellowish-brown (10YR 5/8) mottles; moderate, coarse, blocky structure; hard, firm, sticky and plastic; few roots; some thin weak clay films; very strongly acid; gradual, irregular boundary.
B22tg—26 to 36 inches, gray (5Y 5/1) heavy silt loam; few, coarse, prominent, yellowish-brown (10YR 5/8) and yellowish-red (5YR 5/8 mottles; moderate, very coarse, prismatic and weak, medium, blocky structure; hard, firm, sticky and plastic; thin clay films in pores and on aggregates; strongly acid; abrupt, wavy boundary.
C1—36 to 46 inches, gray (5Y 5/1) silt loam; few, coarse, prominent, yellowish-brown (10YR 5/6) mottles; massive; widely spaced vertical cleavage in places; friable to firm, sticky and slightly plastic; strongly acid; abrupt, wavy boundary.
IIC2—46 to 58 inches, olive-yellow (5Y 6/6) loam; many, coarse, distinct, variegations with strong brown (7.5YR 5/8); massive, firm, sticky and slightly plastic; contains coarse sand and feels gritty when rubbed between the fingers; medium acid.

The B2t horizon ranges from heavy silt loam to silty clay loam in texture and generally is between 18 and 35 percent

clay. The C horizon is silt loam or very fine sandy loam. The IIC horizon is abruptly coarser in texture and in some profiles is mostly sand. Fine, smooth pebbles are present in places, mostly in the IIC horizon. The solum ranges from about 20 to 36 inches in thickness. Bedrock is at an indefinite depth.

In the A horizon hue is 10YR, and in the B horizon hue is 2.5Y. In places the A or B horizons are neutral in color. In the A horizon, the matrix value is 3 to 6 and the matrix chroma is 0 to 3. The thin A1 horizon has the lowest value and chroma. In the B horizon the matrix value is 5 or 6 and the chroma is 0 to 2, or in places 3 in hue of 5Y. Most mottles have hues of 10YR to 5YR, a value of 5 or 6, and chroma of 4 to 8. The C horizon has a gray matrix and high-chroma mottles, or matrix of high chroma and gray mottles, or they are gray and lack mottles.

In unlimed areas the profile is strongly acid to extremely acid, and generally acidity increases with depth. The IIC horizon in the representative profile is not genetically related to the horizons above it. This horizon is less strongly acid than is normal.

Othello soils are poorly drained as are Baile, Elkton, Fallsington, Hatboro, Leonardtown, and Watchung soils. They have less mica and other weatherable minerals than Baile soils. Othello soils have less clayey and more rapidly permeable subsoil than Elkton and Watchung soils. They have a less sandy subsoil than Fallington soils. Othello soils are not so micaceous as Hatboro soils, which lack a heavy subsoil and are on flood plains in the Piedmont area. Othello soils are similar to Leonardtown soils in color, texture, and natural drainage, but those soils have a dense fragipan that is slowly permeable. Othello soils formed in the same kind of silty sediment as the well drained Matapeake soils and the moderately well drained Barclay, Butlertown, and Mattapex soils.

Othello silt loam, 0 to 2 percent slopes (OhA).—This nearly level soil is on the Coastal Plain. In a few acres the surface has washed away, but this erosion generally is not an important concern. In a few spots silt has accumulated in slight depressions. In the areas where this soil is close to the Piedmont uplands the lower part of the subsoil and the substratum contain some finely divided mica in places. Capability unit IIIw–7; woodland suitability group 3w13.

Othello silt loam, 2 to 5 percent slopes (OhB).—This soil has the profile described as representative of the series. It has lost part of the surface layer in places. In a few areas gullies have formed in small spots where erosion is severe. Included in mapping are small areas where finely divided mica is in the lower part of the subsoil and the substratum, and these areas erode more readily wherever gullies have penetrated to such depths. Also included are a few areas that have a slope of more than 5 percent.

If this soil is intensively cultivated the main concern of management is internal drainage. Control of erosion also is a concern. Capability unit IIIw–7; woodland suitability group 3w13.

Rumford Series

The Rumford series consists of deep, gently sloping to moderately sloping, somewhat excessively drained soils on uplands in the southern or Coastal Plain part of the county. These soils formed in sandy sediment that contains small amounts of clay, a little silt, and some, fine, smooth gravel. The native vegetation is chiefly scrub hardwoods and Virginia pine, but shortleaf pine grows in some places.

In a representative profile the surface layer is about 3 inches of very dark gray to dark grayish-brown loamy sand. Below this is a yellowish-brown loamy sand subsurface layer, about 8 inches thick, underlain by a friable, yellowish-brown sandy loam subsoil to a depth of 34 inches. The underlying material is strong-brown loamy sand to a depth of 37 inches; mainly reddish-brown clay, silt, and sand to a depth of 44 inches; and brownish-yellow loose sand to a depth of 50 inches.

Rumford soils are easy to work and early to warm in spring. Some of the earliest crops, such as home garden and truck crops, can be planted on them. These soils have a low available moisture capacity and need supplemental irrigation in some areas, particularly in the warmer, drier months. They are also low in natural plant nutrients.

Rumford soils are well drained and are suitable for building sites. They are suitable for septic tank use, but are limited by slope in some areas. Large amounts of fertilizer are needed for most crops.

Representative profile of Rumford loamy sand, 2 to 5 percent slopes, in a wooded area about 0.4 mile northwest of Bethel Church:

A11—0 to 1 inch, very dark gray (10YR 3/1) loamy sand; single grain; loose; many roots; extremely acid; abrupt, smooth boundary.

A12—1 to 3 inches, dark grayish-brown (2.5YR 4/2) loamy sand; very weak, fine, subangular blocky structure; loose; many roots; extremely acid; abrupt, smooth boundary.

A2—3 to 11 inches, yellowish-brown (10YR 5/4) loamy sand; very weak, fine and medium, subangular blocky structure; very friable; many roots; medium acid to strongly acid; clear, smooth boundary.

B1—11 to 18 inches, yellowish-brown (10YR 5/6) sandy loam; weak, fine and medium, subangular blocky structure; friable, slightly sticky; many roots; very strongly acid; clear, wavy boundary.

B2t—18 to 27 inches, yellowish-brown (10YR 5/6) to strong-brown (7.5YR 5/8) heavy sandy loam; weak, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; distinct clay bridging; some clay films in pores; some fine smooth pebbles; very strongly acid; gradual, smooth boundary.

B3—27 to 34 inches, strong-brown (7.5YR 5/6) sandy loam; weak, medium, subangular blocky structure; friable; very few roots; some fine smooth pebbles; very strongly acid; gradual, wavy boundary.

C1—34 to 37 inches, strong-brown (7.5YR 5/6) gravelly loamy sand; single grain; loose; no roots; strongly acid; clear, wavy boundary.

C2—37 to 44 inches, thinly stratified reddish-brown (5YR 5/3), very pale brown (10YR 7/3), and brown (7.5YR 5/4) clay, silt, and sand; friable; slightly sticky and slightly plastic in finer strata; very strongly acid; abrupt, smooth boundary .

C3—44 to 50 inches, brownish-yellow (10YR 6/6) loose sand; very strongly acid.

The B2t horizon generally is sandy loam, but it is light sandy clay loam in some places, and generally is less than 18 percent clay. The C horizon is sand or loamy sand. Fine, smooth pebbles are throughout the profile. The solum ranges from about 27 to 40 inches in thickness, and bedrock is at indefinite depth.

In the A horizon hue generally is 10YR but ranges to 2.5Y, value is 3 to 5, and chroma is 1 to 4. The thin A1 horizon has the lowest value and chroma. The B horizon centers on hue of 7.5YR but ranges to 5YR, and can be 10YR in part. In the B horizon value is 5 or 6 and chroma is 6 to 8. The C horizon is more variable in color and frequently has higher value than the rest of the profile.

In unlimed areas the profile is strongly acid to extremely acid, and acidity increases with depth. Base saturation is very low in unlimed Rumford soils.

Rumford soils are similar to Evesboro soils in the A horizon, but those soils lack a Bt horizon and are more consistently yellowish-brown in color. Rumford soils are similar to Sassafras soils in color, but Sassafras soils have finer textured A and B horizons and a thicker solum that retains more moisture and plant nutrients.

Rumford loamy sand, 2 to 5 percent slopes (RuB).—This soil has the profile described as representative of the series. Because of the slope this soil is subject to erosion. A few acres are more than slightly eroded, because the thick sandy surface layer allows ready infiltration of water. Included in mapping are a few areas that are almost level.

This soil has low available moisture capacity and low natural fertility. Supplemental irrigation generally is needed. The sandy surface layer also blows when dry unless it is protected by vegetation. Capability unit IIs–4; woodland suitability group 3o14.

Rumford loamy sand, 5 to 10 percent slopes (RuC).—This soil is subject to erosion. In places part of the surface layer has been washed away, but a fairly thick subsurface layer remains. In a few places the subsoil is redder than that described as representative of the series. Included with this soil in mapping are a few shallow gullies.

The chief concern of management is the hazard of erosion. Other concerns are the low available moisture capacity and natural fertility. Capability unit IIIe–33; woodland suitability group 3o14.

Rumford loamy sand, 10 to 15 percent slopes (RuD).—This soil has lost a part of its surface layer in places, and some shallow gullies cut the areas. Included in mapping are spots that have a redder subsoil than that described as representative of the series and that have a little glauconite, or greensand, in the underlying material.

Because of the hazard of erosion, the low available moisture capacity, and low plant nutrients, this soil is marginal for most cultivated crops. Capability unit IVe–5; woodland suitability group 3o14.

Sassafras Series

The Sassafras series consists of deep, nearly level to moderately steep, well-drained, loamy soils on uplands in the southern, or Coastal Plain, part of the county. These soils formed in sandy sediment that contains a moderate amount of silt and clay and gravel in places. The native vegetation is mostly mixed hardwoods, and some second-growth pines. Most of the acreage has been cleared for use as cropland.

In a representative profile the surface layer is about 8 inches of dark yellowish-brown sandy loam. Below this is a brown sandy loam subsurface layer 3 inches thick. The subsoil is about 21 inches of brown or dark-brown sandy clay loam. The underlying material, to a depth of about 50 inches, is mostly brown loamy sand.

Sassafras soils are easy to work and warm quickly in spring. They have moderate available moisture capacity. These soils are suited to most uses, but in places they are limited by slope and erosion. Sassafras soils are well suited to use as building sites. Slope generally is the only limitation to use for septic tanks.

Representative profile of Sassafras sandy loam, 10 to 15 percent slopes, moderately eroded, in a cultivated area about 2½ miles east of Cecilton:

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

A2—8 to 11 inches, brown (7.5YR 5/4) sandy loam; very weak, medium, granular structure; friable; many roots; strongly acid; clear, wavy boundary.

B21t—11 to 24 inches, strong-brown (7.5YR 5/6) sandy clay loam; weak, fine, subangular blocky structure; friable to firm, slightly sticky and slightly plastic; common roots; thin almost continuous clay films; strongly acid; gradual, wavy boundary.

B22t—24 to 32 inches, brown or dark-brown (7.5YR 4/4) sandy clay loam; weak to moderate, medium, subangular blocky structure; firm, sticky and slightly plastic; few roots; distinct discontinuous clay films; strongly acid; clear, wavy boundary.

C1—32 to 38 inches, brown or dark-brown (7.5YR 4/4) loamy sand; single grain; loose to very friable; very strongly acid; clear, wavy boundary.

C2—38 to 50 inches, variegated dark-brown (7.5YR 4/4) to yellowish-red (5YR 4/8 loamy sand; single grain; very friable; soft iron concretions in places; very strongly acid.

The A horizon is sandy loam, fine sandy loam, or loam. The B2t horizon generally is sandy clay loam, but it is heavy sandy loam, heavy loam, or light sandy clay loam in places. It generally is between about 18 and 30 percent clay. The C horizon is coarser in texture than the B horizon, and in places it is coarser than the A horizon. In some places smooth, generally fine, quartzose gravel is present, sometimes in quantities of 15 percent or more. The solum ranges from about 30 to 40 inches in thickness, and bedrock is at an indefinite depth.

In the A horizon hue is 10YR or 7.5YR, value is 3 to 5, and chroma is 1 to 4. The A1 horizon generally is very thin and has the lowest value and chroma. In the B horizon hue centers on 7.5YR, but it ranges to include 5YR and grades toward 10YR. In the B horizon value is 4 to 6 and chroma ranges from 4 to 8. A chroma of less than 6 is always present in some part of the B2t horizon. The C horizon has the same range of color as the B horizon but can have higher value or chroma, or both, and is variegated in places.

In unlimed areas the profile is strongly acid to very strongly acid, and acidity commonly increases with depth.

Sassafras soils are similar to Collington and Rumford soils. They have a lighter brown subsoil than Collington soils that have a component of glauconite, or greensand. Sassafras soils are less sandy throughout than Rumford soils and have a thicker subsoil that is generally less bright in color. Sassafras soil are also similar to Matapeake soils in depth and color, but they are less silty throughout the solum and contain more sand, particularly in the subsoil. Sassafras soils are on the same kind of old upland sediment as the moderately well drained Woodstown soils and the poorly drained Fallsington soils.

Sassafras sandy loam, 0 to 2 percent slopes (SaA).—This is one of the better soils of the county for farming. Included in mapping are a few areas that are slightly eroded. This soil is suited to most crops and is especially well suited to early truck crops. It is easy to work. Erosion is only a slight hazard. Capability unit I–5; woodland suitability group 3o10.

Sassafras sandy loam, 2 to 5 percent slopes, moderately eroded (SaB2).—This is an important soil in the county for farming. Part of the surface layer is gone in most areas, and further erosion is a moderate hazard. Erosion can be controlled by easily applied conservation measures. Included in mapping are some spots that are severely eroded, some gullies, and a few somewhat grav-

elly areas. Capability unit IIe–5; woodland suitability group 3o10.

Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded (SaC2).—Because of slope the hazard of erosion is greater on this soil than on the less sloping soils of the Sassafras series. Slopes generally are smooth, fairly long, and regular. Included in mapping are some wooded areas that have had little if any soil loss and a few gravelly spots. Also included are a few shallow gullies and some spots of soil accumulation. Soil losses are important, but they are not yet severe. Further loss in cultivated areas can be controlled by careful management. Capability unit IIIe–5; woodland suitability group 3o10.

Sassafras sandy loam, 5 to 10 percent slopes, severely eroded (SaC3).—This soil has an exposed subsoil in many areas, and shallow to deep gullies and gravelly spots are present in places. The present plow layer remains sandy but is a brighter brown and is stickier than the plow layer in less eroded soils of the series. Also, the soil is somewhat cloddy and not so friable or crumbly as the soil described as representative. This soil is marginal for cultivation. Excellent management is needed to prevent even more serious erosion on this soil. Capability unit IVe–5; woodland suitability group 3o10.

Sassafras sandy loam, 10 to 15 percent slopes, moderately eroded (SaD2).—This soil has the profile described as representative of the series. It is moderately sloping, but erosion has not severely damaged the plow layer. Part of the plow layer is missing in most places. Included in mapping are some gravelly areas and a few gullies. This soil needs careful management, because of slope, to help control further losses from erosion. A few less eroded areas are wooded and should remain so. Capability unit IVe–5; woodland suitability group 3o10.

Sassafras sandy loam, 10 to 15 percent slopes, severely eroded (SaD3).—This soil is cut by many gullies, and some of the gullies have cut deep into the loose sandy substratum. The substratum caves in and erodes more rapidly than the surface layer and subsoil in most areas. The present plow layer consists mostly of material formerly in the subsoil. Included in mapping are some small areas that are somewhat gravelly.

This soil is not suited to clean-tilled crops. Some areas could be reestablished in trees. Capability unit VIe–2; woodland suitability group 3o10.

Sassafras fine sandy loam, 2 to 5 percent slopes, moderately eroded (SfB2).—This gently sloping soil has a profile similar to that described as representative of the series, except that the sand throughout the profile is considerably finer. For this reason, the soil holds moisture and plant nutrients better than the soil described as representative for the series. Included in mapping are a few shallow gullies and a few areas of nearly level soil.

The hazard of further erosion is moderate on this soil. This soil can be kept in good condition for regular cultivation by easily applied conservation measures. Capability unit IIe–5; woodland suitability group 3o10.

Sassafras gravelly loam, 2 to 5 percent slopes, moderately eroded (SgB2).—This soil has a surface layer and a subsoil that contain less sand, more silt, and in a few places more clay than that in the profile described as representative of the series. This soil also has higher available moisture capacity and greater ability to hold plant nutrients. It contains from 15 to about 20 percent fine to medium, smooth, quartz pebbles or gravel. The percentage of gravel commonly is even greater in the subsoil, and especially in the substratum. In places the subsoil is redder than that described as representative of the series. Included in mapping are a few nearly level areas and some spots of severely eroded soils. Capability unit IIe–4; woodland suitability group 3o10.

Sassafras gravelly loam, 5 to 10 percent slopes, moderately eroded (SgC2).—This soil has lost part of the surface layer through erosion. A few shallow gullies, some local accumulations of soil, and some spots that have a redder subsoil than is normal for this soil are present. The hazard of further erosion is moderate. Intensively applied conservation measures are needed to control erosion if the soil is cultivated. Capability unit IIIe–4; woodland suitability group 3o10.

Sassafras gravelly loam, 5 to 10 percent slopes, severely eroded (SgC3).—Most of the original surface layer of this soil has been removed through erosion. Much of the gravel remains on the surface or is mixed into the plow layer that is sticky and cloddy. When dry, the surface layer is hard. The soil is also thinner than in less eroded areas, and many shallow to deep gullies are present. In places the subsoil is redder than normal. This soil is marginal for cultivation. Capability unit IVe–3, woodland suitability group 3o10.

Sassafras gravelly loam, 10 to 15 percent slopes, severely eroded (SgD3).—This soil has a plow layer that is very hard when dry. It consists of concentrated gravel in a matrix of what was once subsoil. Many gullies are present and some have cut deep into looser substratum material. The substratum material generally is gravelly. Some areas have a redder subsoil than is normal for the series. Included in mapping are small areas that are only moderately eroded. This soil needs to be kept under permanent protective vegetation. Capability unit VIe–2; woodland suitability group 3o10.

Sassafras and Aura soils, 15 to 40 percent slopes (SrE).—This mapping unit consists of strongly sloping to moderately steep areas of Sassafras and Aura soils on the Coastal Plain. The surface layer is dominantly sandy loam, but in places it is gravelly loam and silt loam. In places wet spots and seepage areas are present. Many areas are thin to underlying sandy material. Most areas that have been cleared are severely eroded. Exposed subsoil and shallow, deep, and caving gullies are common.

These soils are severely limited for cultivation, but they can be used for controlled grazing, woodland, wildlife habitat, and certain recreational uses. Because of the dominantly sandy loam surface layer these soils are easy to work or to improve for grazing. A vegetative cover on these soils helps to protect the water and other soils from the harmful effects of excessive runoff, erosion, and siltation. Capability unit VIIe–2; woodland suitability group 3r10.

Stony Land

Stony land (St) consists of areas on uplands in the northern, or Piedmont, part of Cecil County that are so stony they cannot be designated as soil series. Stones are abundant on and beneath the surface, and tillage or seedbed

preparation by modern mechanized methods is not feasible. The stones are mostly of quartzite, granite, gneiss, and very hard mica schist, but in places they are darker colored rock, such as diabase and gabbro. This land covers all ranges of slope, but slopes are dominantly about 25 to nearly 75 percent.

Most of this land is so stony and steep that it is not manageable even for woods, though most of it supports some kind of woodland cover. It is suited to watershed protection and wildlife habitat. Capability unit VIIIs–1; woodland suitability group not assigned.

Tidal Marsh

Tidal marsh (Tm) includes areas that are subject to the regular effects of tidal action. The soil material in these areas has not been examined in detail, but is known to vary from sand to clay, and in places is mucky or peaty. Besides being somewhat salty, some areas contain large amounts of sulphur compounds. If these areas were reclaimed and drained, these compounds would be largely oxidized to other sulphur compounds generally highly toxic to all kinds of vegetation. Areas of Tidal marsh extending inland along some larger streams are less affected by salt and by tidal action than are areas closer to Chesapeake Bay.

Tidal marsh is now of no use for farming. It does not produce crops, grazing, or timber. The only practical uses are for wildlife habitat and for recreational purposes. Some areas have been covered by hydraulic fill to create Made land. Capability unit VIIIw–1; woodland suitability group not assigned.

Watchung Series

The Watchung series consists of gently sloping, poorly drained soils on flats at the heads of drainageways and in depressions in the northern, or Piedmont, part of the county. These soils have a surface layer of dark grayish-brown loam and a subsoil of clay. They are underlain by weathered rock material and by hard rock, generally diabase or gabbro, at a depth of about 5 to 10 feet. The native vegetation is wetland hardwoods, generally dominated by oaks. Most of the acreage is used for pasture or woods.

In a representative profile the surface layer is about 7 inches of dark grayish-brown very stony silt loam. Below this is a gray silt loam subsurface layer about 2 inches thick. The subsoil is 42 inches of mostly silty clay. It is gray in the upper part and yellowish-brown in the lower part. The underlying material, to a depth of about 60 inches, is firm, strong-brown silt loam.

The stony Watchung soils generally are difficult to work. They are wet and sticky for long periods, and the surface layer is hard and cloddy when dry. Water moves through these soils slowly, and they are difficult to drain. These soils have a high available moisture capacity and are well supplied with plant nutrients.

Watchung soils are not suited to crops because of wetness and stoniness. They are used for some grazing, but many areas are idle or are still in woods. These soils are severely limited for most nonfarm uses. They are not suitable for use as building sites or septic tanks.

Representative profile of Watchung very stony silt loam, in a pasture about 1.6 miles northwest of Rising Sun:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; common, fine, distinct, strong-brown (7.5YR 5/6) mottles; moderate, fine, granular structure; slightly hard, friable, sticky and plastic; many fine roots; very stony; strongly acid; clear, wavy boundary.

A2g—7 to 9 inches, gray (10YR 5/1) silt loam; common, medium, distinct, brown or dark-brown (7.5YR 4/4) mottles; weak, thin, platy structure; slightly hard, friable, sticky and plastic; many fine roots; very stony; fine black (10YR 2/1) concretions in places; medium acid; abrupt, wavy boundary.

B21tg—9 to 14 inches, gray (10YR 5/1) silty clay; many, medium, prominent, yellowish-brown (10YR 5/6) mottles; strong, medium, prismatic and blocky structure; very firm, sticky and plastic; roots between aggregates; very stony; thin continuous clay films; interiors or some aggregates strong brown (7.5YR 5/6); some fine black (10YR 2/1) concretions; medium acid; gradual, wavy boundary.

B22tg—14 to 24 inches, gray (N 5/0) clay; many, coarse, prominent, yellowish-brown (10YR 5/8) mottles; strong, medium, prismatic and blocky structure; firm, sticky and plastic; common roots between prisms; stony; continuous clay films; interiors of some aggregates yellowish-brown (10YR 5/8); few, fine, black (10YR 2/1) concretions; medium acid; clear, wavy boundary.

B23tg—24 to 33 inches, gray (5Y 5/1) silty clay; common, medium, prominent, strong-brown (7.5YR 5/6) mottles; strong, coarse, prismatic and very weak, thin, platy structure; firm, sticky and plastic; common roots between aggregates; stony; continuous clay films; some fine black (10YR 2/1) concretions; slightly acid; clear, wavy boundary.

B3—33 to 51 inches, yellowish-brown (10YR 5/6) silty clay; few, fine, prominent, gray (N 5/0) mottles; moderate, coarse, prismatic and weak, thin, platy structure; firm, sticky and plastic; few roots; some thin clay films; some dark reddish-brown (5YR 2/2) stains and concretions; common quartzite and few gabbro cobblestones; neutral; gradual, broken boundary.

C1—51 to 56 inches, strong-brown (7.5YR 5/6) heavy silt loam; few, fine, prominent, gray (N 5/0) mottles; many vertical fractures or cracks, mostly filled with gray (N 5/0) to dark-gray (N 4/0) silt; firm, sticky and plastic; few roots; common quartzite and few gabbro cobblestones; slightly acid; clear, broken boundary.

C2—56 to 60 inches, yellowish-brown (10YR 5/4) silt loam, variegated with strong brown (7.5YR 5/6) and pale brown (10YR 6/3); massive; firm, sticky and slightly plastic; few roots; common quartzite and few gabbro cobblestones; slightly acid.

The B2t horizon is centered on silty clay, but includes clay and heavy silty clay loam, and has an average clay content of more than 35 percent. The C horizon is lighter in texture than the B horizon, and shows traces of rock structure in places. Gravel, cobblestones, or stones are throughout the profile. Stones are common on and near the surface of the soil. The solum generally ranges from about 24 to 48 inches in thickness, but the solum of the profile described as representative of the series is thicker than is common because the B3 horizon is generally much thinner. Depth to bedrock generally is 5 to 10 feet.

The Ap horizon is dark grayish brown or dark gray. In wooded areas there is a thin A1 horizon generally one unit lower in value than the Ap horizon described as representative. Matrix colors in the B2t horizon generally are in hues 2.5Y or 5Y, or less commonly 10YR in hue or neutral. Value is 4 to 6, and chroma generally is 1 to 3. Mottles in these horizons are fine to coarse, distinct to prominent, and common to abundant. Mottles in the B2t horizon are mostly in hues 10YR to 5YR, with value of 4 or 5 and chroma of 4

to 8. The C horizon has about the same range of color as the B horizon, but frequently is higher in proportion of high-chroma colors. Concretions, stains, and sometimes greenish specks are common in these soils.

In unlimed areas the profile is strongly acid near the surface, and acidity decreases with depth. The C horizon and the lower part of the solum approach neutral in reaction. Base saturation in these horizons is high.

Watchung soils are poorly drained as are Baile, Elkton, Fallsington, Hatboro, Leonardtown, and Othello soils. They have a more clayey subsoil than Baile, Fallsington, Hatboro, Leonardtown, and Othello soils. Watchung soils have a fine-textured clayey subsoil as do Elkton soils, but Elkton soils are very strongly acid to extremely acid, and are of indeterminate depth to bedrock. Watchung soils formed in residuum from the same general kinds of rock as the well-drained Legore, Montalto, and Neshaminy soils.

Watchung very stony silt loam (Wa).—This is the only Watchung soil mapped in the county. It is level to gently sloping, and in a few places has slopes up to about 10 percent. It has abundant stones and boulders in places, both on and near the surface and throughout the profile. The stones and boulders are gabbro or diabase, and in places quartzite. This soil cannot be intensively used for farming, but it is suited to trees that tolerate water, wildlife habitat, and grazing. Capability unit VIIs–4; woodland suitability group 1w3.

Woodstown Series

The Woodstown series consists of deep, nearly level to moderately sloping, moderately well drained soils on uplands in the southern, or Coastal Plain, part of the county. These soils formed in sandy sediment that contained moderate amounts of silt and clay. The native vegetation is chiefly hardwoods, dominantly oaks, though pines grow in cutover and second-growth areas. Most of the acreage has been cleared for use as cropland or pasture.

In a representative profile the surface layer is about 8 inches of dark grayish-brown loam. The subsurface layer is about 3 inches of brown loam. The subsoil is about 26 inches thick. The upper 14 inches is pale-brown and yellowish-brown loam. The lower 12 inches is friable, yellowish brown and brown sandy loam. The underlying material, to a depth of about 60 inches, is loose, yellowish-brown loamy sand.

Woodstown soils are easy to work. They are wet in spring and late to warm in some areas, and planting is delayed. Artificial drainage is needed for some crops, particularly on the more level soils. Woodstown soils are easy to drain if adequate outlets are available. They have moderate available moisture capacity.

Woodstown soils are limited for use as building sites and septic tank filter fields by impeded drainage and seasonal wetness. In sloping areas erosion is a hazard.

Representative profile of Woodstown loam, 0 to 2 percent slopes, in a cultivated area about 0.6 mile north of Cecilton:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) loam; weak, fine, granular structure; friable; many roots; medium acid (limed); abrupt, smooth boundary.

A2—8 to 11 inches, brown (10YR 5/3) loam; weak, thin, platy structure (plowsole); friable, slightly sticky; many roots; medium acid; clear, smooth boundary.

B1—11 to 14 inches, pale-brown (10YR 6/3) loam; faint variegations of yellowish brown (10YR 5/6); weak, thin, platy and fine, subangular blocky structure; friable to firm, slightly sticky and slightly plastic; common roots; strongly acid; clear, wavy boundary.

B21t—14 to 25 inches, yellowish-brown (10YR 5/6) heavy loam; faint variegations of pale brown (10YR 6/3); weak to moderate, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; thin discontinuous clay films; strongly acid; gradual, wavy boundary.

B22t—25 to 31 inches, yellowish-brown (10YR 5/6) heavy sandy loam or light sandy clay loam; variegations of strong brown (7.5YR 5/6); few, fine, distinct, light brownish-gray (2.5 6/2) mottles; weak, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few roots; thin, discontinuous, yellowish-brown (10YR 5/4) clay films; clear, wavy boundary.

B3—31 to 37 inches, brown (10YR 5/3) sandy loam; common, medium, distinct, light-gray (N 7/0) and reddish-brown (5YR 4/4) mottles; weak, medium, subangular blocky structure; friable; few roots; some fine smooth pebbles; strongly acid; abrupt, wavy boundary.

C—37 to 60 inches, yellowish-brown (10YR 5/4) loamy sand; common, coarse, distinct,, light brownish-gray (2.5Y 6/2) mottles; single grain; loose; strongly acid.

The A horizon is loam or sandy loam. In undisturbed areas the A1 horizon ranges from 2 to 5 inches in thickness. The B2t horizon is heavy loam, heavy sandy loam, or sandy clay loam, and it generally is 18 to 25 percent clay. The C horizon is coarser textured than the B2t horizon, but an unconforming C horizon of almost any texture is present in places. Thickness of the solum is about 28 to 40 inches. Bedrock is at an indefinite depth.

In all horizons the hue generally is 10YR or 2.5Y, but in the lower part of the B horizon and in the C horizon hue is 5Y in some profiles. In the A horizon value is 3 to 6 and chroma is 1 to 4. The lowest value and chroma are in the A1 horizon. The B2t horizon has a matrix value of 5 or 6 and a matrix chroma of 6 or 8. The unmottled B21t horizon is at least 10 inches thick. The B22t horizon has grayish mottles that have a chroma of 2 or less. In places mottles that have a high chroma are in the B22t horizon. The C horizon is of uniform color or is variegated. It has mottles that have a low chroma, a high chroma, or both.

In unlimed areas the profile is strongly acid to extremely acid, and acidity commonly increases with depth.

Woodstown soils are similar to Keyport and Mattapex soils, and they formed in the same kind of material as the well-drained Sassafras soils and the poorly drained Fallsington soils. Their solum is less silty and more sandy in all parts than that of Mattapex soils. Woodstown soils have a less clayey and less sticky subsoil than Keyport soils.

Woodstown sandy loam, 0 to 2 percent slopes (WoA).—The surface layer of this soil contains more sand, less silt, and less clay than that in the profile described as representative of the series. Also, in a few places the substratum is finer textured and stickier.

This nearly level soil drains or dries slowly, and planting generally is delayed. The removal of seasonal excess water is the most important concern of management. Erosion is only a slight hazard, but a few areas show the effects of surface wash. Capability unit IIw–5; woodland suitability group 2o7.

Woodstown sandy loam, 2 to 5 percent slopes, moderately eroded (WoB2).—Most areas of this soil have lost part of their original surface layer, and a few areas are severely eroded. In most places slopes are smooth and regular, but in some areas the surface is hummocky and small sinks or depressions are present. In many places the substratum contains strata of fine-textured, sticky material.

On this soil the flow of surface runoff generally is adequate to dispose of excess surface water in wet seasons.

Some means of drainage commonly is needed for adequate subsoil drainage. Erosion is a greater hazard than wetness. Capability unit IIe–36; woodland suitability group 2o7.

Woodstown sandy loam, 5 to 10 percent slopes, moderately eroded (WoC2).—This soil has lost part of its original surface layer by erosion and is cut by shallow gullies in places. The hazard of further erosion is severe. Surface drainage is good. Internal drainage needs improvement, however, particularly in seepage spots near the bases of slopes. In some places depth to gray mottles in the subsoil is greater than in the profile described as representative of the series. Also, in a few areas fine, sticky strata are in the substratum. Capability unit IIIe–36; woodland suitability group 2o7.

Woodstown sandy loam, 5 to 10 percent slopes, severely eroded (WoC3).—In many places the original surface layer of this soil is gone. Some areas are severely gullied, and in other areas the subsoil is exposed between the gullies. Depth to the substratum is less than in the profile described as representative of the series.

This soil is marginal for cultivated crops. It is better suited to such permanent vegetation as hay, pasture, or trees. A protective ground cover should be kept on the most critical areas. Capability unit IVe–5; woodland suitability group 2o7.

Woodstown sandy loam, 10 to 15 percent slopes (WoD).—Most of this soil remains wooded and therefore is not eroded. Included in mapping are some cleared trees that are severely damaged by erosion. Also included are some small areas that have a surface layer that is less sandy than that in this soil.

If this soil is cultivated, practices are needed that provide protection from erosion. The soil is better suited to hay, pasture, sodded orchards, or other trees than to tilled crops. Capability unit IVe–5; woodland suitability group 2o7.

Woodstown loam, 0 to 2 percent slopes (WsA).—This soil has the profile described as representative of the series. A few areas show the effects of surface wash, and locally soil has accumulated in slightly depressed spots. This soil is not so easy to work and to drain as Woodstown sandy loam, 0 to 2 percent slopes. It has few limitations to use other than seasonal wetness. Capability unit IIw–1; woodland suitability group 2o7.

Woodstown loam, 2 to 5 percent slopes, moderately eroded (WsB2).—In most places part of the original surface layer of this soil is gone. A few areas are cut by gullies, and some of the gullies cut through the subsoil into the sandy substratum. In some places soil has accumulated near the bases of slopes.

This soil is limited by a moderate hazard of further erosion. Controlling erosion generally is a more important concern of management than impeded internal drainage. Capability unit IIe–16; woodland suitability group 2o7.

Use and Management of the Soils

This section has several main parts. The first part describes use and management of the soils for crops and pasture, the second discusses use of the soils as woodland, and the third gives facts about use of the soils as wildlife habitat. In addition, this section discusses uses of the soils for engineering purposes, for town and country planning, and for recreation.

Use of the Soils for Crops and Pasture

Discussed in the following pages are the capability classification used by the Soil Conservation Service, management of the soils by capability units, general management requirements on soils used for crops and pasture, and estimated yields of some of the principal crops grown under a high level of management.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for trees or engineering.

In the capability system, all kinds of soils are grouped at three levels, the capability class, subclass, and unit. These are discussed in the following paragraphs.

Capability Classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use.

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

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

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife habitat.

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife habitat.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife habitat.

Class VIII soils and landforms have limitations that preclude their use for commercial plants and

restrict their use to recreation, wildlife habitat, or water supply, or to esthetic purposes.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained, *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, but not in Cecil County, shows that the chief limitation is climate that is too cold or too dry.

In Class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in Class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife habitat, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–4 or IIIe–4. Thus, in one symbol, the Roman numeral designates the capability class or degree of limitation, and the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph. The Arabic numeral specifically identifies the capability unit within each subclass.

Management by capability units

In the following pages, each of the capability units in Cecil County is described and suggestions for the use and management of the soils in each unit are given. The units are not numbered consecutively, because not all units in the statewide system are represented in this county. The names of the soil series represented are mentioned in the description of each unit, but this does not mean that all the soils in a given series are in the unit. Woodstown sandy loam, 0 to 2 percent slopes, for example, is in capability unit IVe–5. To find the names of the soils in any given capability unit, refer to the "Guide to Mapping Units" at the end of this soil survey.

CAPABILITY UNIT I–4

This unit consists of deep, well-drained, medium-textured, nearly level soils on uplands. The hazard of erosion is slight. These soils retain moisture well and are fairly easy to work. They are in the Chester, Elsinboro, Glenelg, Matapeake, Montalto, and Neshaminy series.

Soils of this unit are well suited to general crops, forage crops, some truck crops, pasture, and orchards. Under good management they are suited to intensive cultivation. Good management practices include keeping tillage to a minimum, returning all crop residue to the soil, keeping the supply of plant nutrients high, and including legume and green-manure crops in the cropping system. These soils do not need artificial drainage or special management to control erosion. These soils are excellent for uses other than farming, but they should be reserved for farming if feasible.

CAPABILITY UNIT I–5

The only soil in this unit is Sassafras sandy loam, 0 to 2 percent slopes. This is a deep, well-drained, moderately coarse textured soil on uplands. The hazard of erosion is negligible, or is slight in a few local areas. The surface layer or plow layer is sandy loam and is easy to work through a wide range of moisture content.

This soil is well suited to most common crops, including truck crops. The supply of plant nutrients must be kept high for optimum growth, and legumes, green-manure and cover crops, and all crop residue should be fully used. This soil does not need special management to control erosion, but tillage needs to be kept to a minimum, and the surface should be protected by vegetation. Artificial drainage is not needed.

CAPABILITY UNIT I–6

The only soil in this unit is Comus silt loam. This is a deep, well-drained, medium-textured, nearly level soil on flood plains. This soil is periodically flooded but for only a few hours at a time. Some streambank cutting or erosion can occur. This soil has a high available moisture capacity and is moderately permeable. It is moderately easy to work.

This soil is well suited to general crops, forage crops, and pasture. Under good management it is suited to intense cultivation. Good management practices include keeping tillage to a minimum and returning all crop residue to the soil. This soil does not need artificial drainage. Diverting runoff from higher adjacent soils helps to control runoff.

CAPABILITY UNIT IIe–4

This unit consists of deep, well-drained, medium-textured soils on uplands. They are in the Chester, Collington, Elsinboro, Glenelg, Matapeake, Montalto, Neshaminy, and Sassafras series. These soils are gently sloping, and the hazard of erosion is moderate.

These well-aerated soils are well suited to orchards. Good management practices include keeping tillage to a minimum, returning all crop residue to the soil, rotating grazing on pasture, and controlling erosion. These soils have few limitations for most nonfarm uses.

CAPABILITY UNIT IIe–5

This unit consists of deep, well-drained, moderately coarse textured, gently sloping soils on uplands. The hazard of erosion is moderate. These soils are in the Collington and Sassafras series. The plow layer is sandy loam and easy to work.

These soils are suited to most crops if properly managed. Good management practices include contour farming and the use of plant cover as much of the time as possible. Diversion terraces that have safe outlets are needed on long slopes. Natural drainageways need to be kept sodded.

CAPABILITY UNIT IIe–10

This unit consists of well-drained, medium-textured, gently sloping soils on uplands. These soils are moderately deep to deep to bedrock. The hazard of erosion is

moderate. They are somewhat droughty. Permeability is moderate. They are in the Chrome and Legore series. Some areas are gravelly.

If moisture is available these soils are well suited to general crops, forage crops, and pasture. Good management is needed to maintain fertility and to conserve moisture. Using manure and returning all plant residue to the soil help to maintain fertility and tilth. Contour tillage, crop rotation, and stripcropping help control erosion and decrease runoff.

CAPABILITY UNIT IIe-13

This unit consists of moderately well-drained, medium-textured, gently sloping soils on uplands. The hazard of erosion is moderate. Permeability of the subsoil is moderately slow to slow. These soils are in the Aldino, Beltsville, Glenville, and Keyport series. The Aldino, Beltsville, and Glenville soils have a dense fragipan, and the Keyport soils have a very clayey, sticky subsoil.

These soils are not well suited to crops that are damaged by frost heave in winter. Runoff is so rapid that protecting the soils from erosion is an important concern of management. Another concern is improving drainage. The soils are at times too wet for crops to grow well, and at times they are too dry. Spot drainage by tile drains or ditches is needed in places. Good management practices include controlling erosion and removing excess water, particularly early in spring. In some years planting is delayed.

CAPABILITY UNIT IIe-16

This unit consists of moderately well drained, medium-textured, gently sloping soils on uplands. The hazard of erosion is moderate. Permeability in the subsoil is moderate to moderately slow. These soils are in the Butlertown, Mattapex, and Woodstown series.

These soils are not well suited to crops that are damaged by frost heave in winter. The main concerns of management are the control of erosion and the removal of excess water. The permeability in the subsoil facilitates drainage. Tile drains or ditches can be used. The removal of excess water is particularly important early in spring. In some years, planting is delayed.

CAPABILITY UNIT IIe-25

The only soil in this unit is Manor loam, 3 to 8 percent slopes, moderately eroded. This soil is deep to bedrock, well drained to excessively drained, and medium textured. It is on uplands over granitic rock. Permeability is moderate to moderately rapid. Natural fertility is moderate to high. Some areas are gravelly. This soil is easy to work.

If moisture is available, this soil is well suited to general crops, forage crops, orchards, and pasture. When cultivated this soil is very susceptible to erosion. Erosion can be controlled by using vegetative cover crops, contour tillage, and stripcropping. The return of crop residue to the soil and the use of all available manure promotes the conservation of moisture and the reduction of erosion.

CAPABILITY UNIT IIe-36

The only soil in this unit is Woodstown sandy loam, 2 to 5 percent slopes, moderately eroded. This is a moderately well drained, moderately coarse textured soil on uplands. It has a moderately permeable subsoil. This soil has a sandy loam surface layer or plow layer that is easy to work and generally easy to drain.

This soil is suited to most crops. Frost heave in winter can damage perennial crops. The control of erosion generally is a greater concern of management that the improvement of drainage. Tile drains or ditches can be used for needed drainage. This soil tends to be wet in spring. Planting is delayed in areas that are excessively wet.

CAPABILITY UNIT IIe-41

The only soil in this unit is Christiana fine sandy loam, 2 to 5 percent slopes, moderately eroded. This is a deep, well-drained, moderately coarse textured soil on uplands. It has a fine clay subsoil. Permeability in the subsoil is slow. The available moisture capacity is high. Tillage is easy in the loamy surface layer, but it is difficult in the clayey subsoil.

This soil is suited to general crops, forage crops, and pasture. Concerns of management include runoff and erosion in high moisture periods. Because the fine sandy loam surface layer is thin, and the clayey subsoil is slowly, permeable, runoff and erosion need to be controlled. Diversion terraces on long slopes, contour tillage, stripcropping, and grassed waterways help to reduce runoff and erosion. Cover crops should follow row crops if small grain or hay crops do not.

CAPABILITY UNIT IIw-1

This unit consists of nearly level, moderately well-drained, medium-textured soils on uplands. The hazard of erosion is slight or none. Permeability in the subsoil is moderate to moderately slow. These soils are in the Butlertown, Mattapex, and Woodstown series.

These soils are suited to most crops, if they are adequately drained. They can be drained easily by using tile drains or open ditches. Planting dates are delayed in areas of these soils if they are excessively wet. These soils do not dry as quickly or warm as readily as most soils that have better drainage. Frost heave can damage perennial crops in these areas.

CAPABILITY UNIT IIw-3

The only soil in this unit is Glenville silt loam, 0 to 3 percent slopes. This is a moderately well drained, medium-textured soil on uplands. Permeability is moderately slow in the subsoil. Available moisture capacity is moderate. It has a fragipan in the subsoil that restricts the movement of water, air, and roots. The water table is high in winter and in spring. This soil dries and warms slowly in spring.

This soil is suited to general crops, forage crops, and pasture. Frost heave can damage plants in winter. Practices that maintain good tilth and return crop residue to the soil are needed. The main concern of management is the excess moisture. Excess moisture can be removed by the use of tile drains, open ditches, and grassed waterways. Diversion of runoff from higher slopes is helpful.

CAPABILITY UNIT IIw-5

The only soil in this unit is Woodstown sandy loam, 0 to 2 percent slopes. This is a moderately well drained, moderately coarse textured soil on uplands. Permeabil-

ity in the subsoil is moderate. The hazard of erosion is slight or none.

This soil is suited to most crops, if it is adequately drained. Generally, it is easy to drain. Tile drains function well, but ditches can also be used. Planting may be delayed in some years because the soil is wet early in spring and is slow to warm up. Frost heave damages some perennial crops in winter.

CAPABILITY UNIT IIw–7

The only soil in this unit is Codorus silt loam. This is a nearly level, moderately well drained to somewhat poorly drained, medium-textured soil on flood plains. It has a seasonally high water table, though water moves readily through the soil. Available moisture capacity is moderate.

This soil is suited to most crops, but periodic flooding limits its suitability for some crops. In some years, late planting or replanting of corn is needed. Flooding is a more important concern of management than controlling erosion. Ditches that intercept runoff from adjacent higher soils, graded strips for crops, and grassed waterways to safely dispose of excess surface water help to control water and erosion. Tile drains help to improve internal drainage of this soil.

CAPABILITY UNIT IIw–8

This unit consists of nearly level, moderately well drained, medium-textured soils on uplands. Permeability in the subsoil is slow. These soils are in the Aldino, Beltsville, and Keyport series. Water, air, and root penetration is restricted in the Aldino and Beltsville soils by a dense fragipan and in the Keyport soils by a highly clayey, sticky subsoil. These soils should be worked only within a narrow range of moisture content.

These soils are suited to corn, soybeans, pasture, and other crops if they are managed well. These soils are wet and cold in spring. Crops that are planted late need to be selected in preference to those that are commonly planted early in spring.

These soils generally are difficult to drain because of the slow movement of water through the subsoil. Properly spaced ditches should be used to drain the soils. Tile drains can be used for spot drainage; however, they do not function properly in the tight subsoil. If much moisture is present, the use of heavy machinery tends to compact and cause puddles to form on the surface layer. Frost heave can damage perennial crops.

CAPABILITY UNIT IIs–4

The only soil in this unit is Rumford loamy sand, 2 to 5 percent slopes, on uplands. It is a somewhat excessively drained soil that has a thick, very sandy surface layer underlain by a somewhat finer-textured subsoil. Permeability in the subsoil is moderately rapid. This soil is seasonally droughty. Some areas are moderately eroded, and the sandy surface layer tends to blow during dry periods.

This soil warms early in spring and can be used for the earliest crops, especially truck crops. It generally is more limited by seasonal droughtiness than by other factors. The main concern of management is the conservation of moisture and plant nutrients. Irrigation is especially desirable in dry periods during the growing season. Contour tillage in alternate strips of cultivated and close-growing crops helps to slow runoff and to facilitate the absorption of water by the soil. Other concerns of management are the control of soil blowing and erosion in places. Only moderate erosion control practices are needed. These areas should be kept under a cover of plants as much of the time as is feasible. Windbreaks are useful in places.

CAPABILITY UNIT IIs–7

The only soil in this unit is Chillum silt loam, 2 to 5 percent slopes, moderately eroded. It is a moderately eroded, moderately deep, well-drained, medium-textured soil on uplands over a very hard substratum. Permeability is moderately slow. The available moisture content is moderate. This soil is slightly droughty during long dry periods, because the hard subsoil limits the effective depth to which roots can penetrate.

This soil is suited to general crops, forage crops, and pasture, if sufficient moisture is available. Good management includes the use of an appropriate cropping system. Turning manure, cover crops, and crop residue into the soil helps to maintain tilth, reduce erosion, and increase the available water capacity. Contour tillage, strip-cropping, grassed waterways, and diversion terraces help to reduce erosion and conserve moisture.

CAPABILITY UNIT IIs–9

The only soil in this unit is Aura gravelly sandy loam, 2 to 5 percent slopes, moderately eroded. It is a deep, well-drained soil on uplands. Permeability is moderately slow in the subsoil. It is droughty, but the moisture it holds is readily available to plants.

This soil is suited to general crops, forage crops, and pasture. Applying manure, using cover crops, and returning crop residue to the soil help to maintain moisture. Contour tillage, stripcropping, grassed waterways, and diversion terraces help reduce erosion and conserve moisture.

CAPABILITY UNIT IIIe–4

This unit consists of deep, well-drained, medium-textured, gently sloping to moderately sloping soils on uplands. The hazard of erosion is moderate. These soils are in the Collington, Elsinboro, Glenelg, Matapeake, Montalto, Neshaminy, and Sassafras series.

These soils are severely limited because of slope and the risk of erosion, unless complex soil and water conservation practices are used. Keeping tillage to a minimum, contour stripcropping, use of well-sodded diversions and waterways, and planting orchards on the contour help to control erosion. Green-manure crops, cover crops, or sodding helps to protect the surface layer.

CAPABILITY UNIT IIIe–5

This unit consists of deep, well-drained, moderately sloping, moderately coarse textured soils on uplands. The hazard of erosion is moderate. These soils are somewhat droughty in long dry periods. They are in the Collington and Sassafras series.

These soils have severe limitations, unless complex soil and water conservation practices are used. Keeping tillage to a minimum and growing protective vegetation help to control erosion. Contour stripcropping, diver-

sion terraces, and grassed waterways help to reduce further erosion and to conserve moisture.

CAPABILITY UNIT IIIe-7

The only soil in this unit is Chillum silt loam, 5 to 10 percent slopes, moderately eroded, on upland. This is a moderately deep, well-drained, medium-textured soil over a very hard substratum. It is slightly droughty in long dry periods, because the hard substratum limits the depth roots can penetrate. Permeability is moderate to moderately slow. Available water capacity is moderate. The hazard of erosion is moderate. This soil generally is easy to till.

This soil is well suited to general crops, forage crops, and pasture, if sufficient moisture is available. Controlling erosion is a more important concern of management than overcoming the effects of seasonal droughtiness. Returning manure, cover crops, and crop residue to the soil helps maintain tilth, reduce erosion, and increase available moisture. Contour tillage, stripcropping, grassed waterways, and diversion terraces also help to control erosion.

CAPABILITY UNIT IIIe-9

The only soil in this unit is Aura gravelly sandy loam, 5 to 10 percent slopes, moderately eroded, on uplands. This is a deep, well-drained, moderately sloping, sandy and gravelly soil. Permeability is moderately slow. The available moisture capacity is moderate.

This soil is suited to general crops, forage crops, and pasture. Controlling erosion is a more important concern of management than overcoming the effects of droughtiness. The use of hay crops, manure, and cover crops, and returning crop residue to the soil, help to control erosion and to conserve moisture. Contour tillage, stripcropping, grassed waterways, and diversion terraces also help to control erosion.

CAPABILITY UNIT IIIe-10

This unit consists of moderately deep to deep to bedrock, well-drained, medium-textured, moderately sloping soils on uplands. The hazard of erosion is moderate. Permeability is moderate. These soils are in the Chrome and Legore series.

These soils are suited to general crops, forage crops, and pasture, if sufficient moisture is available. Good management of these soils includes growing of hay crops more years than clean-tilled crops. Returning manure, cover crops, and plant residue to the soil helps to maintain fertility and to conserve moisture. Contour tillage, stripcropping, diversion terraces, and grassed waterways help control runoff and erosion.

CAPABILITY UNIT IIIe-13

This unit consists of moderately well drained to somewhat poorly drained, medium-textured, gently sloping to moderately sloping soils on uplands. The hazard of erosion generally is moderate. Permeability in the subsoil is moderately slow to slow. These soils belong to the Beltsville, Conowingo, Glenville, and Keyport series. Beltsville and Glenville soils have a dense fragipan. Conowingo and Keyport soils have a clayey, sticky subsoil. Drainage is impeded in these soils.

These soils are suited to general crops, forage crops, and pasture. Controlling erosion is a more important concern of management than overcoming the effects of impeded drainage, because runoff on these soils is high. Regardless of the high runoff, these soils stay wet until late in spring. This delays planting. Frost heave damages some crops. In some years, these soils are hard and dry in summer. Good management practices on these soils includes growing hay crops more years than clean-tilled crops. Contour tillage, stripcropping, diversion terraces, and grassed waterways help to control runoff.

CAPABILITY UNIT IIIe-16

This unit consists of moderately well drained, medium-textured, gently sloping to moderately sloping soils on uplands. The hazard of erosion is moderate. Permeability in the subsoil is moderate to moderately slow. Available moisture capacity is high. These soils dry slowly. They are fairly easy to work. Soils of this unit are in the Butlertown and Mattapex series.

These soils are suited to general crops, forage crops, and pasture. In some years, planting is delayed in spring because the soil is not sufficiently dry. Controlling erosion is a more important concern of management than draining these soils. A good cropping system includes close-growing crops at least half of the time. Turning available manure, cover crops, and crop residue into the soil helps to reduce erosion and to maintain good tilth. Contour tillage, stripcropping, diversion terraces, and grassed waterways help to control erosion.

CAPABILITY UNIT IIIe-25

The only soil in this unit is Manor loam, 8 to 15 percent slopes, moderately eroded. This is a deep, well-drained to somewhat excessively drained, medium-textured soil on uplands over granitic rock. Erosion is severe in cultivated areas. Permeability is moderate to moderately rapid. Natural fertility is high.

This soil is suited to general crops, forage crops, orchards, and pasture, if sufficient moisture is available. Regardless of the fact that this soil is highly fertile, it is limited by erosion if it is cultivated. A good cropping system includes hay crops at least half of the time. Turning available manure and crop residue into the soil helps to control erosion and to conserve moisture. Use of vegetative cover, contour tillage, stripcropping, diversion terraces, and grassed waterways also helps to control erosion.

CAPABILITY UNIT IIIe-33

The only soil in this unit is Rumford loamy sand, 5 to 10 percent slopes. This is a deep, somewhat excessively drained, gently sloping to moderately sloping soil on uplands. It has a thick, sandy surface layer and a somewhat finer textured subsoil. The hazards of erosion and soil blowing are severe. Permeability in the subsoil is rapid. This soil is seasonally droughty.

This soil is very well suited to truck crops and other early crops. Intensive moisture conservation is needed. Water for irrigation in dry seasons is also needed. The main concern of management is controlling erosion. Tilling on the contour in narrow strips and growing protective vegetation most of the time help to control erosion.

CAPABILITY UNIT IIIe-36

This unit consists of moderately well drained and poorly drained, gently sloping and moderately sloping, moderately coarse textured soils on uplands. The hazard of erosion is slight to moderate. Permeability is moderate. Available moisture capacity is moderate to high. These soils are easy to work, if they are not too wet. They are in the Fallsington and Woodstown series.

These soils are suited to general crops, forage crops, and hay. They are limited by wetness and slope. In some winters, frost heave damages some of the crops. Tile drains or ditches can be used to drain these soils. A good cropping system includes close-growing crops at least half of the time and cover crops as needed. Graded stripcropping, diversion terraces, and grassed waterways help to maintain a suitable moisture content and to control erosion.

CAPABILITY UNIT IIIw-1

This unit consists of nearly level and gently sloping, somewhat poorly drained, medium-textured soils on uplands. Permeability is moderate. Available moisture capacity is high. These soils can be easily worked if the moisture content is suitable. These soils tend to be hard when dry. They are in the Barclay series.

These soils are well suited to general crops, forage crops, and pasture if drainage has been improved. Planting dates are delayed at times because of wetness. In some winters, frost heave damages some crops. Good management includes the maintainance of drainage systems.

CAPABILITY UNIT IIIw-6

This unit consists of nearly level and gently sloping, poorly drained, moderately coarse textured soils on uplands. Permeability in the subsoil is moderate. The water table is at or near the surface in winter and in spring. It rarely is below a depth of about 3 feet. Available moisture capacity is moderate. Natural fertility is moderate. These soils are in the Fallsington series.

These soils are suited to corn, soybeans, hay, and pasture. Erosion control is needed on some of the steeper slopes. Drainage is not difficult, if adequate outlets are present. Tile drains function well. Ditches should not penetrate the loose, sandy substratum. Runoff from higher adjacent areas needs to be intercepted and diverted.

CAPABILITY UNIT IIIw-7

This unit consists of nearly level and gently sloping, poorly drained, medium-textured soils on uplands. Permeability in the subsoil is moderate to moderately slow. The water table is at or near the surface in spring and in winter, and it is rarely below a depth of about 3 feet. Available moisture capacity is high. These soils are difficult to work if they are excessively wet or excessively dry. They are in the Fallsington, Hatboro, and Othello series. The Hatboro soils of this unit are subject to flooding.

These soils are suited to corn, soybeans, hay, and pasture, if artificially drained. If flooding is frequent or severe, the Hatboro soils of this unit commonly are used for grazing and woodland. Row crops can be grown for several consecutive years on these soils, if cover crops and careful management are used. A main concern of management is the control of erosion on some of the more sloping areas. If outlets are adequate drainage is not difficult. Closely-spaced tile drains or ditches can be used, and ditches should not penetrate the sandy substratum. Runoff from adjacent higher areas needs to be intercepted and diverted.

CAPABILITY UNIT IIIw-9

This unit consists of nearly level to gently sloping, poorly drained, medium-textured soils on uplands. These soils have a fine-textured subsoil. Permeability in the subsoil is slow. The water table is at or near the surface in winter, and stays at this level until late in spring. These soils are in the Elkton series.

These soils are better suited to corn, hay, and soybeans than to other crops. They are suited to pasture. These soils are more difficult to drain than other poorly drained soils. Tile drains do not function well in the tight subsoil. Ditches need to be closely spaced. To provide better surface drainage, the soils can be graded between ditches or crops can be planted in elevated or graded rows. Runoff from adjacent higher areas needs to be intercepted and diverted.

CAPABILITY UNIT IVe-3

This unit consists of deep, well-drained, medium-textured to moderately fine textured, gently sloping to strongly sloping soils. The severely eroded soils of this unit are in the Collington, Glenelg, Matapeake, Montalto, and Sassafras series, and the moderately eroded soils are in the Collington, Glenelg, Matapeake, and Neshiminy series. This unit also includes areas of Loamy and clayey land, sloping. In the severely eroded areas, the plow layer consists of what was originally subsoil, and gullies are common to many.

Because of slope and erosion, poor moisture content, and low available plant nutrients these soils are marginal for tilled crops. They are better suited to permanent hay crops, pasture, or contoured orchards that have permanent ground cover than to other uses. Tilled crops should be grown in narrow, contour strips. The main concern of management is the control of erosion.

CAPABILITY UNIT IVe-5

This unit consists of deep, moderately well drained to somewhat excessively drained, moderately coarse textured, gently sloping and moderately sloping soils on uplands. The hazard of erosion is moderate to severe. The moisture capacity generally is low to moderate. The surface layers of these soils are sandy and easy to work. Moderately eroded soils are in the Rumford, Sassafras, and Woodstown series. Severely eroded soils are in the Sassafras and Woodstown series. These soils warm early in spring, except the moderately well drained Woodstown soils that warm more slowly.

These soils are better suited to permanent hay crops than to other crops. They also are suited to pasture, and they are marginally suited to tilled crops. Keeping tillage to a minimum helps control further erosion. If feasible tilled crops should be grown in narrow contour strips. Intensive erosion control measures and the conservation of moisture are needed.

CAPABILITY UNIT IVe-7

This unit consists of deep and moderately deep, moderately coarse textured and medium textured, well-

drained soils on uplands. Soils in this unit are moderately eroded to severely eroded and are gently sloping to moderately sloping. They are in the Aura and Chillum series.

These soils are better suited to permanent hay crops or to pasture than to other crops. Because of slope these soils are marginally suited to clean-tilled crops. Clean-tilled crops should be grown only once in five years. Narrow contour strips, cover crops, diversion terraces, and grassed waterways need to be installed and maintained if clean-tilled crops are grown. Manure can be used to encourage maximum growth and to help control erosion.

CAPABILITY UNIT IVe-9

This unit consists of moderately well drained, medium-textured and moderately fine textured, gently sloping and moderately sloping soils on uplands. The hazard of erosion is mostly severe. These soils have a fragipan or clayey subsoil. Water penetrates slowly, and runoff has eroded away the original surface layer. The present plow layer consists chiefly of what was once subsoil. These soils are in the Beltsville, Butlertown, and Keyport series.

These soils are severely limited for tilled crops by erosion. These soils are better suited to hay, pasture, or other close-growing crops than to cultivated crops. The main concern of management is erosion. Impeded drainage is also a concern. Artificial drainage is needed, but excess water needs to be intercepted and disposed of carefully. Diversions and grassed waterways help control erosion.

CAPABILITY UNIT IVe-10

This unit consists of well-drained, medium-textured and moderately fine textured, moderately sloping or strongly sloping soils on uplands. The hazard of erosion is moderate to severe. Permeability is moderate. These soils are moderately deep and deep to bedrock. They are somewhat droughty and in places are gravelly. These soils are in the Chrome and Legore series.

These soils are better suited to permanent hay crops or pasture than to other crops. If clean-tilled crops are grown, narrow strips should be used. Returning crop residue to the soil, and establishing cover quickly, help to control erosion. Diversion terraces and grassed waterways also help to control erosion and to conserve moisture.

CAPABILITY UNIT IVe-25

This unit consists of deep, well-drained to somewhat excessively drained, moderately sloping and strongly sloping soils on uplands. The hazard of erosion is moderate or severe. These soils erode very easily (fig. 5). They have moderate to moderately rapid permeability and moderate to high natural fertility. In places areas contain gravelly spots. The soils of this unit are in the Manor series.

These soils generally are not well suited to cultivation. They are better suited to permanent hay crops or pasture. Mixing available manure and crop residue into the soils helps to reduce erosion and conserve moisture. Maintaining a vegetative cover, tilling in narrow contour strips, and using diversion terraces and grassed waterways and help control erosion.

Figure 5.—**Shallow gullies and rills on soils in capability unit IVe-25. When cultivated, intensive conservation practices are needed to prevent excessive erosion.**

CAPABILITY UNIT IVw-3

The only soil in this unit is Leonardtown silt loam, 0 to 2 percent slopes. This is a moderately deep, poorly drained soil on uplands. This soil has a slowly permeable fragipan. The dense, hard, plate-like lower subsoil severely restricts movement of water, air, and roots. Water is ponded on or at the surface during the winter and late in spring. Percolation of moisture into the subsoil is slow.

This soil is poorly suited to farming. It is especially poorly suited to small grain crops because of wetness. Drainage is needed if corn or soybeans are grown. If this soil is drained, it can be used for crops continuously if cover crops are grown and turned under to maintain tilth and fertility. Artificial drainage is needed for hay crops and pasture. Open ditches and bedding are effective drainage methods. Animals and heavy equipment damage this soil when it is wet.

CAPABILITY UNIT IVs-1

The only soil in this unit is Evesboro loamy sand, 0 to 5 percent slopes. This is a deep, excessively drained, sandy soil on uplands. Permeability is rapid. Available moisture capacity is low, and this soil is seasonably droughty. It contains very small amounts of natural plant nutrients, and is susceptible to soil blowing and water erosion.

This soil is suited for corn and soybeans and is especially well suited to early truck crops. Good management includes use of a close-growing crop, establishing windbreaks, and stripcropping. Placing crop rows across the prevailing direction of the wind helps to control soil blowing. Turning under crop residue helps maintain the supply of moisture. Irrigation water promotes good crop growth, especially in dry years.

CAPABILITY UNIT Vw-1

This unit consists of poorly drained, medium-textured, slowly permeable soils at the bases of slopes and in drainageways. Available moisture capacity is high. Soil moisture seeps out of adjacent hills and through these soils most of the year. Flooding generally is caused by runoff from surrounding slopes. These soils are in the Baile series.

These soils are suited to forage crops and grazing. They are not suited to row crops or small grains because of wetness. They can be drained with tile drains or ditches. Drainage also is effective on hillside seeps along the bases of slopes. Open ditches are helpful in draining pasture. Frost heave damages plants in places. Animals and equipment damage soils if wet. Vegetative cover and grassed waterways help control erosion which is a concern of management on gently sloping soils.

CAPABILITY UNIT VIe-2

This unit consists of deep, well drained and moderately well drained, moderately sloping to steep soils on uplands. Permeability is moderate or moderately slow. The hazard of erosion is moderate to severe. These soils are in the Collington, Glenelg, Keyport, Matapeake, Montalto, and Sassafras series. Loamy and clayey land, moderately steep is also in this unit.

This unit is suited to pasture, woodland, or grass-covered orchards. Unless intensively managed, these soils and this land type are too steep or too eroded for cultivated crops. If management is intensive row crops can be grown occasionally. Diversion terraces, grassed waterways, and buffer strips are needed in some areas. Overgrazing damages sod and causes erosion. Areas not needed for hay, orchards, or pasture can be reestablished in woods. All woods need to be carefully managed for maximum economic return and for soil and watershed protection.

CAPABILITY UNIT VIe-3

This unit consists of deep and moderately deep, well-drained and somewhat excessively drained, moderately sloping to strongly sloping soils on uplands. The hazard of erosion is severe. These soils are in the Chrome and Manor series.

These soils are suited to pasture. They are not suited to cultivation because of the severe hazard of erosion. Good management includes protection from overgrazing, clipping to prevent undesirable plant growth, and contour furrowing and terracing to improve available moisture content. Wooded areas need to be protected from fire and grazing. Brush and weeds need to be controlled.

CAPABILITY UNIT VIw-1

Only Mixed alluvial land is in this unit. It is dominantly poorly drained, very recently deposited alluvial materials on flood plains.

This land generally is suited to grazing, but grazing is not always economically feasible. Grasses that tolerate water and legumes can be established for grazing, and are grown mostly on cleared areas. Because of seasonal wetness, a high water table much of the year, and the hazard of flooding, grazing is not possible year-round. Wooded areas should be kept in woods, and managed for timber. Other areas can be planted to trees. This land type is suited as wildlife habitat and for outdoor recreation. Many sites are suitable for the construction of ponds.

CAPABILITY UNIT VIs-3

This unit consists of deep, well-drained, very stony, medium-textured, gently sloping to strongly sloping soils on uplands. These soils are in the Manor and Montalto series. They are better suited to trees than to poorly managed pasture. Stoniness makes cultivation impractical and pasture management difficult. Good pasture management includes protection from overgrazing and clipping to control brush and weeds. Wooded areas need to be protected from fire and grazing.

CAPABILITY UNIT VIIe-2

This unit consists of well-drained, moderately sloping to moderately steep soils in the Coastal Plain part of the county. These soils are severely eroded. Some areas contain loose sand and a few wet spots. These soils are in the Aura, Chillum, and Sassafras series. Loamy and clayey land is also in this unit.

Most of these soils and this land type are not suited to cultivated crops or hay crops. They are suited to grazing, but this needs to be carefully limited and controlled to prevent overgrazing or other damage to the sod. This damage affects not only the soils of this unit, but also other areas that receive deposits of debris and runoff from this unit. Large areas of this unit are in second-growth and severely cutover woods that need to be protected and managed for greatest economic return and for watershed protection. Many thin stands and cleared areas need to be reestablished in woods. This unit has potential value for wildlife habitat and for some outdoor recreational uses.

CAPABILITY UNIT VIIe-3

This unit consists of moderately deep and deep, well-drained, moderately sloping to moderately steep soils on uplands. These soils are mostly severely eroded. They are in the Chrome, Legore, and Manor series.

These soils are not well suited to pasture. Encroachment by brush and weeds is difficult to control. Idle and poor pasture needs to be established in woods. These soils are too steep and eroded to be used for cultivated crops. Good woodland management includes protecting the soils from grazing and fire and the selective cutting of mature and marketable trees.

CAPABILITY UNIT VIIs-1

This unit consists of excessively drained, gently sloping to steep, sandy soils. Permeability is rapid. These soils are in the Evesboro series.

These soils are very severely limited by droughtiness and by slope. They are not suitable for crops or pasture but provide limited grazing or shelter for livestock. They are not well suited to trees. If these soils are properly managed, Virginia pine can be grown for pulp wood. They are also suited to loblolly pine. This unit has a potential for wildlife habitat and for recreation.

CAPABILITY UNIT VIIs-4

The only soil in this unit is Watchung very stony silt loam. This is a poorly drained, very stony, medium-textured, nearly level soil on uplands. Permeability is slow.

This soil is not suited to crops or to pasture, because it is too stony and difficult to drain. Stoniness is a greater concern of management than wetness and the hazard of erosion. Few trees of economic value can be grown on this soil. Good woodland management includes protection of existing woods and sites to be reestablished in woods from overgrazing and fire. It also includes selective cutting of mature and marketable trees.

CAPABILITY UNIT VIIIw-1

Only Tidal marsh is in this unit. This marsh is regularly subject to flooding by high tides, by waters that range from salty through various degrees of brackishness. It is suited to wildlife habitat, particularly for waterfowl and muskrats. It is not used for farming.

CAPABILITY UNIT VIIIs-1

This unit consists mainly of Stony land. This land supports little marketable timber and is not suited to farming. It is used chiefly for recreation or for esthetic value in conjunction with some of the adjacent soils.

CAPABILITY UNIT VIIIs-2

Only Coastal beaches are in this unit. The beaches border the Chesapeake Bay, Northeast River, and Elk River. They are chiefly suitable for recreational uses. They are not suited to farming. In some areas it is desirable to stabilize the loose sands to prevent soil blowing, drifting, and washing that might damage the beaches or other areas adjacent to the beaches.

CAPABILITY UNIT VIIIs-4

This unit consists of Clay pits and of Gravel and borrow pits. Unless they are completely reclaimed, they are not suited to farming.

General management requirements

Some management practices needed to obtain a good growth of crops at minimum risk to the soil can be related to specific kinds of soils or to groups of similar soils. Among these practices are the drainage of wet soils, irrigation of soils in dry years, use of adequate soil amendments, use of appropriate cropping systems, use of proper tillage, making good use of crop residue and other available organic materials.

Drainage.—Improved drainage is one of the principal concerns of management in Cecil County. In about 32 percent of the acreage some artificial drainage is needed. As a rule, the soils in these areas are poorly suited to crops unless artificial drainage is established and maintained.

About 4 percent of the acreage in the county is made up of wet soils not suited to crops. Improved drainage on these soils increases quantity and quality of pasture. These soils generally make up only parts of fields. Random drainage systems are more useful and practical than regularly patterned systems.

Soils that require no artificial drainage are those of the Aura, Chester, Chillum, Christiana, Chrome, Collington, Comus, Elsinboro, Evesboro, Glenelg, Legore, Manor, Matapeake, Montalto, Neshaminy, Rumford, and Sassafras soils as well as Loamy and clayey land. These soils make up about 60 percent of the acreage in the county.

Soils that require moderate artificial drainage are those of the Aldino, Barclay, Beltsville, Butlertown, Codorus, Conowingo, Glenville, Keyport, Mattapex, and Woodstown series. These soils make up about 27 percent of the acreage in the county.

Soils that require intensive artificial drainage are those of the Baile, Elkton, Fallsington, Hatboro, Leonardtown, Othello, and Watchung series, and Mixed alluvial land. Mixed alluvial land is not generally suitable for crops, but it can be used for pasture if drained. These soils make up about 11 percent of the acreage in the county.

The rest of the county is made up of miscellaneous land types that generally are not suitable for farming, even if drained. They make up about 2 percent of the acreage in the county.

The kinds of drainage systems adapted to each of the above soils that requires artificial drainage can be found in the Drainage Guide for Maryland.[3]

Mixed alluvial land and the Baile, Codorus, Comus, and Hatboro soils generally are subject to flooding by stream overflow. This hazard varies from site to site. For any particular site, records of flooding are the best guide to limitations and to the degree of flood protection that is required.

Irrigation.—Cecil County is in a region of moderate rainfall that furnishes all the moisture used by crops. There are soils, however, that have low or very low available water capacity, and there have been many dry years. In these years there has been less than normal rainfall or poorly distributed rainfall and rather extended periods of drought during crop seasons.

In such years or seasons, the availability of irrigation water could be an important factor in sustaining crop growth. In Cecil County, where most soils are gently sloping or sloping, sprinkler irrigation is the most satisfactory. There are few places where irrigation by flood or ditch is feasible.

The section "Engineering Uses of the Soils" gives some soil characteristics that influence irrigation. These are primarily available water capacity and permeability, or the rate at which water passes into and through the soil. For soils that have high available water capacity, irrigation is less likely to be needed than for soils that have low available water capacity. Soils that have moderate to rapid infiltration and permeability require less time to absorb given amounts of irrigation water than soils that have slow or very slow infiltration and permeability. Any soil that is not well drained should have a complete artificial drainage system installed if irrigated.

Information concerning irrigation is given in the "Maryland Guide for Sprinkler Irrigation," which can be obtained from the Maryland Agricultural Extension Service.

Fertilizer and Soil Amendments.—The soils in Cecil County are acid, and some of them are extremely acid. Some of the soils have low to moderate natural fertility. All general farm crops grown in the county require some fertilizer and lime, and many soils require large amounts for optimum growth. The kinds and amounts of the

[3] UNITED STATES DEPARTMENT OF AGRICULTURE In cooperation with Md. Agr. Expt. Station. DRAINAGE GUIDE FOR MARYLAND COASTAL PLAINS. (Mimeographed) 1960.

lime and fertilizer needed can be determined by observing crop response in the past, by determining the yield level at which the farmer wishes to operate, and by studying the records of previous management practices, especially the results obtained from chemical soil tests. Assistance in determining the specific requirements for the soils can be obtained from the Soil Testing Laboratory of the University of Maryland.

The very sandy soils that need the least amount of lime commonly need the most fertilizer. Also, these sandier soils may benefit greatly from split, frequent applications rather than large, single applications of fertilizer.

Cropping Systems.—Using a good cropping system is an efficient way of maintaining a supply of organic matter in the soil, and especially helps to prevent or check the loss of soil material through erosion. If a legume or green-manure crop is plowed under, it adds organic material and nitrogen to the soil. As a result, the crop growth is generally higher and the soil is less susceptible to erosion.

A good cropping system also helps to control weeds as well as infestations of insects and some soil-borne diseases. It slows the rate at which plant nutrients are depleted.

Tillage.—For maximum crop growth, soils must be kept in good tilth. Tillage of any kind tends to break down the structure of soils, particularly in the plow layer and in the plowsole immediately below. Minimum tillage is the least amount of tillage needed for quick germination of seeds, adequate growth of seedlings, and for normal crop maturity.

Plow planting or wheel tracking-planting at the time of plowing, without an intervening period before seeding or setting field plants, is a good method of keeping tillage to a minimum. Proper scheduling and application of appropriate herbicides generally eliminates at least one cultivation.

Many soils become compacted and hard to work because of repeated cultivation of row crops by heavy machinery. Such compaction decreases the rate at which water infiltrates into soils, and it decreases the internal aeration of soils. It also slows down internal drainage which may be especially detrimental on soils that are not naturally well drained. If sloping soils become compacted, the amount and rate of runoff are accelerated and the hazard of erosion is increased. Reducing the frequency of tillage, replenishing organic matter, and including sod crops in the cropping system help restore structure to soils that have become excessively compacted.

Contour farming is a widely accepted system of soil management in areas that are susceptible to erosion losses that damage soils and decrease yields. All of the sloping soils that are suitable for regular cultivation but susceptible to erosion should be tilled on the contour, if the conformation of the landscape permits. Stripcropping on the contour is especially effective and useful in places where soil losses make these soils critically marginal for regular cultivation.

The Cecil Soil Conservation District will accept applications for assistance in laying out the contours for contour farming, in planning contour stripcropping and field stripcropping, as well as all other aspects of conservation farming.

Residue Management.—The residue of crops is the part of the plant left in the field after harvesting is complete. All plant material not needed for harvest should be left in the field. This plant material is excellent protection against erosion, and generally should remain on the surface until plowing is necessary. If these residues are turned under they help to maintain the organic-matter content in the soil. This improves soil structure and available water capacity of the plow layer. It promotes aeration of the soil and infiltration of water into it, and decreases runoff that accelerates erosion.

The above applies to losses of soil by water erosion. There is also a hazard of loss by soil blowing, particularly from the very sandy soils of the Evesboro and Rumford series. Residue left on the surface prevents most soil blowing, and traps much of the sand that is blown from less well-protected areas.

Estimated yields

The soils of Cecil County vary considerably in suitability for crops. The best soils consistently produce favorable yields of most cultivated crops. Other soils, though suitable for many crops, produce lower yields. Some soils are better suited to less intensive use than to cultivated crops.

Table 4 shows the estimated average yearly yields per acre of specific crops grown on the soils of Cecil County under improved management.

To obtain the yields shown in table 4, all or nearly all of the following practices are needed:

1. Contour tillage, stripcropping, terracing, minimum tillage, and similar practices are used to help control erosion; soils that need drainage are adequately drained; excess water is disposed of safely; and irrigation is supplied to soils that need it.
2. Crop rotations are of adequate length to control weeds and maintain structure and permeability.
3. Manure, crop residue, and green-manure crops are turned under to supply nitrogen, other nutrients, and organic matter. This improves the nutrient supply and the physical condition of the soil, and reduces the risk of erosion.
4. Fertilizer and lime are applied according to the needs indicated by soil tests; the county agent can be consulted about making these tests.
5. Suitable methods of plowing, preparing the seedbed, and cultivating are used, but tillage is kept to a minimum.
6. Soil preparation, planting, cultivating, and harvesting are done at the right time and in the proper way.
7. The best adapted varieties are planted. Some varieties of crops require some special management for optimum growth.
8. Weeds, diseases, and insects are controlled.

The yields shown in table 4 are not presumed to be the highest yields obtainable. They represent a goal that is practical for most farmers to reach if they use good management. Yields on any soil in a given year can be expected to vary because of differences in management, in the weather, in the crop varieties grown, and in the

TABLE 4.—*Estimated average acre yields of principal crops under a high level of management*

[Clay pits (Cp), Coastal beaches (Co), Gravel and borrow pits (Gv), Made land (MaB and MaD), Stony land (St), and Tidal marsh (Tm) are not listed in table because they are not suitable for crops or pasture and are too variable for yields to be reasonably estimated. Absence of yield value indicates crop is not suited to soil or is not commonly grown]

Soil	Corn	Soybeans	Barley	Wheat	Clover hay	Alfalfa	Bluegrass pasture	Tallgrass pasture
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre days* [1]	*Cow-acre days* [1]
Aldino silt loam, 0 to 3 percent slopes	100	40	55	45	3.0		135	200
Aldino silt loam, 3 to 8 percent slopes, moderately eroded	100	40	55	45	3.0		135	200
Aura gravelly sandy loam, 2 to 5 percent slopes, moderately eroded	100	35	50	45	3.0	3.5		200
Aura gravelly sandy loam, 5 to 10 percent slopes, moderately eroded	90	30	45	40	2.5	3.0		200
Aura gravelly sandy loam, 10 to 15 percent slopes, moderately eroded	80		40	35	2.5	3.0		170
Baile silt loam, 0 to 3 percent slopes					2.0			115
Baile silt loam, 3 to 8 percent slopes					2.0			115
Barclay silt loam, 0 to 2 percent slopes	120	35			3.0			170
Barclay silt loam, 2 to 5 percent slopes	120	35			3.0			170
Beltsville silt loam, 0 to 2 percent slopes	100	35	45	45	3.0			170
Beltsville silt loam, 2 to 5 percent slopes, moderately eroded	100	35	45	45	3.0			170
Beltsville silt loam, 5 to 10 percent slopes, moderately eroded	90	30	45	40	3.0			170
Beltsville silt loam, 5 to 10 percent slopes, severely eroded	80		35	35	2.5			145
Butlertown silt loam, 0 to 2 percent slopes	130	45	55		3.5	4.5		200
Butlertown silt loam, 2 to 5 percent slopes, moderately eroded	130	45	55		3.5	4.5		200
Butlertown silt loam, 5 to 10 percent slopes, moderately eroded	120	40	50		3.5	4.5		200
Butlertown silt loam, 5 to 10 percent slopes, severely eroded	110				3.0	4.0		170
Butlertown silt loam, 10 to 15 percent slopes, moderately eroded	110				3.0	4.0		170
Chester silt loam, 0 to 3 percent slopes	135	45	60	50	3.5	5.5	160	315
Chester silt loam, 3 to 8 percent slopes, moderately eroded	135	45	60	50	3.5	5.5	160	315
Chillum silt loam, 2 to 5 percent slopes, moderately eroded	130	45	55	50	3.5	5.0		285
Chillum silt loam, 5 to 10 percent slopes, moderately eroded	120	40	50	45	3.5	4.5		255
Chillum silt loam, 5 to 10 percent slopes, severely eroded	100			40	3.0	4.0		230
Chillum silt loam, 10 to 15 percent slopes, moderately eroded								
Chillum silt loam, 10 to 15 percent slopes, severely eroded								
Christiana fine sandy loam, 2 to 5 percent slopes, moderately eroded	130	40	55	45	3.0	4.0		230
Chrome silt loam, 3 to 8 percent slopes, moderately eroded	85		35	35	3.0	3.5	135	200
Chrome silt loam, 8 to 15 percent slopes, moderately eroded	75		35	35	2.5	3.0	115	170
Chrome silt loam, 15 to 25 percent slopes, moderately eroded	70		30	30	2.0	3.0	90	170
Chrome clay loam, 8 to 25 percent slopes, severely eroded							80	
Chrome clay loam, 25 to 45 percent slopes, severely eroded								
Codorus silt loam	130	45	50	45	3.5		160	255
Collington sandy loam, 2 to 5 percent slopes, moderately eroded	130	45	60	50	3.5	5.5		315
Collington sandy loam, 5 to 10 percent slopes, moderately eroded	120	40	55	45	3.5	5.0		285
Collington loam, 2 to 5 percent slopes, moderately eroded	130	45	60	50	3.5	5.5		315
Collington loam, 5 to 10 percent slopes, moderately eroded	120	40	55	45	3.5	5.0		285
Collington loam, 5 to 10 percent slopes, severely eroded	100		50	40	3.0	4.5		255
Collington loam, 10 to 15 percent slopes, moderately eroded	100		50	40	3.0	4.5		255
Collington loam, 10 to 15 percent slopes, severely eroded								230
Comus silt loam	140	45	60	50	3.5	5.5	160	315
Conowingo silt loam, 3 to 15 percent slopes	90		50		3.0		135	170
Elkton loam, 0 to 2 percent slopes	110	40			3.5			200
Elkton loam, 2 to 5 percent slopes	110	40			3.5			200
Elkton silt loam, 0 to 2 percent slopes	110	40			3.5			200
Elkton silt loam, 2 to 5 percent slopes	110	40			3.5			200
Elsinboro silt loam, 0 to 2 percent slopes	130	45	60	50	3.5	5.5		285
Elsinboro silt loam, 2 to 5 percent slopes, moderately eroded	130	45	60	50	3.5	5.5		285
Elsinboro silt loam, 5 to 10 percent slopes, moderately eroded	120	35	55	45	3.5	4.5		255
Evesboro loamy sand, 0 to 5 percent slopes	90		30	25	2.0	2.5		145
Evesboro loamy sand, 5 to 15 percent slopes								
Evesboro loamy sand, 15 to 40 percent slopes								
Fallsington sandy loam, 0 to 2 percent slopes	120	35	45		3.0			170
Fallsington sandy loam, 2 to 5 percent slopes	120	35	45		3.0			170
Fallsington sandy loam, 5 to 10 percent slopes	110	30			3.0			170

See footnote at end of table.

TABLE 4.—*Estimated average acre yields of principal crops under a high level of management*—Continued

Soil	Corn	Soybeans	Barley	Wheat	Clover hay	Alfalfa	Bluegrass pasture	Tallgrass pasture
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre days*[1]	*Cow-acre days*[1]
Fallsington loam, 0 to 2 percent slopes	120	35	45	----	3.0	----	----	170
Fallsington loam, 2 to 5 percent slopes	120	35	45	----	3.0	----	----	170
Glenelg silt loam, 0 to 3 percent slopes	135	45	60	50	3.5	5.5	160	315
Glenelg silt loam, 3 to 8 percent slopes, moderately eroded	135	45	60	50	3.5	5.5	160	315
Glenelg silt loam, 8 to 15 percent slopes moderately eroded	125	35	55	45	3.5	5.0	160	285
Glenelg silt loam, 8 to 15 percent slopes, severely eroded	110	----	----	40	3.0	4.5	135	255
Glenelg silt loam, 15 to 25 percent slopes, moderately eroded	110	----	----	40	3.0	4.5	135	255
Glenelg silt loam, 15 to 25 percent slopes, severely eroded	----	----	----	----	----	----	115	----
Glenelg silt loam, 25 to 45 percent slopes	----	----	----	----	----	----	115	----
Glenville silt loam, 0 to 3 percent slopes	100	35	45	40	3.0	----	135	200
Glenville silt loam, 3 to 8 percent slopes, moderately eroded	100	35	45	40	3.0		135	200
Glenville silt loam, 8 to 15 percent slopes, moderately eroded	95	----	40	35	3.0	----	135	200
Hatboro silt loam	115	----	----	----	3.5	----	----	200
Keyport loam, 0 to 2 percent slopes	110	40	50	40	3.0	----	----	170
Keyport loam, 2 to 5 percent slopes, moderately eroded	110	40	50	40	3.0	----	----	170
Keyport loam, 5 to 10 percent slopes, moderately eroded	90	30	40	35	3.0	----	----	170
Keyport silt loam, 0 to 2 percent slopes	110	40	50	40	3.0	----	----	170
Keyport silt loam, 2 to 5 percent slopes, moderately eroded	110	40	50	40	3.0	----	----	170
Keyport silt loam, 5 to 10 percent slopes, moderately eroded	90	30	40	35	3.0	----	----	170
Keyport silt loam, 10 to 15 percent slopes, moderately eroded	----	----	----	----	2.5	----	----	115
Keyport silty clay loam, 2 to 5 percent slopes, severely eroded	70	----	35	30	2.5	----	----	145
Keyport silty clay loam, 5 to 10 percent slopes, severely eroded	----	----	----	----	----	----	----	115
Legore silt loam, 3 to 8 percent slopes, moderately eroded	95	----	40	40	3.0	3.5	135	200
Legore silt loam, 8 to 15 percent slopes, moderately eroded	90	----	40	35	2.5	3.0	115	170
Legore silt loam, 15 to 25 percent slopes, moderately eroded	80	----	35	30	2.0	3.0	90	170
Legore silty clay loam, 8 to 15 percent slopes, severely eroded	80	----	35	30	2.0	3.0	90	170
Legore silty clay loam, 15 to 45 percent slopes, severely eroded	----	----	----	----	----	----	----	----
Leonardtown silt loam, 0 to 2 percent slopes	70	25	30	----	2.5	----	----	145
Leonardtown silt loam, 2 to 5 percent slopes	70	25	30	----	2.5	----	----	145
Loamy and clayey land, sloping	----	----	----	----	----	----	----	----
Loamy and clayey land, moderately steep	----	----	----	----	----	----	----	----
Loamy and clayey land, steep	----	----	----	----	----	----	----	----
Manor loam, 3 to 8 percent slopes, moderately eroded	95	----	40	40	3.0	3.5	135	200
Manor loam, 8 to 15 percent slopes, moderately eroded	90	----	40	35	2.5	3.0	115	170
Manor loam, 8 to 15 percent slopes, severely eroded	80	----	35	30	2.0	3.0	90	170
Manor loam, 15 to 25 percent slopes, moderately eroded	80	----	35	30	2.0	3.0	90	170
Manor loam, 15 to 25 percent slopes, severely eroded	----	----	----	----	----	----	80	----
Manor loam, 25 to 45 percent slopes	----	----	----	----	----	----	80	----
Manor very stony loam, 3 to 25 percent slopes	----	----	----	----	----	----	90	----
Matapeake silt loam, 0 to 2 percent slopes	140	45	60	50	3.5	5.5	----	315
Matapeake silt loam, 2 to 5 percent slopes, moderately eroded	140	45	60	50	3.5	5.5	----	315
Matapeake silt loam, 5 to 10 percent slopes, moderately eroded	130	40	55	45	3.5	5.0	----	285
Matapeake silt loam, 5 to 10 percent slopes, severely eroded	110	----	50	40	3.0	4.5	----	255
Matapeake silt loam, 10 to 15 percent slopes, moderately eroded	110	----	50	40	3.0	4.5	----	255
Matapeake silt loam, 10 to 15 percent slopes, severely eroded	----	----	----	----	----	----	----	230
Matapeake silt loam, silty substratum, 0 to 2 percent slopes	150	45	65	50	3.8	5.8	----	340
Matapeake silt loam, silty substratum, 2 to 5 percent slopes, moderately eroded	150	45	65	50	3.8	5.8	----	340
Mattapex silt loam, 0 to 2 percent slopes	140	45	55	45	3.5	4.5	----	255
Mattapex silt loam 2 to 5 percent slopes, moderately eroded	140	45	55	45	3.5	4.5	----	255
Mattapex silt loam, 5 to 10 percent slopes, moderately eroded	130	40	50	40	3.5	4.0	----	230
Mixed alluvial land	----	----	----	----	2.0	----	----	160
Montalto silt loam, 0 to 3 percent slopes	135	45	60	50	3.5	5.5	160	315
Montalto silt loam, 3 to 8 percent slopes, moderately eroded	135	45	60	50	3.5	5.5	160	315
Montalto silt loam, 8 to 15 percent slopes, moderately eroded	125	35	55	45	3.5	5.0	160	285
Montalto very stony silt loam, 3 to 25 percent slopes	----	----	----	----	----	----	90	----
Montalto silty clay loam, 8 to 15 percent slopes, severely eroded	110	----	50	40	3.0	4.5	135	255

See footnote at end of table.

TABLE 4.—*Estimated average acre yields of principal crops under a high level of management*—Continued

Soil	Corn	Soybeans	Barley	Wheat	Clover hay	Alfalfa	Bluegrass pasture	Tallgrass pasture
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Cow-acre days*[1]	*Cow-acre days*[1]
Montalto silty clay loam, 15 to 25 percent slopes, severely eroded							115	
Neshaminy silt loam, 0 to 3 percent slopes	135	45	60	50	3.5	5.5	160	315
Neshaminy silt loam, 3 to 8 percent slopes, moderately eroded	135	45	60	50	3.5	5.5	160	315
Neshaminy silt loam, 8 to 15 percent slopes, moderately eroded	125	35	55	45	3.5	5.0	160	285
Neshaminy silt loam, 15 to 25 percent slopes, moderately eroded	110		50	40	3.0	4.5	135	255
Othello silt loam, 0 to 2 percent slopes	115	40			3.5			200
Othello silt loam, 2 to 5 percent slopes	115	40			3.5			200
Rumford loamy sand, 2 to 5 percent slopes	110	40	50	45	3.5	5.0		285
Rumford loamy sand, 5 to 10 percent slopes	100	35	50	40	3.0	4.5		255
Rumford loamy sand, 10 to 15 percent slopes	80		40	35	3.0	4.0		230
Sassafras sandy loam, 0 to 2 percent slopes	130	45	60	50	3.5	5.5		315
Sassafras sandy loam, 2 to 5 percent slopes, moderately eroded	130	45	60	50	3.5	5.5		315
Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded	120	40	55	45	3.5	5.0		285
Sassafras sandy loam, 5 to 10 percent slopes, severely eroded	100		50	40	3.0	4.5		255
Sassafras sandy loam, 10 to 15 percent slopes, moderately eroded	100		50	40	3.0	4.5		255
Sassafras sandy loam, 10 to 15 percent slopes, severely eroded								230
Sassafras fine sandy loam, 2 to 5 percent slopes, moderately eroded	130	45	60	50	3.5	5.5		315
Sassafras gravelly loam, 2 to 5 percent slopes, moderately eroded	130	45	60	50	3.5	5.5		315
Sassafras gravelly loam, 5 to 10 percent slopes, moderately eroded	120	40	55	45	3.5	5.0		285
Sassafras gravelly loam, 5 to 10 percent slopes, severely eroded	100		50	40	3.0	4.5		255
Sassafras gravelly loam, 10 to 15 percent slopes, severely eroded								230
Sassafras and Aura soils, 15 to 40 percent slopes								150
Watchung very stony silt loam								115
Woodstown sandy loam, 0 to 2 percent slopes	140	45	55	45	3.5	4.5		255
Woodstown sandy loam, 2 to 5 percent slopes, moderately eroded	140	45	55	45	3.5	4.5		255
Woodstown sandy loam, 5 to 10 percent slopes, moderately eroded	130	40	50	40	3.5	4.0		230
Woodstown sandy loam, 5 to 10 percent slopes, severely eroded	110		45	35	3.0	3.5		200
Woodstown sandy loam, 10 to 15 percent slopes	110		45	35	3.0	3.5		200
Woodstown loam, 0 to 2 percent slopes	140	45	55	45	3.5	4.5		255
Woodstown loam, 2 to 5 percent slopes, moderately eroded	140	45	55	45	3.5	4.5		255

[1] Cow-acre-days is a term used to express the carrying capacity of pasture. It is the number of animal units carried per acre multiplied by the number of days the pasture is grazed during a single grazing season without injury to the sod. For example, an acre of pasture that provides 30 days of grazing for two cows has a carrying capacity of 60-acre-days.

numbers and kinds of insects and diseases. Yields under intensive, good management and ordinary conditions should not vary more than about 10 percent from those given in table 4.

More information about management practices needed to obtain good yields can be found in the subsections, "Management by Capability Units," and "General Management Requirements."

Use of the Soils as Woodland

Woodland in Cecil County occupies a limited acreage in wetland and swamps. Only a few wooded areas have not been altered, to some degree, by man or by livestock.

Hardwoods are the dominant trees in this county. On the better drained soils the hardwoods are mostly oaks, and oaks also make up a large proportion of the hardwood stands on soils that have poor drainage. Other hardwoods common to the county are sweetgum, black gum, holly, swamp maple, hickory, beech, locust, and many kinds of scrub oaks. Large areas that were formerly cultivated are now wooded. Most of the other woodland has been severely cutover or burned over. Much of the timber harvested has been oak or yellow-poplar.

Virginia pine has invaded much of the cutover and second-growth woodland throughout the county, especially on the sandier, better drained soils. Loblolly pine

grows well if it is planted in the southern two-thirds of the county. Little natural seeding takes place because Cecil County is at the northern limit of the area in which loblolly pine grows naturally. Shortleaf pine, pitch pine, and pond pine grow in places, but they are of minor importance.

Virginia pine establishes itself readily by seeding. It can also be established by planting. White pine grows better than Virginia pine on most soils if it is planted where it cannot be overtopped by other trees. The soils in the northern part of the county are better suited to white pine than are those in the southern part.

Woodland suitability groups

The soils of Cecil County have been evaluated and grouped for the production of wood crops according to a nationwide system used by the Soil Conservation Service. In this system soils are placed in woodland classes according to their suitability for trees. Then, they are placed in subclasses according to the kinds of soil limitations, if any, that affect woodland management. Finally, they are placed in woodland suitability groups within the subclasses, according to the degree of such limitations.

In the system of classifying the soils for woodland use, the class is indicated by an arabic number. This number is the first digit in the designation of a woodland suitability group. Subclasses are identified by a lowercase letter of the alphabet, as follows: *o*—the soil has no important limitations to management; *w*—excessive water is on or in the soil, or the hazard of flooding is a limitation; *s*—the soil is sandy; *c*—clay in the subsoil is a limitation, because clay cannot support heavy equipment if the soil is wet; *d*—underlying rock or hard layers limit depth to which roots can penetrate; and *r*—the soil has slopes. The third digit in the designation for the woodland suitability group is a numeral that separates the group according to the degree of difficulty in applying woodland management.

The potential productivity of a soil for trees is expressed as site index. Site index is the average height, in feet, that a specified kind of tree growing on a soil will reach at 50 years of age. Soils on which trees have the most rapid growth rates have the highest site index. Those soils are placed in class 1 for potential productivity of woodland products.

Site indexes have not been determined for any species of trees in Cecil County. They have been determined for the same species of trees growing on the same kinds of soil in other parts of Maryland and in Delaware, New Jersey, and Virginia. More of this kind of information is available for yellow-poplar and loblolly pine than for other kinds of trees that grow in this county. For this reason, the placement of soils in Cecil County into classes, subclasses, and woodland suitability groups is based mainly on the site indexes determined for yellow-poplar and loblolly pine.

The soils of Cecil County have been placed in four productivity classes. Soils in class 1 have the highest potential for productivity of woodland products. They have a site index of 95 or more for yellow-poplar and loblolly pine. Soils in class 2 have a site index of between 85 and 95 for yellow-poplar and loblolly pine. Those in class 3 have a site index of between 75 and 85. Soils in class 4, the lowest in potential productivity, have a site index of between 65 and 75. Soils that have a site index of less than 65 were not classified according to their potential use as woodland.

The soils in each of the woodland suitability groups in these four classes have about the same limitations and are subject to the same hazards that affect management. These factors are competition from other plants, equipment limitations, seedling mortality, and the hazards of windthrow and erosion. The limitations and hazards are rated *slight*, *moderate*, or *severe*.

Plant competition is the invasion and rate of growth of undesirable plants when openings are made in the forest canopy. *Equipment limitations* are based on the degree to which soils and topography restrict or prohibit the use of equipment commonly used in management of trees. The *hazard of windthrow* refers to properties of the soil that influence the development of tree roots. The *hazard of erosion* is determined on the basis of erodibility of a soil that is not fully protected by a woodland cover.

Assistance in managing woodlands can be obtained from the assistant district forester for the county. He can be reached through the office of the county agent or through the Cecil Soil Conservation District.

In the following pages, the woodland suitability groups in Cecil County are discussed. The names of the soil series represented are mentioned in the description of each woodland group, but this does not mean that all soils in that series are in the group. To find the names of the soils in any given woodland suitability group, refer to the "Guide to Mapping Units" at the back of this survey.

WOODLAND SUITABILITY GROUP 1o9

The only soil in this group is the well-drained Comus silt loam. It is on flood plains in the northern part of the county.

White pine, yellow-poplar, and black oak are suitable species to be planted for wood crops. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are yellow-poplar, red oak, black oak, black walnut, white oak, sycamore, sugar maple, red maple, and black cherry.

The site index is 85 to 95+ for yellow-poplar and 75 to 85+ for upland oaks. Where the site index is 90, well-stocked unmanaged stands of yellow-poplar that are 50 years old are expected to yield about 24,400 board feet of merchantable timber per acre. The expected average yield increase is about 490 board feet per year for the next 10 years.

Seedling mortality is slight on this soil. Plant competition from annual weeds and grasses is severe. Equipment limitations are slight. Except for scouring during floods, the hazard of erosion is slight. Windthrow hazard is slight. This soil is well suited to hardwoods.

WOODLAND SUITABILITY GROUP 1w3

This group consists of poorly drained soils of the Baile and Watchung series. These soils are in depressions on uplands, around the heads of drains, and on foot slopes adjacent to minor drainageways in the northern part of the county. Susceptibility to flooding, a fluctuating high water table, and restricted drainage are significant limitations.

White pine, European larch, and Norway spruce are suitable species to be planted for wood crops. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands is pin oak. Other acceptable species are wetland oaks, red maple, and sycamore.

In 50 years, well-stocked unmanaged stands of pin oak that have a site index of 85+ are expected to yield 15,500+ board feet of merchantable timber per acre. The expected average yield increase is about 310 board feet per year for stands that are 50 to 60 years old.

Seedling mortality is moderate because of susceptibility to drowning and frost heaving. Plant competition from weeds, grasses, and sedges is severe. Equipment limitations are severe because the water table is high much of the year. Except for some moderate scouring of periodically flooded areas, the hazard of erosion is slight. The windthrow hazard is slight. Soils in this unit are well suited to pin oak and other native wetland hardwoods.

WOODLAND SUITABILITY GROUP 1w9

The only soil in this group is moderately poorly drained to moderately well drained **Codorus silt loam.** It is on flood plains in the northern part of the county. Susceptibility to flooding, a fluctuating high water table, and restricted drainage are major limitations.

White pine, yellow-poplar, and black oak are suitable species to be planted for wood crops. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are yellow-poplar, red oak, black oak, and black walnut. Other acceptable species are white oak, sycamore, sugar maple, red maple, and black cherry.

The site index is 85 to 95+ for yellow-poplar and 75 to 85+ for upland oaks. In 50 years, well-stocked unmanaged stands of yellow-poplar that have a site index of 90 are expected to yield 24,400 board feet of merchantable timber per acre. The expected average yield increase is about 490 board feet per acre per year for the next 10 years.

Seedling mortality is slight on this soil. Plant competition from annual weeds and grasses is severe. Equipment limitations are moderate because of a seasonally high water table. Except for scouring during floods, the erosion hazard is slight. The windthrow hazard is slight. This soil is well suited to hardwoods.

WOODLAND SUITABILITY GROUP 2c4a

This group consists of well-drained silt loams and silty clay loams of the Montalto series. These soils are nearly level to moderately sloping and are on uplands in the northwestern part of the county. Clay in the subsoil is a limitation.

White pine, Norway spruce, black walnut, yellow-poplar, and black locust are suitable species to be planted for wood crops. White pine, Scotch pine, and Norway spruce are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are yellow-poplar, basswood, white ash, red oak, black oak, white oak, black walnut, black cherry, and sugar maple. Other acceptable species are hickory, red maple, and black locust.

Site index is 85 to 95 for yellow-poplar and 75 to 85 for upland oaks. At age 50, well-stocked unmanaged stands of yellow-poplar are expected to yield 24,400 board feet of merchantable timber per acre. The expected average yield increase is about 490 board feet per year for stands that are 50 to 60 years old. For similar stand conditions the yield for upland oaks is 13,750 board feet per acre, and the yield increase is 275 board feet per acre per year.

Seedling mortality is slight on these soils. Plant competition is moderate for hardwoods and severe for conifers. Equipment limitations are moderate because these soils have a clayey sticky subsoil. The erosion and windthrow hazards are slight. Soils in this unit are well suited to hardwoods.

WOODLAND SUITABILITY GROUP 2c4b

This group consists of well-drained soils of the Montalto series. These soils are gently sloping to strongly sloping and are on uplands in the northern part of the county. Some areas are very stony. Clay in the subsoil is a limitation.

White pine, Norway spruce, black walnut, yellow-poplar, and black locust are suitable species to be planted for wood crops. White pine, Scotch pine, and Norway spruce are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are yellow-poplar, basswood, white ash, red oak, black oak, white oak, black walnut, black cherry, and sugar maple. Other acceptable species are hickory, red maple, and black locust.

Site index is 85 to 95 for yellow-poplar and 75 to 85 for upland oaks. At age 50, well-stocked unmanaged stands of yellow-poplar are expected to yield 24,400 board feet of merchantable timber per acre. The expected average yield increase is about 490 board feet per year for stands that are 50 to 60 years old. For similar stand conditions the yield for upland oaks is 13,750 board feet per acre, and the yield increase is 275 board feet per acre per year.

Seedling mortality is slight on these soils. Plant competition is moderate for hardwoods and severe for conifers. Equipment limitations are severe because of a clayey sticky subsoil and steepness of slope. The erosion hazard is moderate on moderately steep soils and severe on steep soils. The windthrow hazard is slight. These soils are well suited to hardwoods.

WOODLAND SUITABILITY GROUP 2o4

This group consists of well-drained soils of the Chester, Glenelg, Legore, and Neshaminy series. These soils are nearly level to moderately sloping and are on uplands in the northern part of the county. They have no significant limitations.

White pine, Norway spruce, black walnut, yellow-poplar, and black locus are suitable species to be planted for wood crops. White pine, Scotch pine, and Norway spruce are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are yellow-poplar, basswood, white ash, red oak, black oak, white oak, black walnut, black cherry, and sugar maple. Other

acceptable species are hickory, red maple, and black locust.

Site index is 85 to 95 for yellow-poplar and 75 to 85 for upland oaks. At age 50, well-stocked unmanaged stands of yellow-poplar are expected to yield 24,400 board feet of merchantable timber per acre. The expected average yield increase is about 490 board feet per year for stands that are 50 to 60 years old. For similar stand conditions the yield for upland oaks is 13,750 board feet per acre, and the yield increase is 275 board feet per acre per year.

Seedling mortality is slight on these soils. Plant competition is moderate for hardwoods and severe for conifers. Competition is from vines, shrubs, unwanted tree species, and herbaceous plants. Equipment limitations and the hazards of erosion and windthrow are slight. Soils in this unit are well suited to yellow-poplar and upland oaks.

WOODLAND SUITABILITY GROUP 2o5

This group consists of well-drained sandy loams and silt loams of the Collington and Elsinboro series. These soils are nearly level to moderately sloping and are on uplands and terraces above flood plains in the southern two-thirds of the county. They have no significant restrictions or limitations.

White pine, yellow-poplar, and loblolly pine are suitable species to be planted for wood crops. Scotch pine, white pine, Austrian pine, and Norway spruce are suitable for Christmas trees, Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are yellow-poplar, oaks, and loblolly pine. Other acceptable species are hickory and red maple.

Site index is 85 to 95 for yellow-poplar, 75 to 85 for upland oaks, and 85 to 95 for loblolly pine. At age 50, well-stocked unmanaged stands of yellow-poplar are expected to yield 24,400 board feet of merchantable timber per acre. The expected average yield increase is about 490 board feet per year for stands that are 50 to 60 years old. For similar stand conditions the yields for upland oaks and loblolly pine are 13,750 and 34,100 board feet per acre, respectively, and the yield increases are 275 and 680 board feet per acre per year, respectively.

Seedling mortality is slight on these soils. Plant competition is severe for pines and moderate for hardwoods. Equipment limitations and the hazards of erosion and windthrow are slight. Soils in this unit are well suited to hardwoods and loblolly pine.

WOODLAND SUITABILITY GROUP 2o7

This group consists of moderately well drained soils of the Butlertown and Woodstown series. These soils are nearly level to moderately sloping and are on uplands in the southern two-thirds of the county. They have no significant restrictions or limitations.

Loblolly pine, white pine, sweetgum, and yellow-poplar are suitable species to be planted for wood crops. White pine, Scotch pine, and Norway spruce are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are loblolly pine, sweetgum, yellow-poplar, and ash. Other acceptable species are white oak, red maple, sycamore, and black gum.

Site index is 85 to 95 for loblolly pine, yellow-poplar, and sweetgum. At age 50, well-stocked unmanaged stands of yellow-poplar are expected to yield 24,400 board feet of merchantable timber per acre. The expected average yield increase is about 490 board feet per acre per year for stands that are 50 to 60 years old. These growth and yield figures for yellow-poplar can be used as a guide for sweetgum. The yield for loblolly pine is 34,100 board feet per acre, and the yield increase is 680 board feet per acre per year.

Seedling mortality is slight on these soils. Plant competition is severe for pines and moderate for hardwoods. Equipment limitations and the hazards of erosion and windthrow are slight. Soils in this group are well suited to loblolly pine and hardwoods.

WOODLAND SUITABILITY GROUP 2o11

The only soil in this group is the well-drained to somewhat excessively drained Manor loam, 3 to 8 percent slopes, moderately eroded. This soil is gently sloping and is on uplands in the northern part of the county. It has no significant restrictions or limitations.

White pine and Virginia pine are suitable species to be planted for wood crops. White pine, Scotch pine, Norway spruce, white spruce, and red pine are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are red oak, black oak, white oak, yellow-poplar, black cherry, and sugar maple. Other acceptable species are oak, hickory, and Virginia pine.

Site index is 75 to 85 for yellow-poplar and for upland oaks and 65 to 75 for Virginia pine. At age 50, well-stocked unmanaged stands of yellow-poplar are expected to yield 17,600 board feet of merchantable timber per acre. The expected average yield increase is about 350 board feet per acre per year for stands that are 50 to 60 years old. For similar stand conditions the yield for upland oaks is 9,750 board feet per acre, and the yield increase is 195 board feet per acre per year. Stands of Virginia pine that are 30 years old are expected to yield 33 cords of wood pulp per acre, and the yield increase is about 1.1 cords per acre per year for stands that are 30 to 40 years old.

Seedling mortality is slight on this soil. Plant competition is moderate to severe for pines and slight for hardwoods. Equipment limitations are slight and the hazards of erosion and windthrow are slight. This soil is well suited to hardwoods.

WOODLAND SUITABILITY GROUP 2r4

This group consists of well-drained silt loams and clay loams of the Glenelg, Legore, and Neshaminy series. These soils are strongly sloping to moderately steep and are on uplands in the northern part of the county. Steepness of slopes restricts or limits woodland use and management.

White pine, Norway spruce, black walnut, yellow-poplar, and black locust are suitable species to be planted for wood crops. White pine, Scotch pine, and Norway spruce are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are yellow-poplar, basswood, white ash, red oak, black oak, white oak, black walnut, black cherry, and sugar maple. Other

acceptable species are hickory, red maple, and black locust.

Site index is 85 to 95 for yellow-poplar and 75 to 85 for upland oak. At age 50, well-stocked unmanaged stands of yellow-poplar are expected to yield 24,400 board feet of merchantable timber per acre. The expected average yield increase is about 490 board feet per year for stands that are 50 to 60 years old. For similar stand conditions the yield for upland oaks is 13,750 board feet per acre, and the yield increase is 275 board feet per acre per year.

Seedling mortality is slight on these soils. Plant competition is moderate for hardwoods and severe for conifers. Equipment limitations are severe because of steepness of slope. Erosion hazard is moderate on moderately steep soils and severe on steep and very steep soils. The windthrow hazard is slight. These soils are well suited to hardwoods.

WOODLAND SUITABILITY GROUP 2r7

The only soil in this group is the moderately well drained Butlertown silt loam, 10 to 15 percent slopes, moderately eroded. This soil is on uplands in the southern two-thirds of the county. Slopes are steep enough to limit or restrict woodland use and management.

Loblolly pine, white pine, sweetgum, and yellow-poplar are suitable species to be planted for wood crops. White pine, Scotch pine, and Norway spruce are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are loblolly pine, sweetgum, yellow-poplar, and ash. Other acceptable species are white oak, red maple, sycamore, and black gum.

Site index is 85 to 95 for loblolly pine, yellow-poplar, and sweetgum. At age 50, well-stocked unmanaged stands of yellow-poplar are expected to yield 24,400 board feet of merchantable timber per acre. The expected average yield increase is about 490 board feet per acre per year for stands that are 50 to 60 years old. These growth and yield figures can be used as a guide for sweetgum. The yield for loblolly pine is 34,100 board feet per acre, and the yield increase is 680 board feet per acre per year.

Seedling mortality is slight on this soil. Plant competition is severe for pines and moderate for hardwoods. Equipment limitations are moderate because of steepness of slope. The erosion hazard is moderate, and the windthrow is slight. This soil is well suited to loblolly pine and hardwoods.

WOODLAND SUITABILITY GROUP 2r11

This group consists of well-drained to somewhat excessively drained soils of the Manor series. These soils are gently sloping to moderately steep and are on uplands in the northern part of the county. Slopes are steep enough to limit or restrict woodland use and management.

White pine and Virginia pine are suitable species to be planted for wood crops. White pine, Scotch pine, Norway spruce, white spruce, and red pine are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are red oak, black oak, white oak, yellow-poplar, black cherry, and sugar maple. Other acceptable species are oaks, hickory, and Virginia pine.

Site index is 75 to 85 for yellow-poplar and 65 to 75 for upland oaks and for Virginia pine. In 50 years, well-stocked unmanaged stands of yellow-poplar are expected to yield 17,600 board feet of merchantable timber per acre. The expected yield increase is about 350 board feet per acre per year for stands that are 50 to 60 years old. For similar stand conditions the yield for upland oaks is 9,750 board feet per acre, and the yield increase is 195 board feet per acre per year. Stands of Virginia pine that are 30 years of age are expected to yield 33 cords of pulpwood per acre, and the yield increase is about 1.1 cords per acre per year for stands that are 30 to 40 years old.

Seedling mortality is slight on these soils. Plant competition is moderate to severe for pines and slight for hardwoods. Equipment limitations are slight on strongly sloping soils and moderate on moderately steep and steep soils. The erosion hazard is moderate on strongly sloping soils and severe on steep soils. The windthrow hazard is slight. These soils are well suited to hardwoods.

WOODLAND SUITABILITY GROUP 2w7

This group consists of somewhat poorly drained and poorly drained silt loams and sandy loams of the Barclay and Fallsington series. Mixed alluvial land is also included. These soils are nearly level to moderately sloping and are on uplands, heads of drainageways, and flood plains of small streams in the southern two-thirds of the county. Restricted drainage, a fluctuating high water table, and susceptibility to flooding are significant limitations for woodland use and management.

Loblolly pine, white pine, sweetgum, and yellow-poplar are suitable species to be planted for wood crops. White pine, Scotch pine, and Norway spruce are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are loblolly pine, sweetgum, yellow-poplar, and ash. Other acceptable species are white oak, red maple, sycamore, and black gum.

Site index is 85 to 95 for loblolly pine, yellow-poplar, and sweetgum. In 50 years, well-stocked unmanaged stands of yellow-poplar are expected to yield 24,400 board feet of merchantable timber per acre. The expected average yield increase is about 490 board feet per acre per year for stands that are 50 to 60 years old. The growth and yield figures for yellow-poplar can be used as a guide for sweetgum. The yield for loblolly pine is 43,100 board feet per acre, and the yield increase is 680 board feet per acre per year.

Seedling mortality is moderate on these soils. Plant competition is severe for pines and moderate for hardwoods. Equipment limitations are severe because of a seasonal high water table. The hazards of erosion and windthrow are slight. These soils are well suited to loblolly pine and hardwoods.

WOODLAND SUITABILITY GROUP 2w12

This group consists of moderately well drained silt loams of the Glenville series. These soils are nearly level to moderately sloping and are in depressions on uplands and around the heads and upper courses of drainageways in the northern part of the county. Restricted drainage, a fluctuating high water table, and flooding are significant limitations.

White pine and Norway spruce are suitable species to be planted for wood crops. White pine, Scotch pine, Norway spruce, white spruce, and Austrian pine are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are red oak, black oak, white oak, yellow-poplar, basswood, sugar maple, and black cherry. Other acceptable species are white oak, red maple, hickory, Virginia pine, and white pine.

Site index is 75 to 85 for yellow-poplar and 65 to 75 for upland oaks, northern hardwoods, black cherry, and Virginia pine. At age 50, well-stocked unmanaged stands of yellow-poplar are expected to yield 17,600 board feet of merchantable timber per acre. The expected average yield increase is about 350 board feet per acre per year for stands that are 50 to 60 years old. The yield for upland oaks is 9,750 board feet per acre, and the yield increase is 195 board feet per acre per year. The growth and yield figures for upland oaks can be used as a guide for northern hardwoods and black cherry. Stands of Virginia pine that are 30 years of age are expected to yield 33 cords of pulp wood per acre, and the yield increase is 1.1 cords per acre per year to age 40.

Seedling mortality is slight on these soils. Plant competition from brush is severe for pines and generally is slight for hardwoods. Equipment limitations are severe because of a high water table. The erosion hazard is slight, and the windthrow hazard is moderate. These soils are well suited to hardwoods, Virginia pine, and white pine.

WOODLAND SUITABILITY GROUP 3c10

The only soil in this group is the well-drained Christiana fine sandy loam, 2 to 5 percent slopes, moderately eroded. This soil has a clayey, sticky and plastic subsoil. It is on uplands in the central part of the county. Clay in the profile restricts woodland use and management.

Loblolly pine, white pine, sweetgum, and yellow-poplar are suitable species to be planted for wood crops. White pine, Scotch pine, and Norway spruce are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are loblolly pine, yellow-poplar, and ash. Other acceptable species are oaks, sweetgum, red maple, and Virginia pine.

Site index is 75 to 85 for loblolly pine and yellow-poplar and 65 to 75 for Virginia pine and upland oaks. At age 50, well-stocked unmanaged stands for loblolly pine are expected to yield 23,600 board feet of merchantable timber per acre. The expected yield increase is about 470 board feet per acre per year for stands that are 50 to 60 years old. The yield for yellow-poplar is 17,600 board feet per acre, and the yield increase is 350 board feet per acre per year. The yield for upland oaks is 9,750 board feet per acre, and the yield increase is 200 board feet per acre per year. Stands of Virginia pine that are 30 years old are expected to yield 33 cords of pulp wood per acre, and the yield increase is 1.1 cords per acre per year to age 40.

Seedling mortality is slight on this soil. Plant competition is moderate for pines and hardwoods. Equipment limitations are severe because of a clayey, sticky, plastic subsoil. The erosion hazard is severe, and the windthrow hazard is slight. This soil is well suited to loblolly pines and hardwoods.

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WOODLAND SUITABILITY GROUP 3c16a

This group consists only of Loamy and clayey land, sloping. It is dominantly well drained, nearly level to gently sloping, and is on uplands in the central third of the county. The clayey, sticky, plastic subsoil restricts woodland use and management.

Loblolly pine, Virginia pine, and white pine are suitable species to be planted for wood crops. Scotch pine and white pine are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are Virginia pine and loblolly pine. Other acceptable species are red maple and sweetgum.

Site index is 65 to 75 for Virginia pine and 75 to 85 for loblolly pine. Stands of Virginia pine that are 30 years of age can be expected to yield 33 cords of pulp wood per acre, and the yield increase is 1.1 cords per acre per year to age 40. At age 50, well-stocked unmanaged stands of loblolly pine are expected to yield 23,600 board feet of merchantable timber per acre, and the yield increase is about 470 board feet per acre per year for stands that are 50 to 60 years old.

Seedling mortality and plant competition are slight on this land. Equipment limitations are severe because of a clayey, sticky, plastic subsoil. The hazards of erosion and windthrow are moderate. Loamy and clayey land, sloping, is well suited to Virginia pine and loblolly pine.

WOODLAND SUITABILITY GROUP 3c16b

This group consists of Loamy and clayey land. This land is dominantly well drained, moderately steep to steep, and is on uplands in the central third of the county. It has a highly clayey, sticky and plastic subsoil that restricts woodland use and management.

Loblolly pine, Virginia pine, and white pine are suitable species to be planted for wood crops. Scotch pine and white pine are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are Virginia pine and loblolly pine. Other acceptable species are red maple and sweetgum.

Site index is 65 to 75 for Virginia pine and 75 to 85 for loblolly pine. Stands of Virginia pine that are 30 years of age can be expected to yield 33 cords of pulp wood per acre. The expected average yield increase is 1.1 cords per acre per year to age 40. At age 50, well-stocked unmanaged loblolly pine stands are expected to yield 23,600 board feet of merchantable timber per acre, and the yield increase is about 470 board feet per acre per year for stands that are 50 to 60 years old.

Seedling mortality and plant competition are slight on this land. Equipment limitations are severe because of a clayey, sticky, plastic subsoil and a seasonal high water table. The erosion hazard is severe, and the windthrow hazard is moderate. This land is well suited to Virginia pine and loblolly pine.

WOODLAND SUITABILITY GROUP 3d16

This group consists of well-drained soils of the Aura series. These soils are gently sloping to moderately sloping, and are in the central third of the county. They

have a very hard gravel subsoil in a clayey matrix that restricts the depth to which tree roots can grow.

Loblolly pine, Virginia pine, and white pine are suitable species to be planted for wood crops. Scotch pine and white pine are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are Virginia pine and loblolly pine. Other acceptable species are red maple and sweetgum.

Site index is 65 to 75 for Virginia pine and 75 to 85 for loblolly pine. At age 30, stands of Virginia pine can be expected to yield 33 crops of pulp wood per acre. The expected average yield increase is 1.1 cords per acre per year to age 40. At age 50, well-stocked unmanaged stands of loblolly pine are expected to yield 23,600 board feet of merchantable timber per acre, and the yield increase is about 470 board feet per acre per year for stands that are 50 to 60 years old.

Seedling mortality, plant competition, and equipment limitations are slight. The erosion hazard is slight to severe on the steeper soils. The windthrow hazard is moderate. These soils are well suited to Virginia pine and loblolly pine.

WOODLAND SUITABILITY GROUP 3o10

This group consists of well-drained soils of the Chillum, Matapeake, and Sassafras series. These soils are nearly level to moderately sloping, and are on uplands in the southern two-thirds of the county. They have no significant restrictions or limitations for woodland use or management.

Loblolly pine, white pine, sweetgum, and yellow-poplar are suitable species to be planted for wood crops. White pine, Scotch pine, and Norway spruce are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are loblolly pine, yellow-poplar, and ash. Other acceptable species are oaks, sweetgum, red maple, and Virginia pine.

Site index is 75 to 85 for loblolly pine and yellow-poplar and 65 to 75 for Virginia pine and upland oaks. Well-stocked unmanaged stands of loblolly pine that are 50 years of age are expected to yield 23,600 board feet of merchantable timber per acre. The expected average yield increase is about 470 board feet per acre per year for stands that are 50 to 60 years old. The yield for yellow-poplar is 17,600 board feet per acre, and the yield increase is 350 board feet per acre per year. The yield for upland oaks is 9,750 feet per acre, and the yield increase is 200 board feet per acre per year. At 30 years of age, stands of Virginia pine are expected to yield 33 cords of pulp wood per acre, and the yield increase is 1.1 cords per acre per year to age 40.

Seedling mortality is slight on these soils. Plant competition is moderate for pines and hardwoods. Equipment limitations are slight, and the hazards of erosion and windthrow are slight. The soils in this group are well suited to loblolly pine and hardwoods.

WOODLAND SUITABILITY GROUP 3o12

This group consists of moderately well-drained soils of the Aldino series. These soils are nearly level and gently sloping and are on uplands around the heads and along the upper courses of drainageways in the northern part of the county. They have no significant restrictions or limitations for woodland use and management.

White pine and Norway spruce are suitable species to be planted for wood crops. White pine, Scotch pine, Norway spruce, white spruce, and Austrian pine are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are red oak, black oak, white ash, yellow-poplar, basswood, sugar maple, and black cherry. Other acceptable species are white oak, red maple, hickory, Virginia pine, and white pine.

Site index is 75 to 85 for yellow-poplar and 65 to 75 for upland oaks, northern hardwoods, black cherry, and Virginia pine. At 50 years of age, well-stocked unmanaged stands of yellow-poplar are expected to yield 17,600 board feet of merchantable timber per acre. The expected average yield increase is about 350 board feet per acre per year for stands that are 50 to 60 years old. The yield for upland oaks is 9,750 board feet per acre, and the yield increase is 195 board feet per acre per year. The upland oaks figures can be used as a guide for northern hardwoods and black cherry. Stands of Virginia pine that are 30 years old are expected to yield 33 cords of pulp wood per acre, and the yield increase is 1.1 cords per acre per year to age 40.

Seedling mortality is slight on these soils. Plan competition from hardwood brush is severe for pines and generally is slight for hardwoods. Equipment limitations are moderate because of a seasonal high water table. The erosion hazard is slight, and the windthrow hazard is moderate. Soils in this group are well suited to hardwoods, Virginia pine, and white pine.

WOODLAND SUITABILITY GROUP 3o13

This group consists of moderately well drained soils of the Mattapex series. These soils are nearly level to moderately sloping and are on uplands in the southern two-thirds of the county. They have no significant restrictions or limitations for woodland use and management.

Loblolly pine and sweetgum are suitable species to be planted for wood crops. White pine and Scotch pine are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands is loblolly pine. Other acceptable species are oaks, sweetgum, and red maple.

Site index is 75 to 85 for loblolly pine and sweetgum. At 50 years of age, well-stocked unmanaged stands of loblolly pine are expected to yield 23,600 board feet of merchantable timber per acre. The expected average yield increase is about 470 board feet per acre per year for stands that are 50 to 60 years old. The yield for sweetgum, based on figures for yellow-poplar, is 17,600 board feet per acre, and the yield increase is 35 board feet per acre per year.

Seedling mortality is moderate on these soils because of a high water table. Plant competition is severe for pines and moderate for hardwoods. Equipment limitations are moderate because of a seasonal high water table. The erosion and windthrow hazards are slight. Soils in this unit are well suited to loblolly pine, sweetgum, and other hardwoods.

WOODLAND SUITABILITY GROUP 3o14

This group consists of somewhat excessively drained soils of the Rumford series. These soils are gently sloping and are on uplands in the southern two-thirds of the county. They have no significant restrictions or limitations for woodland use and management.

Loblolly pine is a suitable species to be planted for wood crops. Scotch pine, white pine, and Virginia pine are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands is loblolly pine. An acceptable species is Virginia pine.

Site index is 75 to 85 for loblolly pine and 65 to 75 for Virginia pine. At 50 years of age, well-stocked unmanaged stands of loblolly pine are expected to yield 23,600 board feet of merchantable timber per acre. The expected average yield increase is about 470 board feet per acre per year for stands that are 50 to 60 years old. Stands of Virginia pine that are 30 years of age are expected to yield 33 cords of pulp wood per acre, and the yield increase is 1.1 cords per acre per year to age 40.

Seedling mortality is moderate on these soils because of droughtiness. Plant competition and the hazards of erosion and windthrow are slight. Equipment limitations are moderate. Soils in this group are well suited to loblolly pine and Virginia pine.

WOODLAND SUITABILITY GROUP 3r10

This group consists of the dominantly well-drained, undifferentiated Sassafras and Aura soils. These soils are strongly sloping to moderately steep and are on uplands in the southern two-thirds of the county. Slopes are strong enough to restrict or limit woodland use and management.

Loblolly pine, white pine, sweetgum, and yellow-poplar are suitable species to be planted for wood crops. White pine, Scotch pine, and Norway spruce are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are loblolly pine, yellow-poplar, and ash. Other acceptable species are oaks, sweetgum, red maple, and Virginia pine.

Site index is 75 to 85 for loblolly pine and yellow-poplar and 65 to 75 for Virginia pine and upland oaks. At age 50, well-stocked unmanaged stands of loblolly pine are expected to yield 23,600 board feet of merchantable timber per acre. The expected average yield increase is about 470 board feet per acre per year for stands that are 50 to 60 years old. The yield for yellow-poplar is 17,600 board feet per acre, and the yield increase is 350 board feet per acre per year. The yield for upland oaks is 9,750 board feet per acre, and the yield increase is 200 board feet per acre per year. Stands of Virginia pine that are 30 years old are expected to yield 33 cords of pulp wood per acre, and the yield increase is 1.1 cords per acre per year to age 40.

Seedling mortality is slight on these soils. Plant competition is moderate. Equipment limitations are severe because of steepness of slope. The erosion hazard is moderate to severe on the steeper soils. The windthrow hazard is slight. Soils in this group are well suited to loblolly pine and hardwoods.

WOODLAND SUITABILITY GROUP 3s14a

This group consists of excessively drained soils of the Evesboro series. These soils are nearly level to moderately sloping and are on uplands in the central third of the county. Coarse-textured material in the soil restricts woodland use and management.

Loblolly pine is a suitable species to be planted for wood crops. Scotch pine, white pine, and Virginia pine are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands is loblolly pine. An acceptable species is Virginia pine.

Site index is 75 to 85 for loblolly pine and 65 to 75 for Virginia pine. At age 50, well-stocked unmanaged stands of loblolly pine are expected to yield 23,600 board feet of merchantable timber per acre. The expected average yield increase is about 470 board feet per acre per year for stands that are 50 to 60 years old. At age 30, stands of Virginia pine are expected to yield 33 cords of pulp wood per acre, and the yield increase is 1.1 cords per acre per year to age 40.

Seedling mortality is moderate on these soils because of droughtiness. Plant competition is slight. Equipment limitations are moderate. The erosion and windthrow hazards are slight. Soils in this group are well suited to loblolly pine and Virginia pine.

WOODLAND SUITABILITY GROUP 3s14b

The only soil in this group is the excessively drained Evesboro loamy sand, 15 to 40 percent slopes. This soil is strongly sloping to moderately steep and is on uplands in the central third of the county. Coarse-textured material in this soil restricts woodland use and management.

Loblolly pine is a suitable species to be planted for wood crops. Scotch pine, white pine, and Virginia pine are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands is loblolly pine. An acceptable species is Virginia pine.

Site index is 75 to 85 for loblolly pine and 65 to 75 for Virginia pine. At age 50, well-stocked unmanaged stands of loblolly pine are expected to yield 23,600 board feet of merchantable timber per acre. The expected average yield increase is about 470 board feet per acre per year for stands that are 50 to 60 years old. At age 30, stands of Virginia pine are expected to yield 33 cords of pulp wood per acre, and the yield increase is 1.1 cords per acre per year to age 40.

Seedling mortality is moderate on this soil because of droughtiness. Plant competition is slight. Equipment limitations are severe because of loose sand near the surface and steepness of slope. The erosion hazard is moderate, and the windthrow hazard is slight. This soil is well suited to loblolly pine and Virginia pine.

WOODLAND SUITABILITY GROUP 3w3

The only soil in this group is the poorly drained Hatboro silt loam. This soil is on flood plains of major streams flowing through and out of the northern part of the county. Susceptibility to flooding, restricted drainage, and a fluctuating to high water table are significant limitations.

White pine, European larch, and Norway spruce are suitable species to be planted for wood crops. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands is pin oak. Other acceptable species are wetland oaks, red maple, and sycamore.

Site index is 65 to 75 for pin oak. At age 50, well-stocked unmanaged stands of pin oak are expected to yield 9,750 board feet of merchantable timber per acre. The expected average yield increase is about 195 board feet per acre per year for stands that are 50 to 60 years old. These figures are based on yield and growth data for upland oaks.

Seedling mortality is moderate on this soil because of poor drainage and susceptibility to frost action. Plant competition from weeds, grasses, and sedges is severe. Equipment limitations are severe because of susceptibility to periodic flooding and a high water table much of the year. The erosion is slight, except for some moderate scouring during flooding. The windthrow hazard is slight. This soil is well suited to pin oak and other adapted wetland hardwoods.

WOODLAND SUITABILITY GROUP 3w12

The only soil in this group is the moderately well drained to somewhat poorly drained Conowingo silt loam, 3 to 15 percent slopes. This soil is gently sloping to moderately sloping and is on uplands in the extreme northern part of the county. This soil has a sticky plastic subsoil. Susceptibility to flooding, restricted drainage, and a fluctuating to high water table are significant restrictions or limitations for woodland use and management.

White pine and Norway spruce are suitable species to be planted for wood crops. White pine, Scotch pine, Norway spruce, white spruce, and Austrian pine are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are red oak, black oak, white ash, yellow-poplar, basswood, sugar maple, and black cherry. Other acceptable species are white oak, red maple, hickory, Virginia pine, and white pine.

Site index is 75 to 85 for yellow-poplar and 65 to 75 for upland oaks, northern hardwoods, black cherry, and Virginia pine. At age 50, well-stocked unmanaged stands of yellow-poplar are expected to yield 17,600 board feet of merchantable timber per acre. The expected average yield increase is about 350 board feet per acre per year for stands that are 50 to 60 years old. The yield for upland oak is 9,750 board feet per acre, and the yield increase is 195 board feet per acre per year. The upland oak figures can be used as a guide for northern hardwoods and black cherry. Stands of Virginia pine that are 30 years of age are expected to yield 33 cords of pulp wood per acre, and the increase is 1.1 cords per acre per year to age 40.

Seedling mortality is slight on this soil. Plant competition from hardwood brush is severe for pines, and it generally is slight for hardwoods. Equipment limitations are severe because of a seasonal high water table and a sticky plastic subsoil. The hazard of erosion and windthrow are moderate. This soil is well suited to hardwoods, Virginia pine, and white pine.

WOODLAND SUITABILITY GROUP 3w13

This group consists of poorly drained soils of the Elkton, Leonardtown, and Othello series and of moderately well drained soils of the Keyport series (fig. 6). These soils are on upland flats in the southern two-thirds of the county. These soils are dominantly nearly level and gently sloping, but Keyport soils are moderately sloping in places. Elkton and Keyport soils have a clayey plastic subsoil. Leonardtown soils have a hard, compacted, very silty fragipan in the subsoil, and Othello soils have a very silty subsoil over coarse material. Susceptibility to flooding, restricted drainage, and a fluctuating to high water table are significant restrictions or limitations for woodland use and management.

Loblolly pine and sweetgum are acceptable species to be planted for wood crops. White pine and Scotch pine are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands is loblolly pine. Other acceptable species are oaks, sweetgum, and red maple.

Site index is 75 to 85 for loblolly pine and sweetgum. At age 50, well-stocked unmanaged stands of loblolly pine are expected to yield 23,600 board feet of merchantable timber per acre. The expected average yield increase is about 470 board feet per acre per year for stands that are 50 to 60 years old. The yield for sweetgum, based on similar data for yellow-poplar, is 17,600 board feet per acre, and the yield increase is 35 board feet per acre per year.

Figure 6.—Selecting yellow-poplar for cutting on a Keyport soil. The wooded area is on Elk Neck, between the Elk River and the Chesapeake Bay.

Seedling mortality is moderate on these soils because of a high water table. Plant competition is severe for pines and moderate for hardwoods. Equipment limitations are severe because of a seasonal high water table. The erosion hazard is slight, and the windthrow hazard is moderate. Soils in this group are well suited to loblolly pine, sweetgum, and other hardwoods.

WOODLAND SUITABILITY GROUP 3w16

This group consists of moderately well drained silt loams of the Beltsville series. These soils are nearly level to moderately sloping and are on uplands in the southern two-thirds of the county. They have a hard, compact, silty fragipan in the lower part of the subsoil. Susceptibility to flooding, restricted drainage, and a fluctuating to high water table are significant restrictions or limitations for woodland use and management.

Loblolly pine, Virginia pine, and white pine are suitable species to be planted for wood crops. Scotch pine and white pine are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are Virginia pine and loblolly pine. Other acceptable species are red maple and sweetgum.

Site index is 65 to 75 for Virginia pine and 75 to 85 for loblolly pine. Stands of Virginia pine that are 30 years old are expected to yield 33 cords of pulp wood per acre. The expected average yield increase is 1.1 cords per acre per year to age 40. At age 50, well-stocked unmanaged stands of loblolly pine are expected to yield 23,600 board feet of merchantable timber per acre, and the yield increase is about 470 board feet per acre per year for stands that are 50 to 60 years old.

Seedling mortality and plant competition are slight. Equipment limitations are moderate because of a seasonal high water table. The erosion hazard generally is slight, but it is moderate on moderately sloping soils. The windthrow hazard is moderate. Soils in this group are well suited to Virginia pine and loblolly pine.

WOODLAND SUITABILITY GROUP 4c11a

This group consists of well-drained silt loams of the Chrome series. These soils are gently sloping and moderately sloping and are on uplands in the northern part of the county. They have a waxy clayey subsoil that restricts woodland use and management. Bedrock is at a depth of about 40 inches.

White pine is a suitable species to be planted for wood crops. White pine, Scotch pine, Norway spruce, white spruce, and red pine are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are red oak, black oak, white oak, yellow-poplar, black cherry, and sugar maple. Other acceptable species are oaks, hickory, and Virginia pine.

Site index is 65 to 75 for yellow-poplar and 55 to 65 for upland oaks and Virginia pine. At age 50, well-stocked unmanaged stands of yellow-poplar are expected to yield 14,200 board feet of merchantable timber per acre. The expected yield increase is about 245 feet per acre per year for stands that are 50 to 60 years old. The yield for upland oaks is 6,450 board feet per acre, and the yield increase is 130 board feet per acre per year. Stands of Virginia pine that are 30 years old are expected to yield 22 cords of pulp wood per acre, and the yield increase is 0.7 cord per acre per year to age 40.

Seedling mortality is slight on these soils. Plant competition is severe for pines and moderate for hardwoods. Equipment limitations are moderate because of a clayey waxy subsoil. The erosion and windthrow hazards are slight. Soils in this group are fairly well suited to hardwoods and pine.

WOODLAND SUITABILITY GROUP 4c11b

This group consists of well-drained silt loams and clay loams of the Chrome series. These soils are moderately sloping to moderately steep and are on uplands in the northern part of the county. They have a waxy clayey subsoil that restricts woodland use and management. Bedrock is at a depth of about 40 inches.

White pine is a suitable species to be planted for wood crops. White pine, Scotch pine, Norway spruce, white spruce, and red pine are suitable for Christmas trees. Natural stands should be managed until they are ready for harvesting. The preferred species in natural stands are red oak, black oak, white oak, yellow-poplar, black cherry, and sugar maple. Other acceptable species are oaks, hickory, and Virginia pine.

Site index is 65 to 75 for yellow-poplar and 55 to 65 for upland oaks and Virginia pine. At 50 years of age, well-stocked unmanaged stands of yellow-poplar are expected to yield 14,200 board feet of merchantable timber per acre. The expected average yield increase is about 245 board feet per acre per year for stands that are 50 to 60 years old. The yield for upland oaks is 6,450 board feet per acre, and the yield increase is 130 board feet per acre per year. Stands of Virginia pine that are 30 years old are expected to yield 22 cords of pulp wood per acre, and the yield increase is 0.7 cord per acre per year to age 40.

Seedling mortality is moderate on these soils. Plant competition is slight. Equipment limitations and the erosion hazard generally are moderate, but they are severe on steep soils. The windthrow hazard is slight. Soils in this group are fairly well suited to hardwoods and pines.

Use of the Soils for Wildlife

The uplands of Cecil County are potentially very good as habitat for game birds, mammals, and nongame wildlife. The wetlands have less potential for wildlife habitat. The wetlands, however, are of greater economic importance than the uplands because many property owners lease waterfowl hunting rights to sportsmen. The county is located on the Atlantic flyway of migratory waterfowl.

About 87 percent of the acreage of the county has a fair or better potential for open-land wildlife. Open-land wildlife consists of deer, rabbit, woodchuck, quail, and other upland birds. Pheasants inhabit the northern part of the county. About 98 percent of the acreage of the county has a fair or better potential for such woodland wildlife as deer and squirrel. Only about 8 percent of the county has a fair or better potential for habitat for such wetland wildlife as racoon, woodcock, beaver, muskrat, and waterfowl.

The welfare of wildlife depends largely on the amount and distribution of food, shelter, and water. If any of these elements is missing, inadequate, or inaccessible, wildlife is absent or scarce. The kinds of wildlife that live in a given area and the number of each kind are closely related to land use, to the resulting kinds and patterns of vegetation, and to the supply and distribution of water. These factors, in turn, generally are related to the kinds of soils.

Habitat for wildlife normally can be developed or improved by planting suitable vegetation, by properly managing the existing plant cover, by fostering the natural establishment of desirable plants, or by using a combination of these measures.

TABLE 5.—*Suitability of soils for elements of*

[Clay pits (Cp), Gravel and borrow pits (Gv), and Made land (MaB and MaD) are not shown in this table, because their properties are in the rating

Soil series and map symbols	Elements of wildlife habitat			
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants
Aldino:				
AdA	Fair	Good	Good	Good
AdB2	Fair	Good	Good	Good
Aura:				
AuB2, AuC2	Fair	Good	Good	Fair
AuD2	Poor	Fair	Good	Fair
Baile:				
BaA	Poor	Fair	Fair	Good
BaB	Poor	Fair	Fair	Good
Barclay:				
BcA	Fair	Fair	Good	Good
BcB	Fair	Fair	Good	Good
Beltsville:				
BeA	Fair	Good	Good	Good
BeB2, BeC2	Fair	Good	Good	Good
BeC3	Fair	Fair	Good	Good
Butlertown:				
BuA	Good	Good	Good	Good
BuB2, BuC2	Fair	Good	Good	Good
BuC3, BuD2	Poor	Fair	Good	Good
Chester:				
CeA	Good	Good	Good	Good
CeB2	Fair	Good	Good	Good
Chillum:				
ChB2, ChC2	Fair	Good	Good	Good
ChC3, ChD2	Poor	Fair	Good	Good
ChD3	Unsuited	Poor	Good	Good
Christiana:				
ClB2	Fair	Good	Good	Good
Chrome:				
CmB2, CmC2	Poor	Poor	Fair	Fair
CmD2, CnD3	Unsuited	Poor	Fair	Fair
CnE3	Unsuited	Unsuited	Fair	Fair
Coastal beaches:				
Co	Unsuited	Poor	Poor	Unsuited
Codorus:				
Cr	Fair	Good	Good	Good
Collington:				
CsB2, CsC2, CtB2, CtC2	Fair	Good	Good	Good
CtC3, CtD2	Poor	Fair	Good	Good
CtD3	Unsuited	Poor	Good	Good
Comus:				
Cu	Fair	Good	Good	Good

Table 5 lists the soils in the county and rates their suitability for eight elements of wildlife habitat and for three kinds of wildlife. The ratings used are *good*, *fair*, *poor*, and *unsuited*.

For soils rated *good*, habitat generally is easily developed, improved, or maintained. Limitations are few, if any, and satisfactory results are assured.

For soils rated *fair*, habitat generally can be developed, improved, or maintained. These soils have moderate limitations. Good management and frequent attention are required for satisfactory results.

For soils rated *poor*, habitat generally can be developed, improved, or maintained, though limitations are severe. Management is difficult and expensive and re-

wildlife habitat and kinds of wildlife

too variable for rating. Present land use, the position of a soil in relation to other soils, and the mobility of wildlife were not considered of the soils]

Elements of wildlife habitat—Continued				Kinds of wildlife—		
Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Open-land	Woodland	Wetland
Poor	Poor	Poor	Poor	Good	Good	Poor.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Fair	Unsuited	Unsuited	Unsuited	Good	Fair	Unsuited.
Fair	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Fair	Good	Good	Good	Fair	Good	Good.
Fair	Poor	Poor	Poor	Fair	Good	Poor.
Poor	Fair	Fair	Fair	Good	Fair	Fair.
Poor	Poor	Unsuited	Unsuited	Good	Fair	Unsuited.
Poor	Poor	Poor	Poor	Good	Good	Poor.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Fair	Unsuited.
Poor	Poor	Poor	Poor	Good	Good	Poor.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Fair	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Fair	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Fair	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Unsuited	Unsuited	Unsuited	Unsuited	Unsuited	Unsuited	Unsuited.
Poor	Poor	Poor	Poor	Good	Good	Poor.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.

TABLE 5.—*Suitability of soils for elements of*

Soil series and map symbols	Elements of wildlife habitat			
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants
Conowingo:				
CwC	Poor	Fair	Good	Good
Elkton:				
E1A, EmA	Poor	Fair	Fair	Good
E1B, EmB	Poor	Fair	Fair	Good
Elsinboro:				
EoA	Good	Good	Good	Good
EoB2, EoC2	Fair	Good	Good	Good
Evesboro:				
EvB	Poor	Poor	Poor	Poor
EvD	Unsuited	Poor	Poor	Poor
Eve	Unsuited	Unsuited	Poor	Poor
Fallsington:				
FaA, FmA	Poor	Fair	Fair	Good
FaB, FmB	Poor	Fair	Fair	Good
FaC	Poor	Fair	Fair	Good
Glenelg:				
GeA	Good	Good	Good	Good
GeB2, GeC2	Fair	Good	Good	Good
GeC3, GeD2	Poor	Fair	Good	Good
GeD3	Unsuited	Poor	Good	Good
GeE	Unsuited	Fair	Good	Good
Glenville:				
GnA	Fair	Good	Good	Good
GnB2, GnC2	Fair	Good	Good	Good
Halboro:				
Ha	Fair	Good	Good	Good
Keyport:				
KeA, KpA	Fair	Good	Good	Good
KeB2, KeC2, KpB2, KpC2	Fair	Good	Good	Good
KpD2, KsB3	Fair	Fair	Good	Good
KsC3	Poor	Fair	Good	Good
Legore:				
LeB2, LeC2	Fair	Good	Good	Good
LeD2, LgC3	Poor	Fair	Good	Good
LgE3	Unsuited	Poor	Good	Good
Leonardtown:				
LoA	Poor	Poor	Fair	Fair
LoB	Poor	Poor	Fair	Fair
Loamy and clayey land:				
LyC	Poor	Fair	Fair	Fair
LyD, LyE	Unsuited	Unsuited	Fair	Fair
Manor:				
M1B2, M1C2	Fair	Fair	Fair	Fair
M1C3, M1D2	Poor	Fair	Fair	Fair
M1D3, M1E, MmD	Unsuited	Poor	Fair	Fair
Matapeake:				
MnA, MoA	Good	Good	Good	Good
MnB2, MnC2, MoB2	Fair	Good	Good	Good
MnC3, MnD2	Poor	Fair	Good	Good
MnD3	Unsuited	Poor	Good	Good
Mattapex:				
MpA	Fair	Good	Good	Good
MpB2, MpC2	Fair	Good	Good	Good

wildlife habitat and kinds of wildlife—Continued

Elements of wildlife habitat—Continued				Kinds of wildlife—		
Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Open-land	Woodland	Wetland
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Fair	Good	Good	Good	Fair	Good	Good.
Fair	Fair	Poor	Poor	Fair	Good	Poor.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Good	Unsuited	Unsuited	Unsuited	Poor	Poor	Unsuited.
Good	Unsuited	Unsuited	Unsuited	Unsuited	Poor	Unsuited.
Good	Unsuited	Unsuited	Unsuited	Unsuited	Poor	Unsuited.
Fair	Good	Good	Good	Fair	Good	Good.
Fair	Fair	Poor	Poor	Fair	Good	Poor.
Fair	Poor	Unsuited	Unsuited	Fair	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Poor	Poor	Poor	Poor	Good	Good	Poor.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Fair	Fair	Fair	Good	Fair	Fair.
Poor	Poor	Poor	Poor	Good	Good	Poor.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Fair	Good	Good	Good	Poor	Fair	Good.
Fair	Poor	Unsuited	Unsuited	Poor	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Fair	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Fair	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Fair	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited
Poor	Poor	Poor	Poor	Good	Good	Poor.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.

TABLE 5.—*Suitability of soils for elements of*

Soil series and map symbols	Elements of wildlife habitat			
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants
Mixed alluvial land:				
Mr	Poor	Fair	Fair	Good
Montalto:				
MtA	Good	Good	Good	Good
MtB2, MtC2	Fair	Good	Good	Good
MvD, MyC3	Poor	Fair	Good	Good
MyD3	Unsuited	Poor	Good	Good
Neshaminy:				
NeA	Good	Good	Good	Good
NeB2, NeC2	Fair	Good	Good	Good
NeD2	Poor	Fair	Good	Good
Othello:				
OhA	Poor	Fair	Fair	Good
OhB	Poor	Fair	Fair	Good
Rumford:				
RuB, RuC	Fair	Fair	Fair	Fair
RuD	Poor	Poor	Fair	Fair
Sassafras:				
SaA	Good	Good	Good	Good
SaB2, SaC2, SfB2, SgB2, SgC2	Fair	Good	Good	Good
SaC3, SaD2, SgC3	Poor	Fair	Good	Good
SaD3, SgD3	Unsuited	Poor	Good	Good
Sassafras and Aura:				
SrE	Unsuited	Unsuited	Good	Good
Stony land:				
St	Unsuited	Unsuited	Poor	Fair
Tidal marsh:				
Tm	Unsuited	Unsuited	Unsuited	Unsuited
Watchung:				
Wa	Unsuited	Poor	Fair	Good
Woodstown:				
WoA, WsA	Fair	Good	Good	Good
WoB2, WoC2, WsB2	Fair	Good	Good	Good
WoC3, WoD	Poor	Fair	Good	Good

wildlife habitat and kinds of wildlife—Continued

Elements of wildlife habitat—Continued				Kinds of wildlife—		
Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Open-land	Woodland	Wetland
Fair	Fair	Poor	Fair	Fair	Good	Fair.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Fair	Good	Good	Good	Fair	Good	Good.
Fair	Fair	Poor	Poor	Fair	Good	Poor.
Fair	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Fair	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Unsuited	Good	Fair	Unsuited	Unsuited	Unsuited	Fair.
Fair	Poor	Poor	Poor	Poor	Fair	Poor.
Poor	Poor	Poor	Poor	Good	Good	Poor.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.

severe. Management is difficult and expensive and requires intensive effort. Satisfactory results are questionable.

For soils rated *unsuited*, habitat is impractical to develop, improve, or maintain. Limitations are severe, and unsatisfactory results are probable.

The suitability ratings can be used as an aid in—

1. Planning the broad use of parks, refuges, nature-study areas, and other recreational developments for wildlife.
2. Selecting the better soils for creating, improving, or maintaining specific kinds of wildlife habitat elements.
3. Determining the relative intensity of management needed for individual habitat elements.
4. Eliminating sites that would be difficult or not feasible to manage for specific kinds of wildlife.
5. Determining areas that are suitable for acquisition for use by wildlife.

Elements of Wildlife Habitat. The habitat elements rated in table 5 are discussed in the following paragraphs.

Grain and seed crops include corn, sorghum, wheat, barley, oats, millet, buckwheat, and cowpeas. Included also are other crops grown for grain or for seed. The major soil properties affecting this habitat element are effective root depth, available moisture capacity, natural drainage, slope, stones on the surface, hazard of flooding, and texture of the surface layer and subsoil.

Grasses and legumes are domestic grasses and legumes that are established by planting. They include bluegrass, fescue, brome, timothy, orchardgrass, reed canarygrass, clover, lespadeza, and alfalfa. The major soil properties affecting this habitat element are effective root depth, available moisture capacity, natural drainage, slope, stones on the surface, hazard of flooding, and texture of the surface layer and subsoil.

Wild herbaceous upland plants are perennial grasses and weeds that generally are established naturally. Included are bluestem, quackgrass, panicgrass, goldenrod, wild carrot, nightshade, and dandelion. The major soil properties affecting this habitat element are effective root depth, available moisture capacity, natural drainage, stones on the surface, hazard of flooding or ponding, and texture of the surface layer and subsoil.

Hardwood woody plants are nonconiferous trees, shrubs, and woody vines that produce nuts or other fruits, buds, catkins, twigs, or foliage that wildlife feeds on. They generally are established naturally but can be planted. Among the native plants are oak, cherry, maple, poplar, apple, hawthorn, dogwood, persimmon, sumac, sassafras, hazelnut, black walnut, hickory, sweetgum, bayberry, blueberry, huckleberry, blackhaw, virburnum, grape, and briers. The major elements are effective root depth, available moisture capacity, natural drainage, and stones on the surface.

Also in this group are several varieties of fruit-bearing shrubs that are raised commercially for planting. Autumn-olive, Amur honeysuckle, Tatarian honeysuckle, crabapple, multiflora rose, highbush cranberry, and silky cornel dogwood are some of the shrubs that generally are available. They can be planted on soils that are rated well suited. Hardwoods that are not available commercially generally can be transplanted successfully.

Coniferous woody plants consist of cone-bearing evergreen trees and shrubs that primarily provide cover, browse, and seeds for wildlife. Included are Norway spruce, Virginia pine, loblolly pine, shortleaf pine, pond pine, Scotch pine, red cedar, and Atlantic white cedar. Generally, the plants are established naturally in areas that have a thin cover of weeds and sod. The major soil properties affecting this habitat element are effective root depth, available moisture capacity, natural drainage, stones on the surface, and texture of the surface layer and subsoil. Soils that are well suited are those on which plants grow slowly and closing of the canopy is delayed. Branches maintained close to the ground provide food and cover for rabbit, pheasant, and other small animals. Trees that grow quickly form a dense canopy that shuts out the light, and the lower branches die.

On poorly suited soils widely spaced conifiers can quickly, but only temporarily, produce the desired growth. Maintaining these plants is difficult because the soils are well suited to hardwood plants. Unless the stand is carefully managed, hardwoods invade and commonly overtop the conifers.

Wetland food and cover plants are wild herbaceous, annual, and perennial plants that grow on moist to wet soils. They include smartweed, wild millet, bulrush, sedges, barnyard grass, pondweed, duckweed, duckmillet, arrow-arum, pickerelweed, waterwillow, wetland grasses, wildrice, and cattails. The major soil properties affecting this habitat element are natural drainage, stones on the surface, frequency of flooding or ponding, slope, and texture of the surface layer and subsoil.

Shallow water developments consist of impoundments or excavations that provide areas of shallow water near habitats for wetland wildlife. Examples are shallow dugouts, level ditches, blasted potholes, and marshes where water is kept at a depth of 6 to 24 inches. The major elements are depth to bedrock, natural drainage, slope, hazard of flooding, and stones on the surface.

Excavated ponds are dugout areas that generally contain ground water rather than runoff. They provide water for many kinds of wildlife, particularly migratory or overwintering waterfowl (fig. 7). The major soil properties affecting this habitat element are depth to bedrock, natural drainage, stones on the surface, slope, and hazard of flooding. Farm ponds of the impounded type are not considered in table 5. They can, however, provide water for wildlife and also be suitable for such recreational activities as fishing. If stocked with fish, these ponds should be at least 6 feet deep over a large part of the area.

Kinds of wildlife. Table 5 rates the soils according to their suitability for three classes of wildlife in the county—open-land, woodland, and wetland wildlife.

Open-land wildlife includes quail, pheasant, meadowlark, field sparrow, dove, cottontail rabbit, red fox, and woodchuck. These birds and mammals generally make their home in areas of cropland, pasture, meadow, and lawns and in areas overgrown by grasses, herbs, and shrubs.

Woodland wildlife includes ruffed grouse, woodcock, thrush, vireo, scarlet tanager, gray and red squirrels, gray fox, white-tailed deer, raccoon, and wild turkey. Stands of hardwoods, coniferous trees, shrubs, or a mixture of these plants provide food and cover.

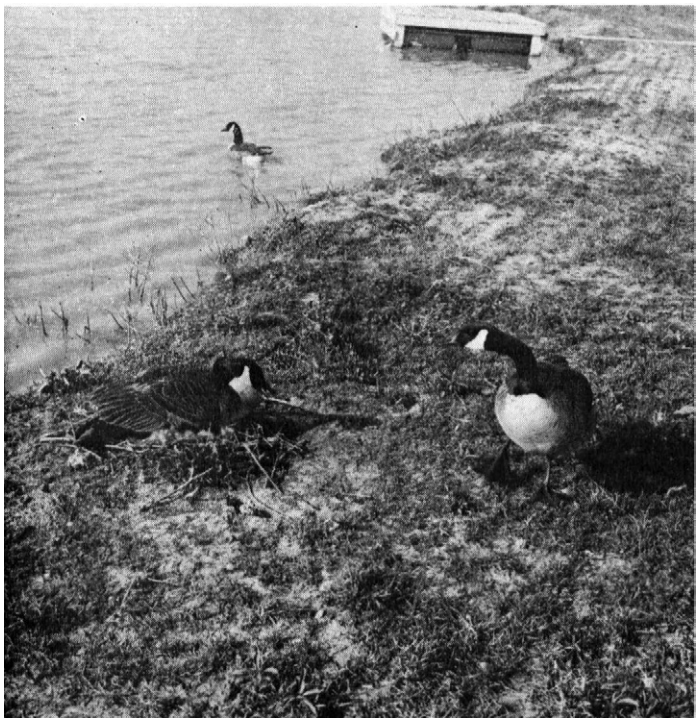

Figure 7.—Canada geese nesting close to a pond constructed on Othello silt loam, 0 to 2 percent slopes.

Wetland wildlife includes duck, geese, rails, heron, shore birds, and muskrat that commonly live in ponds, marshes, and swamps.

Ratings indicated under kinds of wildlife in table 5 are based on the ratings shown in this table for suitability of the soils for elements of wildlife habitat. For *open-land wildlife* the ratings are based on grain and seed crops, grasses and legumes, wild herbaceous upland plants, hardwood plants, and coniferous wildlife habitat. For *woodland wildlife* the ratings are based on grasses and legumes, wild herbaceous upland plants, hardwood woody plants, and coniferous woody plants. For *wetland wildlife* the ratings are based on wetland food and cover plants, shallow water developments, and excavated ponds.

Engineering Uses of the Soils [4]

In this subsection the physical properties of the soils of the county are related to problems of engineering. The properties of the soils were estimated on the basis of facts obtained by (1) examining the soils closely in the field and evaluating their characteristics as they apply to engineering needs and (2) testing samples taken from various horizons of soils in selected series that are represented in Cecil County. Also considered were the results of tests made on samples of similar soils in other parts of Maryland and in adjacent States. On the basis of the estimated physical properties, interpretations were made that will be helpful to those who use the soils of Cecil County for engineering construction.

[4] THEODORE IFFT, State conservation engineer, SCS, assisted in preparing this subsection.

Engineers can use the information in this subsection, along with the soil map in the back of this survey, for many purposes. It should be emphasized that the engineering interpretations do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads or where excavations are deeper than the depths of layers here reported. Even in these situations, the soil map is useful in planning more detailed field investigations or for anticipating the kinds of problems that may be expected. Also, engineers should not apply specific values to the estimates for bearing capacity given in this survey.

As an example of the need for onsite investigation, the information in this subsection shows that the soils of the Butlertown series are not suitable as a source of sand or gravel to the depth of layers here reported. It does not show the likelihood of finding sand or gravel at greater depths. The information also shows that the soils of the Sassafras series are suitable for use in constructing dikes, dams, levees, and other embankments. It does not show how good any particular sites of the Sassafras soils are for these purposes. Tests at the site of proposed engineering work are required to obtain such additional detailed information.

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

1. Make soil and land use studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Make preliminary estimates in designing drainage and irrigation systems and in planning farm ponds, diversion terraces, and structures for soil and water conservation or for other purposes.
3. Make preliminary evaluations of soil and terrain 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 sand, gravel, and other construction material.
5. Correlate performance of engineering structures with kinds of soil to develop information that will be useful in designing and maintaining the structures.
6. Determine the suitability of soils for cross-country movement of vehicles and construction equipment.
7. Supplement information obtained from other published maps and reports and from aerial photographs than can be readily used by engineers.
8. Develops other preliminary estimates for construction purposes based on soil conditions pertinent to a particular area.

Information of value in planning engineering work is given throughout the text, especially in the sections "Descriptions of the Soils" and "Formation, Morphology, and Classification of Soils." By using this survey, an engineer can select and concentrate on those soil units most important for his proposed kind of construction, and in this manner reduce the number of samples taken for laboratory testing and complete an adequate soil investigation at minimum cost.

Some terms used by the soil scientist may be unfamiliar to the engineer, and some words—for example, soil,

clay, silt, and sand—may have special meaning in soil science. These and other terms used in the soil survey are defined in the Glossary at the back of this survey. Most of the information about engineering is given in tables 6, 7, 8, and 9.

Engineering classification systems

Most highway engineers classify soil material in accordance with the system approved by the American Association of State Highway Officials (AASHO) (*1*). In this system soil materials are classified into seven principal groups. The groups range from A–1, which consists of gravelly soils of high bearing capacity, to A–7, which consists of clay soils having low strength when wet. Within each group, the relative engineering value of the soil material is indicated by a group index number. Group index numbers range from 0 for the best material to 20 for the poorest. The group index number is shown in parentheses, following the soil group symbol in table 7.

TABLE 6.—*Estimated soil properties*

[Clay pits (Cp), Coastal beaches (Co), Gravel and borrow pits (Gv), Made land (MaB and MaD), Mixed alluvial land (Mr), Stony land (St), The undifferented group, Sassafras and Aura soils (SrE), is not shown, but the properties of the Sassafras soils

Soil series and map symbols	Typical profile			Range in properties representative of the series in Cecil County		
				Classification		
	Bedrock—depth from surface and kind of rock	Water table—depth from surface	Horizons—depth from surface	Dominant USDA texture	Unified	AASHO
		Feet	*Inches*			
Aldino: AdA, AdB2	4 to 6 ft., serpentine, gabbro.	[1]2	0–10	Silt loam	ML	A–4
			10–21	Light silty clay loam	CL	A–6
			21–39	Silty clay loam	ML	A–4 or A–7
			39–55	Heavy silt loam	SM, ML, or MH	A–2, A–4, or A–5
			55–60	Gravelly silt loam	GM, GC, SM, or MH	A–2, A–3, or A–7
Aura: AuB2, AuC2, AuD2	[2]	20	0–23	Gravelly sandy loam	SM	A–2, A–4
			23–57	Gravelly sandy clay loam.	SC or CL	A–4 or A–6
			57–80	Gravelly sandy loam	GC	A–2
Baile: BaA, BaB	5 to 8 ft.; mica schist, quartzite.	0	0–10	Silt loam	ML or MH	A–4
			10–39	Silty clay loam	CL, SC, or SM	A–4, A–6, or A–7
			39–60	Sandy loam	SM, ML, or CL	A–5, A–6, or A–4
Barclay: BcA, BcB	[2]	1	0–14	Silt loam	ML or CL	A–4 or A–6
			14–40	Silt loam	SC or CL	A–4 or A–6
			40–60	Sandy loam and loamy sand.	SM	A–2 or A–4
Beltsville: BeA, BeB2, BeC2, BeC3	[2]	[1]1–2	0–10	Silt loam	ML or CL	A–4
			10–46	Silt loam to sandy clay loam.	CL	A–4 or A–6
			46–60	Fine sandy loam	SM or ML	A–2 or A–4
Butlertown: BuA, BuB2, BuC2, BuC3, BuD2.	[2]	[1]1–2	0–12	Silt loam	ML or CL	A–4
			12–44	Heavy silt loam	ML or CL	A–4 or A–6
			44–59	Silt loam	ML or CL	A–4 or A–6
			59–64	Sandy clay loam	SM, ML, or CL	A–2 or A–4
Chester: CeA, CeB2	5 to 10 ft.; micaceous schist, gneiss, rippable.	4	0–7	Silt loam	ML	A–4
			7–42	Heavy silt loam	SM, ML, SC, or CL	A–4, A–5, A–6, or A–7
			42–60	Loam	SM, CL, or ML	A–2, A–4, or A–5

Some engineers prefer to use the Unified soil classification system (7). In this system soil materials are identified as coarse grained (eight classes), fine grained (six classes), and highly organic.

Estimated engineering properties of the soils

Table 6 shows estimated soils properties that are important in engineering. For each major or significant horizon of the soil, the table shows the USDA texture and the engineering classifications according to the two most widely used systems. These systems are the Unified, used by the Department of Defense, SCS engineers, and others and the AASHO, adapted by the American Association of State Highway Officials.

Five soils in the county have a fragipan layer. In addition, the Aura and the Chillum soils have hard, compact, and gravelly layers.

The information in table 6 applies to soils that are only slightly eroded. The surface layer of many severely eroded soils of the county has been partly or completely

significant to engineering

and Tidal marsh (Tm) are omitted from table because their properties are too variable for estimating, and onsite investigation is required. and the Aura soils mapped separately are shown in table. > = more than; < = less than]

Range in properties representative of the series in Cecil County—Continued

Percentage passing sieve—				Permeability	Available moisture capacity	Unlimed reaction	Moisture-density		Shrink-swell potential	Corrosivity	
No. 4 (4.74 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				Optimum moisture	Maximum dry density		Untreated steel	Concrete
				In./hr.	*In./in. of soil*	*pH*	*Pct.*	*Lb./cu. ft.*			
95–100	95–100	90–100	80–95	0. 63–6. 3	0. 18–0. 27	5. 1–6. 0	13–20	101–110	Low	Low	Moderate.
95–100	90–100	85–100	60–95	0. 63–2. 0	0. 18–0. 24	4. 5–6. 0	13–20	101–120	Low to moderate.	High	High.
85–100	80–100	65–100	50–100	<0. 20	0. 18–0. 24	4. 5–5. 5	13–20	101–120	Low to moderate.	High	High.
85–100	80–100	65–100	30–100	0. 20–2. 0	0. 12–0. 24	4. 5–6. 0	11–21	101–120	Low	High	High.
70–100	65–100	60–100	30–100	0. 63–2. 0	0. 12–0. 18	4. 5–7. 0	11–21	101–120	Low	High	High.
80–95	60–85		20–50	0. 63–2. 0	0. 12–0. 18	4. 5–5. 0			Low	Low	High.
80–95	65–85		45–65	0. 20–0. 63	0. 12–0. 18	5. 1–5. 5	10–15	111–130	Low	Low	High.
40–50	35–45		20–30	0. 20–0. 63	0. 08–0. 12	4. 5–5. 0	10–15	121–130	Low	Low	High.
90–100	90–100	85–100	70–90	0. 20–0. 63	0. 18–0. 27	4. 5–5. 5	14–20	101–110	Low	Low	Moderate.
95–100	80–100	75–95	45–80	<0. 20	0. 18–0. 24	4. 5–6. 0	18–24	101–110	Low to moderate.	Moderate	Moderate.
85–100	80–100	75–100	35–75	<0. 20	0. 12–0. 18	4. 5–5. 5	12–18	105–115	Low to moderate.	Moderate	High.
100	100	90–100	75–100	0. 63–2. 0	0. 18–0. 27	4. 0–5. 0	14–24	101–110	Low	High	High.
100	100	95–100	30–60	0. 63–2. 0	0. 18–0. 24	4. 0–5. 0	10–18	111–120	Low	High	High.
90–100	90–100	60–100	15–40	0. 63–6. 3	0. 08–0. 18	4. 0–5. 0	10–14	101–120	Low	High	High.
100	100	95–100	75–90	0. 63–2. 0	0. 18–0. 24	4. 0–5. 0			Low	Moderate	High.
100	100	95–100	75–90	<0. 20	0. 12–0. 18	4. 0–5. 0	10–15	111–120	Low to moderate.	Moderate	High.
75–100	65–100	55–85	25–80	0. 63–6. 3	0. 08–0. 12	4. 0–5. 0	10–15	111–125	Low	Moderate	High.
90–100	85–100	80–100	75–100	0. 63–6. 3	0. 18–0. 24	4. 5–5. 5			Low	Moderate	High.
95–100	90–100	85–100	75–100	0. 63–2. 0	0. 18–0. 24	4. 5–6. 5	12–18	101–110	Low	Moderate	High.
95–100	95–100	85–100	65–80	0. 20–0. 63	0. 18–0. 24	4. 5–6. 0	14–18	101–110	Low	Moderate	High.
90–100	90–100	75–100	30–80	0. 63–2. 0	0. 12–0. 24	4. 5–5. 5	10–18	101–120	Low	Moderate	High.
90–100	90–100	75–90	55–75	0. 63–2. 0	0. 18–0. 24	5. 1–6. 0			Low	Moderate	Moderate.
85–100	85–100	65–95	40–80	0. 63–2. 0	0. 12–0. 18	5. 1–6. 0	13–19	105–120	Low	Low	Moderate.
85–100	85–100	75–95	30–65	0. 63–6. 3	0. 08–0. 12	4. 6–5. 5	13–23	101–110	Low	Low	Moderate.

TABLE 6.—*Estimated soil properties*

Soil series and map symbols	Typical profile			Range in properties representative of the series in Cecil County		
				Classification		
	Bedrock—depth from surface and kind of rock	Water table—depth from surface	Horizons depth from surface	Dominant USDA texture	Unified	AASHO
		Feet	*Inches*			
Chillum: ChB2, ChC2, ChC3, ChD2, ChD3.	(2)	5	0–9	Silt loam	ML or CL	A–4
			9–36	Heavy silt loam	CL or ML	A–4 or A–6
			36–60	Loam	SM, GC, or GM	A–2
Christiana: ClB2	(2)	5	0–9	Fine sandy loam	SM or ML	A–2 or A–4
			9–84	Clay	CH	A–7
Chrome: CmB2, CmC2, CmD2, CnD3, CnE3.	1½ to 3 ft.; serpentine.	5	0–7	Silt loam	ML or MH	A–4 or A–7
			7–14	Silty clay	MH or CH	A–7
			14–25	Silty clay loam to silt loam.	GM, GC, ML, or MH.	A–2 or A–7
Codorus: Cr	6 to 20 ft.; variable, unconforming	[3] 1½–2	0–28	Silt loam to loam	ML	A–4
			28–60	Silt loam to silty clay loam.	ML, MH, or CL	A–4, A–5, or A–6
Collington: CsB2, CsC2, CtB2, CtC2, CtC3, CtD2, CtD3.	(2)	5	0–7	Loam	SM or ML	A–2 or A–4
			7–39	Clay loam	SC, ML, or CL	A–4 or A–6
			39–60	Sandy clay loam	SM or SC	A–2 or A–4
Comus: Cu	6 to 20 ft.; variable, unconforming.	[3] 4	0–18	Silt loam	ML	A–4
			18–30	Heavy silt loam	ML or CL	A–4 or A–6
			30–50	Gravelly sandy loam	SM or MH	A–4 or A–5
Conowingo: CwC	3 to 5 ft.; serpentine, gabbro, diorite.	1½–2	0–9	Silt loam	ML or CL	A–4 or A–6
			9–30	Silty clay	CH or CL	A–7 or A–6
			30–40	Silty clay loam	MH, CL, CH or ML	A–6 or A–7
Elkton: ElA, ElB, EmA, EmB	(2)	0	0–7	Silt loam	ML, CL, or SM	A–4 or A–6
			7–48	Silty clay	CL	A–4, A–6, or A–7
			48–60	Silty clay loam	SC, ML, or CL	A–2, A–4, A–6, or A–7
Elsinboro: EoA, EoB2, EoC2	6 to 20 ft.; granite, schist, rippable.	4	0–15	Silt loam	ML	A–4
			15–39	Light silty clay loam	SM, ML, SC, or CL	A–4, A–5, A–6, or A–7
			39–60	Gravelly sandy loam	SM, SC, ML, or CL	A–2, A–4, or A–5
Evesboro: EvB, EvD, EvE	(2)	10	0–60	Loamy sand or sand	SM, or SP–SM	A–2 or A–3

See footnotes at end of table.

significant to engineering—Continued

Range in properties representative of the series in Cecil County—Continued

Percentage passing sieve—				Permeability	Available moisture capacity	Unlimed reaction	Moisture-density		Shrink-swell potential	Corrosivity	
No. 4 (4.74 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				Optimum moisture	Maximum dry density		Untreated steel	Concrete
				In./hr.	*In./in. of soil*	*pH*	*Pct.*	*Lb./cu. ft.*			
95–100	95–100	90–100	50–90	0. 63–2. 0	0. 18–0. 27	4. 5–5. 0			Low	Low	Moderate.
95–100	95–100	90–100	60–90	0. 63–2. 0	0. 18–0. 24	4. 5–6. 5	12–18	101–120	Low to moderate.	Moderate	Moderate.
40–70	35–60	30–60	20–30	0. 20–0. 63	0. 08–0. 12	4. 0–5. 0	10–15	111–130	Low	Low	High.
100	95–100		30–65	0. 63–2. 0	0. 12–0. 18	4. 0–5. 0			Low	Moderate	High.
100	100		90–100	<0. 20	0. 18–0. 24	4. 0–5. 0	18–24	91–100	Moderate to high	High	High.
70–100	65–100		60–85	0. 63–2. 0	0. 18–0. 27	6. 0–7. 0			Low	Moderate	Moderate.
70–100	65–100		60–100	0. 63–2. 0	0. 18–0. 24	6. 0–7. 0	25–55	81–100	Moderate to high.	Moderate	Moderate.
30–85	25–75		20–60	0. 63–2. 0	0. 08–0. 24	6. 0–7. 5	15–40	81–120	Low to moderate.	Moderate	Moderate.
95–100	90–100	85–100	75–90	0. 63–2. 0	0. 18–0. 24	4. 5–5. 5	16–20	101–110	Low	Moderate	Low.
95–100	90–100	85–100	80–95	0. 63–2. 0	0. 18–0. 24	4. 5–5. 0	16–20	101–110	Low to moderate.	Moderate	Low.
100	100	60–100	25–75	0. 63–6. 3	0. 12–0. 27	4. 0–5. 0			Low	Moderate	High.
100	100	90–100	40–80	0. 63–2. 0	0. 18–0. 24	4. 0–5. 0	12–18	111–125	Low to moderate.	Moderate	High.
90–100	85–100	75–100	20–40	0. 63–6. 3	0. 08–0. 18	4. 0–5. 0	10–14	101–125	Low	Moderate	High.
95–100	90–100	70–85	65–80	0. 63–2. 0	0. 18–0. 24	4. 5–5. 5	12–18	101–110	Low	Moderate	Moderate.
95–100	90–100	70–90	65–85	0. 63–2. 0	0. 18–0. 24	4. 5–6. 0	12–18	101–110	Low	Moderate	Moderate.
90–100	85–100	55–80	40–65	0. 63–2. 0	0. 12–0. 24	5. 5–6. 0	13–23	101–110	Low	Moderate	Moderate.
95–100	95–100	80–100	80–100	0. 20–0. 63	0. 18–0. 27	5. 1–6. 0			Moderate	High	Moderate.
85–100	70–100	65–100	60–100	<0. 20	0. 18–0. 24	5. 1–6. 0	20–28	91–100	High	High	Moderate.
80–95	60–95	55–95	50–90	<0. 20	0. 18–0. 24	6. 1–7. 0	20–28	91–100	High	High	Moderate.
95–100	95–100	90–100	45–90	0. 20–2. 0	0. 18–0. 27	4. 0–5. 0			Low to moderate.	High	High.
95–100	95–100	90–100	60–100	<0. 20	0. 18–0. 24	4. 0–5. 0	16–24	101–120	Moderate	High	High.
85–100	85–100	60–100	20–100	0. 20–0. 63	0. 12–0. 24	4. 0–5. 0	10–20	101–125	Low to moderate.	High	High.
90–100	90–100	75–90	55–80	0. 63–2. 0	0. 18–0. 24	5. 1–6. 0			Low	Moderate	Moderate.
85–100	85–100	65–95	40–85	0. 63–2. 0	0. 12–0. 18	5. 1–6. 0	13–19	105–120	Low	Low	Moderate.
85–100	70–100	50–95	25–65	0. 63–6. 3	0. 08–0. 12	4. 6–5. 5	13–23	101–125	Low	Low	Moderate.
100	95–100	75–95	10–25	>6. 3	0. 04–0. 06	4. 0–5. 0	10–14	101–115	Low	Very low	High.

TABLE 6.—*Estimated soil properties*

Soil series and map symbols	Typical profile			Range in properties representative of the series in Cecil County		
				Classification		
	Bedrock—depth from surface and kind of rock	Water table—depth from surface	Horizons depth from surface	Dominant USDA texture	Unified	AASHO
		Feet	*Inches*			
Fallingston: FaA, FaB, FaC, FmA, FmB.	(2)	0	0–16	Loam	SM, SC, or ML	A–2 or A–4
			16–36	Heavy sandy loam	SM, SC, or ML	A–2, A–4, or A–6
			36–55	Loam	SM, SC, SP, SP–SM	A–2 or A–3
Glenelg: GeA, GeB2, GeC2, GeC3, GeD2, GeD3, GeE.	4 to 10 ft.; micaceous, schist, rippable.	4	0–8	Silt loam	ML	A–4 or A–6
			8–24	Heavy silt loam	SM, SC, ML, or CL	A–4, A–5, A–6, or A–7
			24–50	Loam	SM, CL, or ML	A–2, A–4, or A–5
Glenville: GnA, GnB2, GnC2	5 to 10 ft.; mica, schist.	1	0–12	Silt loam	ML or CL	A–4
			12–22	Heavy silt loam	ML or CL	A–4 or A–6
			22–40	Heavy silt loam	ML or CL	A–4
			40–55	Sandy clay loam	SM, SC, ML, or MH	A–4 or A–5
Hatboro: Ha	6 to 20 ft.; variable; unconforming.	0	0–49	Silt loam	ML or MH	A–4 or A–5
			49–54	Sandy loam	SM or SP–SM	A–2
Keyport: KeA, KeB2, KeC2, KpA, KpB2, KpC2, KpD2, KsB3, KsC3.	(2)	1½–2	0–8	Loam	ML or CL	A–4
			8–40	Silty clay	CL, CH, or MH	A–6 or A–7
			40–60	Silty clay	SM, SC, ML, or CL	A–2, A–4, A–6, or A–7
Legore: LeB2, LeC2, LeD2, LgC3, LgE3.	5 to 10 ft.; diorite, gabbro.	5	0–8	Silt loam	ML or CL	A–4 or A–6
			8–22	Light silty clay loam	CL or MH	A–6 or A–7
			22–60	Fine sandy loam	ML or MH	A–4, A–6, or A–7
Leonardtown: LoA, LoB	(2)	1 0	0–11	Silt loam	ML	A–4
			11–39	Light silty clay loam	CL	A–4 or A–6
			39–50	Gravelly loam	ML or SM	A–2 or A–4
Loamy and clayey land: LyC, LyD, LyE.	(2)	1½–4	Variable	Variable	ML	A–4
			Variable	Clay	CH	A–7
Manor: MlB2, MlC2, MlC3, MlD2, MlD3, MlE, MmD.	6 to 10 ft.; mica, schist.	10	0–19	Loam	ML	A–4 or A–5
			19–72	Loam	ML or SM	A–2, A–4, or A–5
Matapeake: MnA, MnB2, MnC2, MnC3, MnD2, MnD3, MoA, MoB2.	(2)	5	0–12	Silt loam	ML or CL	A–4
			12–37	Heavy silt loam	ML or CL	A–4 or A–6
			37–48	Sandy loam	SP–SM or SM	A–2
			48–60	Loamy sand	SP or SP–SM	A–3 or A–2

See footnotes at end of table.

significant ot engineering—Continued

Range in properties representative of the series in Cecil County—Continued

Percentage passing sieve—				Permeability	Available moisture capacity	Unlimed reaction	Moisture-density		Shrink-swell potential	Corrosivity	
No. 4 (4.74 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				Optimum moisture	Maximum dry density		Untreated steel	Concrete
				In./hr.	*In./in. of soil*	*pH*	*Pct.*	*Lb./cu.ft.*			
95–100	95–100	70–95	30–55	2. 0–6. 3	0. 12–0. 18	4. 0–5. 0			Low	High	High.
95–100	95–100	65–100	20–55	0. 63–2. 0	0. 18–0. 24	4. 0–5. 0	10–14	111–125	Low	High	High.
95–100	95–100	50–90	5–35	0. 63–6. 3	0. 06–0. 10	4. 0–5. 0	10–14	101–125	Low	High	High.
90–100	90–100	75–90	55–75	0. 63–2. 0	0. 18–0. 24	4. 5–6. 0			Low	Moderate	Moderate.
85–100	85–100	65–95	40–80	0. 63–2. 0	0. 12–0. 18	4. 5–6. 0	13–19	105–120	Low	Low	Moderate.
85–100	85–100	75–95	30–65	0. 63–6. 3	0. 08–0. 12	4. 6–5. 5	13–23	101–110	Low	Low	Moderate.
85–100	85–100	75–95	65–85	0. 63–2. 0	0. 18–0. 24	5. 0–5. 5			Low	High	Moderate.
85–100	85–100	80–95	65–90	0. 63–2. 0	0. 18–0. 24	4. 5–5. 5	14–18	101–110	Low	High	High.
85–100	85–100	80–100	65–90	0. 20–0. 63	0. 18–0. 24	4. 5–5. 5	14–18	101–110	Low	High	High.
75–90	75–95	65–85	40–75	0. 63–2. 0	0. 12–0. 18	4. 5–5. 0	13–23	101–120	Low	High	High.
95–100	95–100	80–100	65–100	0. 63–2. 0	0. 18–0. 27	4. 5–5. 5	15–23	101–110	Low	High	High.
90–100	85–100	50–75	15–25	0. 63–6. 3	0. 06–0. 10	4. 5–5. 0	10–14	101–110	Low	High	High.
95–100	95–100	90–100	65–100	0. 20–2. 0	0. 18–0. 27	4. 0–5. 0			Low	High	High.
95–100	95–100	95–100	80–100	<0. 20	0. 18–0. 27	4. 0–5. 0	14–24	101–110	Moderate	High	High.
90–100	80–100	60–100	25–100	0. 20–0. 63	0. 18–0. 24	4. 0–5. 0	10–24	95–125	Low to moderate.	High	High.
90–100	90–100	85–100	60–85	0. 20–2. 0	0. 18–0. 24	5. 1–7. 0			Low	Moderate	Moderate.
90–100	90–100	85–100	75–90	0. 63–2. 0	0. 18–0. 24	5. 6–7. 0	16–25	91–110	Low to moderate.	Moderate	Moderate.
75–95	70–90	65–80	50–75	0. 63–2. 0	0. 18–0. 24	5. 6–7. 3	12–22	101–120	Low to moderate.	Moderate	Moderate.
95–100	95–100	95–100	90–100	0. 20–0. 63	0. 18–0. 24	4. 0–5. 0			Low	High	High.
95–100	95–100	90–100	80–100	<0. 20	0. 18–0. 24	4. 0–5. 0	10–14	105–120	Moderate	High	High.
95–100	95–100	85–100	30–90	0. 20–2. 0	0. 10–0. 24	4. 0–5. 0	8–12	110–125	Low	High	High.
90–100	90–100		50–90	0. 63–2. 0	0. 18–0. 24	4. 0–5. 0	18–24	101–110	Low	Moderate	High.
90–100	90–100		90–100	<0. 20	0. 18–0. 24	4. 0–5. 0	18–24	91–100	Moderate to high.	High	High.
90–100	90–100	75–90	50–80	0. 63–2. 0	0. 18–0. 24	4. 5–5. 5	14–20	101–110	Low	Low	Moderate.
90–100	80–100	50–65	30–60	0. 63–6. 3	0. 12–0. 18	4. 5–5. 5	14–20	101–110	Low	Low	Moderate.
95–100	95–100	90–100	50–100	0. 63–2. 0	0. 18–0. 27	4. 5–5. 0			Low	Low	Moderate.
95–100	95–100	90–100	60–90	0. 63–2. 0	0. 18–0. 24	4. 5–5. 0	12–18	101–120	Low to moderate.	Moderate	Moderate.
90–100	85–100	60–100	10–35	0. 63–6. 3	0. 10–0. 18	4. 5–5. 0	10–15	111–125	Low	Low	High.
90–100	85–100	30–60	0–20	>6. 3	<0. 06	4. 0–5. 0	8–12	91–110	Low	Low	High.

TABLE 6.—*Estimated soil properties*

Soil series and map symbols	Typical profile			Range in properties representative of the series in Cecil County		
	Bedrock—depth from surface and kind of rock	Water table—depth from surface	Horizons depth from surface	Classification		
				Dominant USDA texture	Unified	AASHO
		feet	*Inches*			
Mattapex: MpA, MpB2, MpC2	(2)	2	0–14	Silt loam	ML or CL	A–4
			14–31	Heavy silt loam	CL	A–4 or A–6
			31–64	Light silt loam	SP–SM or SM	A–2 or A–3
Montalto: MtA, MtB2, MtC2, MvD, MyC3, MyD3.	5 to 12 ft.; gabbro, diorite.	5	0–11	Silt loam	ML or CL	A–4, A–6, or A–7
			11–42	Silty clay or clay	CH, ML, MH or CL	A–6 or A–7
			42–62	Loam	SM, MH, or ML	A–4, A–5, or A–7
Neshaminy: NeA, NeB2, NeC2, NeD2.	5 to 10 ft.; gabbro, diorite, and granite mixed.	4	0–9	Silt loam	ML	A–4 or A–6
			9–40	Silty clay loam and clay.	SM, SC, ML, CL, or MH	A–4, A–5, A–6, or A–7
			40–60	Clay	SM, ML, CL, CH, or MH	A–2, A–4, A–5, or A–7
Othello: OhA, OhB	(2)	0	0–15	Slit loam	ML or CL	A–4
			15–36	Heavy silt loam	ML or CL	A–4 or A–6
			36–60	Loam to silt loam	SM	A–2 or A–4
Rumford: RuB, RuC, RuD	(2)	5	0–11	Loamy sand	SM	A–2
			11–34	Sandy loam	SM or SC	A–2 or A–4
			34–44	Stratified clay, silt, and sand.	SM	A–2
			44–50	Sand	SP, SP–SM, or SM	A–2 or A–3
Sassafras: SaA, SaB2, SaC2, SaC3, SaD2, SaD3, SfB2.	(2)	5	0–11	Sandy loam or fine sandy loam.	SM or ML	A–2 or A–4
			11–32	Sandy clay loam	SM, SC, CL, or ML	A–2 or A–4
			32–50	Loamy sand	SM or SP–SM	A–2
SgB2, SgC2, SgC3, SgD3	(2)	----------	0–11	Gravelly loam	SM or ML	A–4
			11–32	Sandy clay loam	SC, CL, or ML	A–4 or A–6
			32–50	Loamy sand	SM or GM	A–2
Wachung: Wa	5 to 10 ft.; diorite, diabase, gabbro.	0	0–9	Silt loam	ML	A–4
			9–51	Silty clay or clay	CL or MH	A–5, A–6, or A–7
			51–60	Silt loam	MH	A–5, A–6, or A–7
Woodstown: WoA, WoB2, WoC2, WoC3, WoD, WsA, WsB2.	(2)	2	0–11	Sandy loam or loam	SM or ML	A–2 or A–4
			11–37	Heavy loam to sandy loam.	SC, CL, or SM	A–4 or A–6
			37–60	Loamy sand	SP, SM, SC, or SP–SM	A–2

[1] Water table perched.
[2] Bedrock at indefinite great depth, not measured.

significant to engineering—Continued

Range in properties representative of the series in Cecil County—Continued

Percentage passing sieve—				Permeability	Available moisture capacity	Unlimed reaction	Moisture-density		Shrink-swell potential	Corrosivity	
No. 4 (4.74 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)				Optimum moisture	Maximum dry density		Untreated steel	Concrete
				In./hr.	*In./in. of soil*	*pH*	*Pct.*	*Lb./cu. ft.*			
95–100	95–100	90–100	55–90	0. 20–2. 0	0. 18–0. 27	4. 5–5. 5			Low	Moderate	Moderate.
95–100	95–100	90–100	60–100	0. 20–0. 63	0. 18–0. 24	4. 5–5. 5	12–18	101–120	Low to moderate.	High	High.
95–100	95–100	75–90	10–35	0. 63–6. 3	0. 06–0. 18	4. 0–5. 0	10–15	111–125	Low	High	High.
95–100	90–100	90–100	80–100	0. 63–2. 0	0. 18–0. 24	5. 0–5. 5			Low	Moderate	Moderate.
95–100	90–100	85–100	80–100	0. 20–0. 63	0. 18–0. 24	5. 0–5. 5	18–22	95–110	Moderate to high.	Moderate	Moderate.
85–100	85–100	45–95	50–75	0. 63–2. 0	0. 12–0. 18	6. 1–6. 5	16–20	101–115	Low	Low	Moderate.
70–100	65–100	60–90	55–75	0. 63–2. 0	0. 18–0. 24	5. 1–6. 0			Low	Moderate	Moderate.
85–100	85–100	65–95	40–80	0. 63–2. 0	0. 12–0. 18	6. 1–6. 5	13–19	105–120	Low to moderate.	Low	Moderate.
85–100	85–100	57–95	30–80	0. 63–6. 3	0. 08–0. 12	6. 6–7. 3	13–23	101–110	Low to moderate.	Low	Moderate.
95–100	95–100	80–100	60–100	0. 20–2. 0	0. 18–0. 27	4. 0–5. 0			Low	High	High.
95–100	90–100	85–100	70–100	0. 20–0. 63	0. 18–0. 24	4. 0–5. 0	12–18	111–120	Low to Moderate	High	High.
85–100	80–100	55–95	15–40	0. 63–6. 3	0. 06–0. 12	4. 0–5. 0	10–14	111–125	Low	High	High.
95–100	95–100	50–85	15–30	>6. 3	0. 06–0. 08	4. 0–5. 0			Low	Low	Low.
95–100	95–100	65–90	25–40	>6. 3	0. 12–0. 18	4. 0–5. 0	7–18	111–125	Low	Low	High.
95–100	95–100	30–85	15–40	>6. 3	0. 06–0. 12	4. 0–5. 0	10–15	101–110	Low	Low	High.
95–100	95–100	30–60	0–15	>6. 3	<0. 06	4. 0–5. 0	8–12	91–110	Low	Low	High.
95–100	85–100	45–75	30–60	2. 0–6. 3	0. 12–0. 18	4. 0–5. 0			Low	Low	High.
95–100	85–100	65–90	25–55	0. 63–2. 0	0. 18–0. 24	4. 0–5. 0	7–18	111–125	Low	Low	High.
90–100	80–100	30–80	10–25	2. 0–6. 3	<0. 08	4. 0–5. 0	9–15	101–125	Low	Low	High.
80–95	60–85	40–65	35–60	2. 0–6. 3	0. 12–0. 18	4. 0–5. 0			Low	Low	High.
80–95	65–85	45–75	50–70	0. 63–2. 0	0. 18–0. 24	4. 0–5. 0	7–18	111–125	Low	Low	High.
40–60	35–55	30–50	20–30	2. 0–6. 3	<0. 08	4. 0–5. 0	9–15	101–125	Low	Low	High.
90–100	90–100	85–100	60–75	0. 20–0. 63	0. 18–0. 27	4. 5–5. 5	14–20	101–110	Low	Moderate	Moderate.
95–100	90–100	85–100	65–90	<0. 20	0. 18–0. 24	4. 5–5. 5	18–24	101–110	Moderate to high.	Moderate	Moderate.
85–100	80–100	75–100	60–75	<0. 20	0. 12–0. 18	4. 5–5. 5	12–18	105–115	Moderate to high.	Moderate	High.
95–100	95–100	75–95	30–65	0. 63–2. 0	0. 12–0. 18	4. 0–5. 0			Low	Low	High.
95–100	95–100	75–100	35–65	0. 63–2. 0	0. 18–0. 24	4. 0–5. 0	7–18	111–125	Low	Moderate	High.
95–100	95–100	40–70	10–35	2. 0–6. 3	0. 06–0. 08	4. 0–5. 0	9–15	101–120	Low	Moderate	High.

[3] Subject to flooding.

TABLE 7.—*Engineering*

[Tests performed by Soil Consultants, Inc., in accordance with standard

Soil name and location	Report No.	Depth from surface	Moisture-density		Mechanical analysis[1]	
			Maximum dry density	Optimum moisture	Percentage passing sieve	
					¾ in.	⅜ in.
		Inches	*Pounds per cubic foot*	*Percent*		
Aldino silt loam:	9–1	0–10	103	19	[3] 99	99
0.6 mile west of U.S. Highway No. 22 and north of Mt. Zore Road. (Modal)	9–4	21–28	104	19	----------	100
	9–7	55–60	110	19	[4] 77	74
Baile silt loam:	5–1	0–9	76	36	----------	----------
0.1 mile east of Rowland Road and north of Dr. Jack Road. (Modal)	5–4	17–31	106	20	----------	100
	5–9	67–91	110	14	----------	100
1.3 miles west of State Route 276 and south of Post Road. (High chroma subsoil)	6–1	0–9	106	16	[3] 99	99
	6–3	16–21	122	11	[4] 93	91
	6–5	29–44	116	14	[3] 99	99
	6–7	57–80	113	14	----------	100
0.5 mile south of State Route 273 and west of Dr. Miller Road. (Firm subsoil)	2–2	3–10	100	20	----------	----------
	2–5	19–27	116	15	[3] 97	97
	2–11	59–66	115	14	----------	----------
Butlertown silt loam:	8–1	0–8	108	17	----------	----------
1 mile north of Cecilton and east of U.S. Highway No. 213. (Modal)	8–4	28–44	114	15	----------	----------
	8–6	49–59	115	16	----------	100
1 mile south of Wards Hill Road and east of Budds Landing Road. (Deep fragipan)	10–1	0–10	104	16	----------	----------
	10–4	23–35	108	16	----------	----------
	10–8	64–76+	115	15	----------	----------
Conowingo silt loam:	16–1	0–6	108	18	[5] 99	98
0.1 mile north of Rock Springs and west of U.S. Highway No. 222. (Modal)	16–4	15–30	115	15	[3] 96	93
	16–5	30–40	114	15	[4] 96	92
Elsinboro silt loam:	11–1	0–10	106	17	[3] 98	95
0.2 mile south of State Route 277 and east of State Route 316. (Modal)	11–4	26–39	110	18	100	98
	11–5	39–60	123	12	[3] 98	93
Glenelg silt loam:	7–1	0–8	103	17	[3] 98	97
1.2 miles west of old State Route 276 and south of Post Road. (Modal)	7–3	13–22	112	15	[3] 99	98
	7–6	41–72	108	15	----------	----------
Glenville silt loam:	4–1	0–9	107	17	100	99
0.5 mile north of State Route 273 and west of Fairview Road. (Silty subsoil)	4–5	23–31	110	17	----------	----------
	4–8	55–65	112	16	[3] 99	97
0.4 mile north of Blueball and east of State Route 545. (Grading toward Beltsville)	3–1	0–8	106	16	[3] 98	98
	3–6	27–41	112	15	----------	100
	3–7	41–66	114	15	----------	100
	3–8	66–86	117	13	[3] 96	92
Montalto silt loam:	12–1	0–7	101	20	100	98
Southwest of the intersection of Ridge and Foots Roads. (Modal)	12–4	27–42	96	28	100	98
	12–6	48–62	100	23	[3] 98	98
Neshaminy silt loam:	1–1	0–9	111	16	[4] 85	79
1 mile north of Pilot and west of road to Pleasant Grove. (Modal)	1–3	21–40	106	23	100	99
	1–4	40–60	99	26	100	99

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

test data

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

Mechanical analysis [1]—Continued								Liquid limit	Plasticity index	Classification	
Percentage passing sieve—Continued				Percentage smaller than—						AASHO	Unified
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074mm.)	0.05 mm.	0.02 mm.	0. 005 mm.	0. 002 mm.				
99	98	95	88	85	61	26	14	36	9	A-4(8)	ML
99	96	91	82	81	69	38	27	44	14	A-7-5(10)	ML
72	66	60	48	47	42	25	18	42	15	A-7-6(4)	GM-GC
----------	100	98	88	78	56	19	9	67	18	A-7-5(15)	MH or OH
99	97	90	68	63	40	22	15	43	13	A-7-5(8)	ML
98	91	74	37	33	28	17	14	[5] NP	[5] NP	A-4(0)	SM
98	96	89	82	79	54	20	11	33	7	A-4(8)	ML
89	85	72	45		35	22	16	28	11	A-6(2)	SC
98	95	84	64	62	45	22	12	28	7	A-4(6)	ML-CL
99	86	68	46	40	25	8	3	NP	NP	A-4(2)	SM
100	99	95	86	85	67	35	23	40	13	A-6(9)	ML
95	81	79	71	70	54	29	22	34	14	A-6(9)	CL
----------	100	98	78	75	57	28	22	33	11	A-6(8)	CL
100	99	97	91	89	58	20	10	31	6	A-4(8)	ML
----------	100	95	84	82	56	27	17	34	9	A-4(8)	ML
99	98	87	65	64	56	37	30	38	16	A-6(8)	CL
----------	100	99	96	93	56	17	8	35	8	A-4(8)	ML
----------	100	99	97	95	70	38	33	38	12	A-6(9)	ML
----------	100	97	78	76	62	33	25	35	9	A-4(8)	ML
96	90	84	80	79	66	34	25	38	13	A-6(9)	ML or CL
87	71	65	60	58	43	31	23	38	15	A-6(7)	CL
81	64	58	53	51	42	31	24	40	14	A-6(5)	ML
94	92	86	80	79	60	28	20	33	7	A-4(8)	ML
96	90	86	82	81	72	44	34	44	17	A-7-6(12)	ML
86	71	50	29	28	28	28	27	45	18	A-2-7(1)	SM
96	94	89	74	72	49	22	9	40	12	A-6-(9)	ML
97	95	87	68	66	55	32	24	38	14	A-6(8)	CL
100	96	83	44	36	19	6	3	NP	NP	A-4(2)	SM
98	95	90	70	69	55	29	19	34	8	A-4(7)	ML
100	99	96	85	84	64	34	22	33	9	A-4(8)	ML
94	91	84	56	52	44	24	16	36	9	A-4(4)	ML
97	96	93	84	82	63	31	20	33	8	A-4(8)	ML
99	98	96	90	88	64	27	18	34	10	A-4(8)	ML
99	98	97	94	92	71	31	21	30	8	A-4(8)	CL
86	79	68	39	36	28	14	10	39	11	A-6(1)	SM
96	92	90	82	80	69	41	28	42	12	A-7-5(20)	ML
95	90	88	80	76	69	56	48	66	29	A-7-5(20)	MH
98	98	94	70	64	55	36	29	48	12	A-7-5(9)	ML
72	66	61	56	54	42	20	11	40	12	A-6(5)	ML
98	88	83	76	74	68	58	48	50	18	A-7-5(13)	MH
98	94	88	78	75	68	57	47	62	27	A-7-5(19)	MH

[2] SCS and BPR have agreed to consider that all soils having plasticity indexes within two points of A-line are to be given a borderline classification. An example of a borderline classification obtained by this use is ML–CL.

[3] For these soil horizons, 100 percent of the sample tested passed the 1½-inch sieve.

[4] For these soil horizons, 100 percent of the sample tested passed the 3-inch sieve.

[5] NP=nonplastic.

TABLE 8.—*Suitability of soil as engineering material*

[Clay pits (Cp), Coastal beaches (Co), Gravel and borrow pits (Gv), Made land (MaB and MaD), Stony land (St), and Tidal marsh (Tm) are omitted from table because their characteristics are too variable for rating. The undifferentiated group, Sassafras and Aura soils (SrE), is omitted, but the suitability of the Sassafras soils and the Aura soils mapped separately are shown in table]

Soil series	Workability of soil when wet	Susceptibility to frost action	Suitability as source of—			
			Topsoil [1]	Sand	Gravel	Road fill
Aldino: AdA, AdB2	Poor	High	Fair	Not suitable	Not suitable	Fair to good.
Aura: AuB2, AuC2, AuD2	Fair	Moderate	Poor	Fair to good	Excellent	Excellent.
Baile: BaA, BaB	Poor	High	Fair	Not suitable	Not suitable	Very poor.
Barclay: BcA, BcB	Poor	High	Good	Not suitable	Not suitable	Poor.
Beltsville: BeA, BeB2, BeC2, BeC3	Poor	High	Fair	Poor	Poor	Poor.
Butlertown: BuA, BuB2, BuC2, BuC3, BuD2.	Poor	High	Good	Not suitable	Not suitable	Fair.
Chester: CeA, CeB2	Poor	Moderate	Good	Not suitable	Not suitable	Fair to good.
Chillum: ChB2, ChC2, ChC3, ChD2, ChD3.	Poor	Moderate	Good	Not suitable	Good	Good.
Christiana: ClB2	Very poor	Moderate to high.	Fair	Not suitable	Not suitable	Very poor.
Chrome: CmB2, CmC2, CnD3, CnE3.	Fair to poor	Moderate	Fair [2]	Not suitable	Not suitable	Very poor.
Codorus: Cr	Poor	High	Fair to good	Not suitable	Poor to not suitable.	Poor.
Collington: CsB2, CsC2, CtB2, CtC2, CtC3, CtD2, CtD3.	Fair	Moderate	Good	Fair	Not suitable	Good.
Comus: Cu	Poor	Moderate	Good	Poor to fair	Fair to not suitable.	Poor to fair.
Conowingo: CwC	Very poor	High	Poor	Not suitable	Not suitable	Not suitable.
Elkton: ElA, ElB, EmA, EmB	Poor	High	Poor	Not suitable	Not suitable	Poor.
Elsinboro: EoA, EoB2, EoC2	Poor	Moderate	Good	Not suitable	Not suitable	Fair to good.
Evesboro: EvB, EvD, EvE	Good	Low	Poor	Fair	Not suitable	Fair.
Fallsington: FaA, FaB, FaC, FmA, FmB.	Fair	High	Fair	Fair	Not suitable	Fair to good.
Glenelg: GeA, GeB2, GeC2, GeC3, GeD2, GeD3, GeE.	Poor	Moderate	Good	Not suitable	Not suitable	Fair to good.
Glenville: GnA, GnB2, GnC2	Poor	High	Fair	Not suitable	Not suitable	Fair.
Hatboro: Ha	Poor	High	Fair	Not suitable	Fair to not suitable.	Poor.
Keyport: KeA, KeB2, KeC2, KpA, KpB2, KpC2, KpD2, KsB3, KsC3.	Poor	High	Fair	Not suitable	Not suitable	Poor.
Legore: LeB2, LeC2, LeD2, LgC3, LgE3.	Poor	Moderate	Good	Not suitable	Not suitable	Fair.
Leonardtown: LoA, LoB	Poor	High	Poor to fair	Poor to not suitable.	Poor to fair	Poor to good.
Loamy and clayey land: LyC, LyD, LyE.	Very poor	Moderate to high.	Fair	Not suitable	Not suitable	Very poor.
Manor: MlB2, MlC2, MlC3, MlD2 MlD3, MlE, MmD.	Fair	Moderate	Fair to good [3]	Not suitable	Not suitable	Poor.
Matapeake: MnA, MnB2, MnC2, MnC3, MnD2, MnD3, MoA, MoB2.	Poor	Moderate	Good	Fair to good	Not suitable	Fair to good.
Mattapex: MpA, MpB2, MpC2	Poor	High	Good	Poor	Not suitable	Fair.
Mixed alluvial land: Mr	Poor	High	Poor to fair	Mostly not suitable.	Mostly not suitable.	Poor to good.
Montalto: MtA, MtB2, MtC2, MvD, MyC3, MyD3.	Poor	Moderate	Good [4]	Not suitable	Not suitable	Poor to fair.
Neshaminy: NeA, NeB2, NeC2, NeD2.	Poor	Moderate	Good	Not suitable	Not suitable	Fair to good.
Othello: OhA, OhB	Poor	High	Fair	Poor	Not suitable	Poor.
Rumford: RuB, RuC, RuD	Good	Low	Fair	Fair to good	Not suitable	Poor to good.
Sassafras: SaA, SaB2, SaC2, SaC3, SaD2, SaD3, SfB2, SgB2, SgC2, SgC3, SgD3.	Fair	Moderate	Good [5]	Fair	Not suitable [5]	Good.
Watchung: Wa	Poor	High	Fair	Not suitable	Not suitable	Very poor.
Woodstown: WoA, WoB2, WoC2, WoC3, WoD, WsA, WsB2.	Fair	High	Good	Fair to poor	Not suitable	Good.

[1] Rating is for surface layer, or to a depth of 10 inches, whichever is less. Severely eroded soils generally are not a suitable source of topsoil.

[2] A soil that has a severely eroded clay loam surface layer is a poor source of topsoil.

[3] A soil that has a severely eroded silty clay loam surface layer or a very stony surface layer is a poor to unsuitable source of topsoil.

[4] A soil that has a severely eroded silty clay loam surface layer is a fair source of topsoil. A soil that has a very stony silt loam surface layer is a poor source of topsoil.

[5] Sassafras gravelly loam is a poor to fair source of topsoil, but is a fair to good source of gravel.

removed through erosion, and the subsoil and substratum are near the surface. Also, the thicknesses of the horizons vary somewhat from place to place. The thickness and other properties given in table 6 are for the typical profile.

Permeability is the rate at which water moves downward through a saturated soil that is undisturbed. This rate is for ideal conditions, or where there is no hydraulic pressure from above and no restriction on the water as it permeates into underlying materials and drainage ditches.

Available moisture capacity is the water content of the soil at field capacity, minus the water content at the wilting point of most plants. It is expressed as inches of water per inch of soil. Reaction range indicates the degree of acidity of the soil horizon.

Maximum dry density is the amount of dry soil that can be compacted into a unit volume. Optimum moisture is the moisture content at which the maximum dry density of a soil can be obtained by compaction. For any one soil material, there is a specific optimum moisture content, below or above which maximum density cannot be obtained by compaction.

Shrink-swell potential indicates the volume change that can be expected when the soil moisture changes from dry to wet or from wet to dry. It is estimated primarily on the basis of the kind and amount of clay in a horizon. Few of the soils of Cecil County have a high shrink-swell potential. For most soils of the county this potential is low. Corrosion potential is the probable corroding effect on pipes and other underground installations, expressed as low, moderate, or high. It is given for untreated steel and for concrete.

Engineering test data

Table 7 shows the results of analyses of 41 horizon samples taken from 13 soil profiles that represent nine of the major series in Cecil County. Tests and mechanical analyses were made to determine moisture density, grain size distribution, and some liquid and plastic properties. The engineering classification of each horizon is based on these analyses. The information in tables 6, 8, and 9 is based partly on these tests and partly on similar tests made elsewhere.

Soil interpretations for engineering

Table 8 lists estimated suitability ratings of soils as engineering material. Each soil in the county is rated for its workability when wet and for its susceptibility to frost action. In addition, the major horizons are rated for suitability as a source of topsoil, sand, gravel, and road fill.

Table 9 shows specific features that affect the suitability of soils for stated kinds of engineering construction. The interpretations are based on the information given in tables 6, 7, and 8, and on the experience of engineers in Maryland and elsewhere.

A soil that is suitable for one engineering purpose may be poor or even unsuitable for some other use. For example, Elkton silt loam is suitable for sites for reservoirs, but it is not suitable as a source of sand. Evesboro soils generally are not suitable for reservoir sites, because they are subject to excessive seepage.

Table 9 indicates both the desirable and the undesirable features of soils that need to be considered before a structure is planned, designed, and constructed. Elkton soils have a silty clay subsoil, which limits their use for embankments or dams. The subsoil is highly erodible and cannot be compacted to a very high density. In places it is suitable for use as core material to reduce seepage in dams. Fine texture and slow permeability in subsoil increase the difficulty of providing adequate drainage. These features limit the suitability of the soil for irrigation.

Suitability of a soil for pipelines is determined by the natural stability of the soil and by the height and seasonal fluctuation of the water table. If the water table is high, it is difficult and dangerous to lay lines for sewer, water, or gas, because ditchbanks are likely to collapse. In some soils the banks lack good stability even if the water table is not high.

The choice of soils for locating roads or highways is affected primarily by the seasonal height of the water table, by the stability of the soil materials, particularly under heavy load or pressure, and by the expected severity of frost action. Topography, such as slope and changes in slopes, is an external factor that also affects road location.

The choice of a site for a pond or reservoir depends largely on the amount or rate of seepage that can be expected in the soil, particularly at the bottom and sides of the reservoir. The amount of seepage often depends on whether the reservoir floor and sides consist of subsoil material, substratum material, or bedrock. These layers frequently differ greatly in seepage characteristics.

The best soil for a reservoir floor is one that has slow seepage and great strength or stability. Also desirable as an external factor is a constant and reliable source of water, if seepage or other water losses are expected to be high.

Soil stability, erodibility, and probable maximum density are factors that strongly affect the choice of a soil for building dikes, levees, dams, or other embankments. The maximum density to which soil material can be compacted affects the strength and permeability of the structure. All earth dams allow some seepage, but it is desirable to keep such seepage to a minimum. Generally, soils that can be compacted to the greatest maximum density, in pounds of dry soil per cubic foot, have the least seepage losses and the greatest strength and stability.

Soils in which the greatest maximum density can be obtained when compacted by ordinary methods contain well-graded sands of various sizes and sufficient fine material to fill the voids between the sand grains. In well-graded soils the particles are well distributed over a wide range of sizes. Sassafras soils are an example of such soils in Cecil County. The subsoil of these soils consists of well-graded sandy clay loam, and its density and bearing strength can be easily increased by compaction.

The ease or difficulty with which a soil can be drained artificially is determined mainly by such features as permeability, the depth to and fluctuation of the water table, and stability in ditch-banks.

Soil features that affect the kind and design of sprinkler irrigation systems are the rate of water intake

TABLE 9.—*Features that affect soil suitability*

[Clay pits (Cp), Gravel and borrow pits (Gv), Made land (MaB and MaD), Stony land (St), and Tidal marsh (Tm) are omitted from table from table. Properties of the Aura and the Sassafras

Soil series and map symbols	Soil features affecting—		
	Location of pipelines [1]	Location of roads or highways [2]	Sites for ponds or reservoirs
Aldino: AdA, AdB2	Perched water table at depth of 2 feet; fair stability; 4 to 6 feet to rippable bedrock.	Perched water table at depth of 2 feet; fair stability; 4 to 6 feet to rippable bedrock; severe frost action.	Slow seepage in solum, moderate seepage in substratum; 4 to 6 feet to bedrock.
Aura: AuB2, AuC2, AuD2	Very good stability	Very good stability; moderate frost action.	Moderately slow seepage
Baile: BaA, BaB	Water table near surface; poor stability; 5 to 8 feet to rippable bedrock.	Water table at surface; poor stability; 5 to 8 feet to rippable bedrock; severe frost action.	Very slow seepage; 5 to 8 feet to bedrock.
Barclay: BcA, BcB	Water table at depth of 1 foot; poor stability.	Water table at depth of 1 foot; poor stability; severe frost action.	Slow seepage in solum; moderate seepage in substratum.
Beltsville: BeA, BeB2, BeC2, BeC3.	Perched water table at depth of 1 to 2 feet; fair stability.	Perched water table at depth of 1 to 2 feet; fair stability; severe frost action.	Slow seepage in subsoil, more rapid seepage in substratum.
Butlertown: BuA, BuB2, BuC2, BuC3, BuD2.	Perched water table at depth of 1 to 2 feet; fair stability.	Perched water table at depth of 1 to 2 feet; fair stability; severe frost action.	Moderately slow seepage in subsoil to more rapid in substratum.
Chester: CeA, CeB2	Good stability; 5 to 10 feet to rippable bedrock.	Good stability; moderate frost action; 5 to 10 feet to rippable bedrock.	Moderate seepage in subsoil, high seepage in substratum; 5 to 10 feet to bedrock.
Chillum: ChB2, ChC2, ChC3, ChD2, ChD3.	Good stability	Good stability; moderate frost action.	Slow seepage in subsoil, variable seepage in substratum.
Christiana: ClB2	Poor to very poor stability; trenches tend to cave or collapse.	Poor to very poor stability; moderate to severe frost action.	Slow to very slow seepage in solum.
Chrome: CmB2, CmC2, CmD2, CnD3, CnE3.	Poor stability; 1½ to 3 feet to rippable bedrock, clay loam surface layer is 1 to 2 feet to bedrock.	Poor stability; 1½ to 3 feet to rippable bedrock clay loam surface layer is 1 to 2 feet to bedrock; moderate frost action.	Moderate seepage in solum; 1½ to 3 feet to rippable bedrock; clay loam surface layer is 1 to 2 feet to bedrock.
Coastal beaches: Co	Poor stability; fluctuating water table; concentration of salt in places.	Fluctuating water table, concentration of salt in places; poor stability; wave action.	Excessive seepage in solum.
Codorus: Cr	Water table at depth of 1½ to 2 feet; poor stability; 6 to 20 feet to unconforming bedrock; flood hazard.	Water table at depth of 1½ to 2 feet; poor stability; 6 to 20 feet to unconforming bedrock; severe frost action; flood hazard.	Slow seepage in solum; 6 to 20 feet to bedrock; constant source of water.

See footnotes at end of table.

for stated kinds of engineering construction

because their features are variable and onsite investigation is required. Sassafras and Aura soils (SrE), mapped as a complex, are omitted soils mapped separately are shown in this table]

Soil features affecting—Continued				
Dikes, levees, dams, and embankments [3]	Drainage systems	Sprinkler irrigation	Terraces or diversions	Waterways [4]
Fair stability; highly erodible; low to high maximum density.	Slow permeability; highly erodible.	High available moisture capacity; medium infiltration; impeded drainage.	Highly erodible; fair stability.	High available moisture capacity; moderate fertility.
Very good stability; highly erodible; medium to very high maximum density.	Well drained	High available moisture capacity; moderate to moderately slow infiltration.	Highly erodible; very good stability.	High available moisture capacity; low fertility.
Poor stability; highly erodible; low to medium maximum density.	Moderately slow to slow permeability; highly erodible.	High available moisture capacity; moderately slow infiltration; poor drainage.	Highly erodible; poor stability.	High available moisture capacity; moderate fertility.
Poor stability; moderately erodible; medium to high maximum density.	Moderate permeability; moderately erodible.	High available moisture capacity; moderately slow infiltration; somewhat poor drainage.	Moderately erodible; poor stability.	High available moisture capacity; moderate fertility.
Fair stability; highly erodible; low to high maximum density.	Slow permeability; highly erodible.	Moderate available moisture capacity; slow infiltration; impeded drainage.	Highly erodible; fair stability.	Moderate available moisture capacity; low fertility.
Fair stability; highly erodible; medium to high maximum density.	Moderately slow permeability; highly erodible.	High available moisture capacity; moderate infiltration; impeded drainage.	Highly erodible; fair stability.	High available moisture capacity; moderate fertility.
Good stability; moderately erodible; low to medium maximum density.	Well drained	High available moisture capacity; medium infiltration.	Moderately erodible; good stability.	High available moisture capacity; moderate fertility.
Good stability; low to very high maximum density; moderately erodible.	Well drained	Moderate available moisture capacity; moderately slow infiltration.	Moderately erodible; good stability.	Moderate available moisture capacity; moderate fertility.
Poor to very poor stability; highly erodible; low maximum density.	Well drained	High available moisture capacity; slow infiltration.	Highly erodible; poor to very poor stability.	High available moisture capacity; low fertility.
Poor stability; moderately erodible; very low to high maximum density.	Well drained	High to moderate available moisture capacity; medium infiltration.	Moderately erodible; poor stability.	High to moderate available moisture capacity; moderate to high fertility.
Poor stability; susceptible to wind and wave action; highly pervious; low to medium maximum density.	Not applicable	Very low available moisture capacity; very rapid infiltration.	Poor stability	Very low available moisture capacity; low fertility.
Poor stability; moderately erodible; low maximum density.	Moderately slow permeability; moderately erodible.	High available moisture capacity; medium infiltration; impeded and somewhat poor drainage.	Moderately erodible; poor stability.	High available moisture capacity; moderate fertility.

TABLE 9.—*Features that affect soil suitability*

Soil series and map symbols	Soil features affecting—		
	Location of pipelines [1]	Location of roads or highways [2]	Sites for ponds or reservoirs
Collington: CsB2, CsC2, CtB2, CtC2, CtC3, CtD2, CtD3.	Good stability	Good stability; moderate frost action.	Moderately slow seepage in subsoil and moderately rapid seepage in substratum.
Comus: Cu	Poor stability; 6 to 20 feet to unconforming bedrock; flood hazard.	Poor stability; 6 to 20 feet to unconforming bedrock; moderate frost action; flood hazard.	Moderate seepage in solum; constant source of water, 6 to 20 feet to bedrock.
Conowingo: CwC	Water table at depth of 1½ to 2 feet; very poor stability; 3 to 5 feet to hard bedrock.	Water table at depth of 1½ to 2 feet; very poor stability; 3 to 5 feet to hard bedrock; severe frost action.	Very slow seepage in solum; 3 to 5 feet to bedrock.
Elkton: ElA, ElB, EmA, EmB	Water table near surface; poor stability.	Water table near surface; poor stability; severe frost action.	Slow to very slow seepage in solum.
Elsinboro: EoA, EoB2, EoC2	Good stability; 5 to 20 feet to rippable bedrock.	Good stability; 5 to 20 feet to rippable bedrock; moderate frost action.	Moderate seepage in subsoil, high seepage in substratum; 5 to 20 feet to bedrock.
Evesboro: EvB, EvD, EvE	Fair stability	Fair stability; loose sand	High to excessive seepage in solum.
Fallsington: FaA, FaB, FaC, FmA, FmB.	Water table near surface; fair to good stability.	Water table near surface; fair to good stability; severe frost action.	Moderate seepage in subsoil, high seepage in substratum.
Glenelg: GeA, GeB2, GeC2, GeC3, GeD2, GeD3, GeE.	Good stability; 4 to 10 feet to rippable bedrock.	Good stability; moderate frost action; 4 to 10 feet to rippable bedrock.	Moderate seepage in subsoil, high seepage in substratum; 4 to 10 feet to bedrock.
Glenville: GnA, GnB2, GnC2	Perched water table at depth of 1 foot; fair stability; 5 to 10 feet to rippable bedrock.	Perched water table at depth of 1 foot; fair stability; 5 to 10 feet to rippable bedrock; severe frost action.	Slow seepage in solum, moderate seepage in substratum; 5 to 10 feet to bedrock.
Hatboro: Ha	Water table near surface; poor stability; 6 to 20 feet to unconforming bedrock; flood hazard.	Water table near surface; poor stability; 6 to 20 feet to unconforming bedrock; severe frost action; flood hazard.	Slow seepage; 6 to 20 feet to bedrock; constant source of water.
Keyport: KeA, KeB2, KeC2, KpA, KpB2, KpC2, KpD2, KsB3, KsC3.	Water table at depth of 1½ to 2 feet; poor to fair stability.	Water table at depth of 1½ to 2 feet; poor to fair stability; severe frost action.	Slow to very slow seepage
Legore: LeB2, LeC2, LeD2, LgC3, LgE3.	Fair to good stability; 5 to 10 feet to hard bedrock.	Fair to good stability; 5 to 10 feet to hard bedrock; moderate frost action.	Moderate seepage in solum; 5 to 10 feet to bedrock.
Leonardtown: LoA, LoB	Perched water table near surface; poor disturbed stability.	Perched water table near surface; poor stability if soil is disturbed; severe frost action.	Very slow seepage in solum.

See footnotes at end of table.

for stated kinds of engineering construction—Continued

Soil features affecting—Continued				
Dikes, levees, dams, and embankments [3]	Drainage systems	Sprinkler irrigation	Terraces or diversions	Waterways [4]
Good stability; moderately erodible; low to very high maximum density.	Well drained	Moderate to high available moisture capacity; moderate infiltration; moderately rapid infiltration in surface layer if sandy loam.	Moderately erodible; good stability.	Moderate to high available moisture capacity; moderate fertility.
Poor stability; moderately erodible; low maximum density.	Well drained	High available moisture capacity; medium infiltration.	Moderately erodible; poor stability.	High available moisture capacity; moderate fertility.
Very poor stability; highly erodible; very low maximum density.	Slow permeability; highly erodible.	High available moisture capacity; slow infiltration; impeded drainage.	Highly erodible; very poor stability.	High available moisture capacity; low fertility.
Poor stability; highly erodible; low to high maximum density.	Slowly permeable; highly erodible.	High available moisture capacity; slow infiltration; poor drainage.	Highly erodible; poor stability.	High available moisture capacity; low fertility.
Good stability; moderately erodible; low to medium maximum density.	Well drained	High available moisture capacity; medium infiltration.	Moderately erodible; good stability.	High available moisture capacity; moderate fertility.
Fair stability; porous; low to medium maximum density.	Excessively drained	Very low available moisture; rapid infiltration.	Fair stability; loose sand.	Very low available moisture capacity; low fertility.
Fair to good stability; moderately erodible; low to very high maximum density.	Moderate permeability; moderately erodible.	Moderate to high available moisture capacity; medium to rapid infiltration; poor drainage.	Moderately erodible; fair to good stability.	Moderate to high available moisture capacity; low fertility.
Good stability; moderately erodible; low to medium maximum density.	Well drained	Moderate to high available moisture capacity; medium infiltration.	Moderately erodible; good stability.	Moderate to high available moisture capacity; moderate fertility.
Fair stability; moderately erodible; low to medium maximum density.	Moderately slow permeability; moderately erodible.	Moderate available moisture capacity; moderate infiltration; impeded drainage.	Moderately erodible; fair stability.	Moderate available moisture capacity; moderate fertility.
Poor stability; highly erodible; low maximum density.	Moderate permeability; highly erodible.	High available moisture capacity; moderately slow infiltration; poor drainage.	Highly erodible; poor stability.	High available moisture capacity; moderate fertility.
Poor to fair stability; highly erodible; very low to very high maximum density.	Slow permeability; highly erodible.	High available moisture capacity; slow infiltration, but slow to very slow in silty clay loam; impeded drainage.	Highly erodible; poor to fair stability.	High available moisture capacity; low fertility.
Fair to good stability; moderately erodible; very low to medium maximum density.	Well drained	Moderate to high available moisture capacity; medium infiltration.	Moderately erodible; fair to good stability.	Moderate to high available moisture capacity; moderate to high fertility.
Poor stability if soil is disturbed; highly erodible; medium to very high maximum density.	Slow permeability; highly erodible.	High available moisture capacity; slow infiltration; poor drainage.	Highly erodible; poor stability if soil is disturbed.	High available moisture capacity; low fertility.

TABLE 9.—*Features that affect soil suitability*

Soil series and map symbols	Soil features affecting—		
	Location of pipelines [1]	Location of roads or highways [2]	Sites for ponds or reservoirs
Loamy and clayey land: LyC, LyD, LyE.	Poor to very poor stability; trenches tend to cave or collapse.	Poor to very poor stability; moderate to severe frost action.	Slow to very slow seepage in solum.
Manor: MlB2, MlC2, MlC3, MlD2, MlD3, MlE, MmD.	6 to 10 feet to rippable bedrock; fair stability; very stony in places.	6 to 10 feet to rippable bedrock; fair stability; moderate frost action; very stony in places.	Moderate to moderately high seepage; 6 to 10 feet to bedrock.
Matapeake: MnA, MnB2, MnC2, MnC3, MnD2, MnD3, MoA, MoB2.	Fair to good stability	Fair to good stability; moderate frost action.	Moderately slow seepage in subsoil, rapid seepage in substratum.
Mattapex: MpA, MpB2, MpC2.	Water table at depth of 2 feet; fair stability.	Water table at depth of 2 feet; fair stability; severe frost action.	Slow seepage in subsoil, high seepage in substratum.
Mixed alluvial land: Mr	Water table at depth of 0 to 4 feet; poor to good stability.	Water table at depth of 0 to 4 feet; moderate to severe frost action.	Variable seepage; constant source of water.
Montalto: MtA, MtB2, MtC2, MvD, MyC3, MyD3.	Fair to good stability; 5 to 12 feet to rippable bedrock; very stony in places.	Fair to good stability; 5 to 12 feet to rippable bedrock; moderate frost action; very stony in places.	Moderate seepage in solum; 5 to 12 feet to rippable bedrock.
Neshaminy: NeA, NeB2, NeC2, NeD2.	Good stability; 5 to 10 feet to rippable bedrock.	Good stability; moderate frost action; 5 to 10 feet to rippable bedrock.	Moderate seepage in subsoil, high seepage in substratum; 5 to 10 feet to bedrock.
Othello: OhA, OhB.	Water table near surface; poor stability.	Water table near surface; poor stability; severe frost action.	Slow seepage in subsoil, higher seepage in substratum.
Rumford: RuB, RuC, RuD	Fair stability	Fair stability; slight frost action.	Moderate seepage in subsoil, rapid seepage in substratum.
Sassafras: SaA, SaB2, SaC2, SaC3, SaD2, SaD3, SfB2, SgB2, SgC2, SgC3, SgD3.	Good stability	Good stability; moderate frost action.	Moderate to high seepage in substratum.
Watchung: Wa	Water table near surface; poor stability; 5 to 10 feet to rippable bedrock; very stony.	Water table near surface; poor stability; 5 to 10 feet to rippable bedrock; severe frost action; very stony.	Very slow seepage in solum; 5 to 10 feet to bedrock.
Woodstown: WoA, WoB2, WoC2, WoC3, WoD, WsA, WsB2.	Water table at depth of 2 feet; good stability.	Water table at depth of 2 feet; good stability; severe frost action.	Moderate to high seepage in substratum.

[1] See also corrosion potential of soils, by major horizons, in table 6.
[2] Does not include important effects of slopes and changes in slopes.

for stated kinds of engineering construction—Continued

Soil features affecting—Continued				
Dikes, levees, dams, and embankments [3]	Drainage systems	Sprinkler irrigation	Terraces or diversions	Waterways [4]
Poor to very poor stability; highly erodible; low maximum density.	Well drained	High available moisture capacity; slow infiltration.	Highly erodible; poor to very poor stability.	High available moisture capacity; low fertility.
Fair stability; highly erodible; low maximum density.	Well drained and somewhat excessively drained.	Moderate available moisture capacity; medium infiltration.	Highly erodible; fair stability; very stony in places.	Moderate available moisture capacity; moderate fertility; very stony in places.
Fair to good stability; Very low to very high maximum density; moderately erodible.	Well drained	High available moisture capacity; medium infiltration.	Moderate erodible; fair to good stability.	High available moisture capacity; moderate fertility.
Fair stability; highly erodible; low to high maximum density.	Moderately slowly permeable; highly erodible.	High available moisture capacity; medium infiltration; impeded drainage.	Highly erodible; fair stability.	High available moisture capacity; moderate fertility.
All features variable	All features variable	All features variable	All features variable	All features variable.
Fair to good stability; moderately erodible; very low to medium maximum density.	Well drained	High available moisture capacity; medium infiltraion.	Moderately erodible; fair to good stability; very stony in places.	High available moisture capacity; moderate fertility; very stony in places.
Good stability; moderately erodible; low to medium maximum density.	Well drained	High available moisture capacity; medium infiltration.	Moderately erodible; good stability.	High available moisture capacity, moderate fertility.
Poor stability; highly erodible; medium to high maximum density.	Moderately slowly permeable; highly erodible.	High available moisture capacity; slow to medium infiltration; poor drainage.	Highly erodible; poor stability.	High available moisture capacity; moderate fertility.
Fair stability; low to very high maximum density; slightly erodible.	Somewhat excessively drained.	Low available moisture capacity; rapid infiltration.	Slightly erodible; fair stability.	Low available moisture capacity; low fertility.
Good stability; moderately erodible; low to very high maximum density.	Well drained	Moderate available moisture capacity; moderately rapid infiltration.	Moderately erodible; good stability.	Moderate available moisture capacity; moderate fertility.
Poor stability; highly erodible; low to medium maximum density.	Slow permeability; highly erodible.	High available moisture capacity; moderately slow infiltration; poor drainage.	Highly erodible; poor stability; very stony.	High available moisture capacity; moderate fertility; very stony.
Good stability; moderately erodible; low to very high maximum density.	Moderate permeability; moderately erodible.	Moderate available moisture capacity; medium infiltration; impeded drainage.	Moderately erodible; good stability.	Moderate available moisture capacity; moderate fertility.

[3] Where a range is given for maximum density, the first rate applies to the subsoil and the second rate to the substratum.
[4] Applies primarily to the surface layer, to normal plow depth.

Figure 8.—**4-H Club members attending a fishing rodeo at the Elkton Community Pond. The soil in the embankment is from areas of an Elsinboro silt loam. This soil readily compacts to give high density and strength and low seepage.**

at the surface, the capacity of the soil to retain moisture, and the need for drainage. Soils that have impeded or poor drainage should be thoroughly drained before the irrigation system is installed. Flood and ditch irrigation are not practiced in Cecil County.

In planning and designing terraces and diversions, stability and susceptibility of the soil to erosion are of special concern. These features, as well as available moisture capacity and natural fertility of the soil, influence the design of waterways through fields and the kinds of grasses or other vegetation used for sodding the waterways.

Use of the Soils for Town and Country Planning

This subsection consists of two main parts. The first part describes residential and related uses of the soils and provides a table that rates the kind and degree of limitations of each soil for specified uses. The second part discusses the use of soils for several recreational activities. Table 11 rates the limitations of each soil for recreational activities.

Use of the soils in community development

Cecil County is chiefly a rural area, but its population is growing. Many residential communities are expanding, and the rate of growth and development can be expected to increase rapidly in the future. Accompanying these changes is a growing demand for information about soils and properties of soils that affect uses not closely related to farming. The most urgent need is for information about soil characteristics that limit the use of soils for the disposal of sewage effluent from on-site septic tanks. Information is also needed about soil characteristics that can influence the choice of sites for homes and residential development.

Table 10 gives the limitations of each soil in the county for some of the uses of interest to community planners, engineers, and similar users. These limitations are rated *slight*, *moderate*, or *severe*, according to the ease or difficulty with which the soil can be used for the stated pur-

pose. A rating of *slight* indicates the soil has no limitations for the specified use. If the limitation is moderate or severe the cause of the limitation is stated.

The ratings are based on the most critical single limitation. For example, if a high water table and poor drainage severely limit the use of a soil for the disposal of sewage effluent from septic tanks, the limitation is rated *severe*, although in other respects the soil may be well suited to septic tank use.

A severe limitation for a particular use does not necessarily mean that a soil so rated cannot be put to that use. Most soils can be used for most purposes, but the difficulty and the cost can be so great that a specific use is not feasible or practical. For example, a soil that has a very high water table is severely limited as a site for homes with basements. It can still be used for such homes, however, if measures are taken to improve drainage and to lower the water table sufficiently and to prevent the recurrence of the high water table. A very steep soil can be used as a site for a parking lot, provided the expense of moving great quantities of soil and of grading and stabilizing the exposed area can be justified.

Properties that limit the soils of Cecil County for uses specified in table 10 are:

Disposal of sewage effluent from septic tanks.—Permeability of the soil, depth to the water table in the wettest season of the year, degree of natural drainage, hazard of flooding, depth to an impervious layer, and slope, and the hazard of polluting underground water, particularly in such soils as those of the Evesboro series.

Sewage lagoons.—Permeability of the soil and its substratum, slope, hazard of flooding, and organic-matter content of the soil material. It is assumed that the layer is removed wherever sewage lagoons are constructed. Ground water pollution is a hazard on some soils.

Homesites, three stories or less, with basements.—Depth to water table, natural drainage, slope, hazard of flooding, and stability and bearing properties. Onsite investigations are needed to determine the suitability for a soil for industrial or commercial buildings and for homes of more than two stories. For homes without basements, limitations are less severe, especially those caused by a high water table or impeded drainage.

Roads, highways, streets, and parking lots.—Depth to water table, natural drainage, steepness of slope, stability and bearing properties of the soil, the hazard of flooding, and the probable severity of frost action.

Home gardens.—Texture of the plow layer, permeability of the subsoil, available moisture capacity, fertility, depth to water table, natural drainage, slope, and degree of erosion. Home gardens apply to small areas where cultural practices for small ornamental plantings that are limited in size, but are intensively applied to vegetables, flowers, and ornamentals.

Use of the soils for recreation

Recreation can be a primary use of an area, but it is more likely to be part of a multiple-use scheme for town and county planning. All resources need to be skillfully managed if they are to provide opportunities for outdoor enjoyment for a growing population. Soils are an important factor in the planning of most recreational uses of soils. Table 11 shows the kind and degree of limitations that the soils of Cecil County have for stated recreational uses. The cause of "moderate and "severe" limitations is explained in the table. Such limitations can sometimes be overcome if the cost involved can be justified. A "slight" limitation generally is of minor importance and can be easily overcome.

Among the recreational uses considered in table 11 are campsites that have heavy foot and vehicular traffic and contiguous parking; athletic fields and intensive play areas for baseball, football, volleyball, soccer, and similar sports; parks, picnic and play areas that have light foot traffic; lawns, golf fairways; and paths and trails for hiking, studying nature, or viewing scenery.

Service buildings and sewage disposal are important in some kinds of recreational activities, particularly those that relate to campsites. The limitations on soils for service buildings (washrooms, bathhouses, and picnic shelters) as well as for seasonal and year-round cottages, are about the same as those for homesites (table 10). Wetness is a less important factor if no basements are involved. Limitations on soils for sewage effluent disposal from septic tanks are also given in table 10.

The major properties that limit the use of soils for recreational purposes are wetness, natural drainage, depth to water table, and the hazard of flooding. Also important are permeability, which affects the ease or difficulty of improving drainage or the rate at which a soil dries after rain, texture as it affects available moisture capacity, stability, slope, and erodibility of surface layer.

Most recreational uses can be limited by any one or a combination of these properties, but any one undesirable soil property seldom limits all kinds of recreation equally. For example, a slope of more than about 5 percent is a severe limitation for a baseball or soccer field because much leveling is required. The only slopes that severely limit the use of soils for general play and picnic areas are those greater than about 15 percent. The only slopes that severely limit use for paths and trails are those greater than about 25 percent that have no other soil limitations.

Steep soils on the sides of ravines and on adjoining narrow bottom lands are not well suited to farming or to use as building sites. Such areas, however, are suitable for some kinds of recreation. Even if they have moderate to severe limitations for recreational uses, they are generally better suited to these uses, than to more intensive use. Many of these areas could be reserved for parks. Nearly 7 percent of the acreage of Cecil County is in this category.

Areas that have been graded or from which soil has been moved should be stabilized as soon as possible to prevent erosion on the site and siltation in streams and surrounding areas. The Cecil Soil Conservation District can be of assistance in determining safe gradients and

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TABLE 10.—*Degree and kind of limitations for*

[Clay pits (Cp), Gravel and borrow pits (Gv), and Made land (MaB and MaD) are omitted from this table. An asterisk in the first may have different properties and limitations and for this reason it is necessary to follow

Soil series and map symbols	Degree and kind of limitation for—	
	Sewage disposal by—	
	Onsite septic tanks [1]	Sewage lagoons
Aldino:		
AdA	Severe: slow permeability	Slight
AdB2	Severe: slow permeability	Moderate: slope
Aura:		
AuB2	Severe: moderately slow permeability	Moderate in subsoil; severe in substratum; gravel.
AuC2	Severe: moderately slow permeability	Severe: slope
AuD2	Severe: moderately slow permeability	Severe: slope
Baile:		
BaA	Severe: slow permeability; high water table	Slight
BaB	Severe: slow permeability; high water table	Moderate: slope
Barclay:		
BcA	Severe: high water table	Moderate: moderate permeability
BcB	Severe: high water table	Moderate: slope; moderate permeability
Beltsville:		
BeA	Severe: slow permeability; seasonal perched water table.	Slight
BeB2	Severe: slow permeability; seasonal perched water table.	Moderate: slope
BeC2	Severe: slow permeability; seasonal perched water table.	Severe: slope
BeC3	Severe: slow permeability; seasonal perched water table.	Severe: slope
Butlertown:		
BuA	Severe: moderately slow permeability	Slight
BuB2	Severe: moderately slow permeability	Moderate: slope
BuC2	Severe: moderately slow permeability	Severe: slope
BuC3	Severe: moderately slow permeability	Severe: slope
BuD2	Severe: moderately slow permeability	Severe: slope
Chester:		
CeA	Slight	Moderate: moderate permeability
CeB2	Slight	Moderate: moderate permeability; slope
Chillum:		
ChB2	Moderate: moderate to moderately slow permeability.	Moderate: moderate to moderately slow permeability; slope.
ChC2	Moderate: moderate to moderately slow permeability.	Moderate: moderate to moderately slow permeability; slope.
ChC3	Severe: compact substratum	Severe:
ChD2	Severe: compact substratum; slope	Severe: slope
ChD3	Severe: compact substratum; slope	Severe: slope

See footnotes at end of table.

stated uses in town and country planning

column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in such mapping units carefully the instructions for referring to other series that appear in the first column of this table]

Degree and kind of limitation for—Continued			
Homesites, three stories or less, with basement	Roads and highways	Streets and parking lots	Home gardens
Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: impeded natural drainage.
Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: slope; impeded natural drainage.
Slight	Slight	Moderate: slope	Moderate: low to moderate available moisture capacity; slope.
Slight	Moderate: slope	Severe: slope	Severe: slope; low to moderate available moisture capacity.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope; low to moderate available moisture capacity.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: poor natural drainage.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: poor natural drainage.
Severe: high water table	Moderate: high water table	Moderate: high water table	Severe: somewhat poor natural drainage.
Severe: high water table	Moderate: high water table	Moderate: high water table; slope.	Severe: somewhat poor natural drainage.
Moderate: seasonal perched water table.	Moderate: seasonal perched water table.	Moderate: seasonal perched water table.	Moderate: impeded natural drainage.
Moderate: seasonal perched water table.	Moderate: seasonal perched water table.	Moderate: seasonal perched water table; slope.	Moderate: slope; impeded natural drainage.
Moderate: seasonal perched water table.	Moderate: seasonal perched water table; slope.	Severe: slope	Severe: slope.
Moderate: seasonal perched water table.	Moderate: seasonal perched water table; slope.	Severe: slope	Severe: slope; severely eroded.
Moderate: seasonal perched water table.	Moderate: seasonal perched water table.	Moderate: seasonal perched water table.	Moderate: impeded natural drainage.
Moderate: seasonal perched water table.	Moderate: seasonal perched water table.	Moderate: seasonal perched water table; slope.	Moderate: slope; impeded natural drainage.
Moderate: seasonal perched water table.	Moderate: seasonal perched water table; slope.	Severe: slope	Severe: slope.
Moderate: seasonal perched water table.	Moderate: seasonal perched water table; slope.	Severe: slope	Severe: slope; severely eroded.
Moderate: seasonal perched water table; slope.	Moderate: seasonal perched water table; slope.	Severe: slope	Severe: slope.
Slight	Slight	Slight	Slight.
Slight	Slight	Moderate: slope	Moderate: slope.
Slight	Slight	Moderate: slope	Moderate: moderate moisture capacity; slope.
Slight	Moderate: slope	Severe: slope	Severe: slope.
Slight	Moderate: slope	Severe: slope	Severe: slope; severely eroded.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope; severely eroded.

TABLE 10.—*Degree and kind of limitations for*

Soil series and map symbols	Degree and kind of limitation for— Sewage disposal by—	
	Onsite septic tanks [1]	Sewage lagoons
Christiana: C1B2	Severe: slow permeability	Moderate: slope
Chrome:		
CmB2	Severe: less than 3 feet to bedrock; danger of polluting ground water.	Severe: less than 3 feet to bedrock; danger of polluting ground water.
CmC2	Severe: less than 3 feet to bedrock; danger of polluting ground water.	Severe: less than 3 feet to bedrock; danger of polluting ground water.
CmD2	Severe: less than 3 feet to bedrock; slope; danger of polluting ground water.	Severe: less than 3 feet to bedrock; slope; danger of polluting ground water.
CnD3	Severe: bedrock at a depth of 1 to 2 feet; slope; danger of polluting ground water.	Severe: bedrock at a depth of 1 to 2 feet; danger of polluting ground water; slope.
CnE3	Severe: bedrock at a depth of 1 to 2 feet; slope; danger of polluting ground water.	Severe: bedrock at a depth of 1 to 2 feet; slope; danger of polluting ground water.
Coastal beaches: Co	Severe: fluctuating water table; tidal flooding; pollution hazard.	Severe: very rapid permeability; pollution hazard; tidal flooding.
Codorus: Cr	Severe: flood hazard; danger of polluting ground water.	Severe: flood hazard; danger of polluting ground water.
Collington:		
CsB2	Slight	Moderate: moderate permeability; slope.
CsC2	Slight	Severe: slope
CtB2	Slight	Moderate: moderate permeability; slope
CtC2	Slight	Severe: slope
CtC3	Slight	Severe: slope
CtD2	Moderate: slope	Severe: slope
CtD3	Moderate: slope	Severe: slope
Comus: Cu	Severe: flood hazard; danger of polluting ground water.	Severe: flood hazard; danger of polluting ground water.
Conowingo: CwC	Severe: slow permeability	Severe: slope
Elkton:		
ElA, EmA	Severe: high water table; slow permeability	Slight
ElB, EmB	Severe: high water table; slow permeability	Moderate: slope
Elsinboro:		
EoA	Slight	Moderate: moderate permeabilty
EoB2	Slight	Moderate: moderate permeability; slope
EoC2	Slight	Severe: moderate permeability
Evesboro:		
EvB	Slight: danger of polluting ground water	Severe: rapid permeabilty; danger of polluting ground water.
EvD	Moderate: slope; danger of polluting ground water.	Severe: slope; rapid permeability; danger of polluting ground water.
EvE	Severe: slope; danger of polluting ground water.	
Fallsington:		
FaA, FmA	Severe: high water table	Moderate: moderate permeability
FaB, FmB	Severe: high water table	Moderate: moderate permeability; slope
FaC	Severe: high water table	Severe: slope

See footnotes at end of table.

stated uses in town and country planning—Continued

Degree and kind of limitation for—Continued			
Homesites, three stories or less, with basement	Roads and highways	Streets and parking lots	Home gardens
Severe: subsoil shrinkage and instability.	Moderate: subsoil shrinkage and instability.	Severe: subsoil shrinkage and instability.	Moderate: slope; shallow to hard clay subsoil.
Moderate: less than 3 feet to bedrock.	Moderate: less than 3 feet to rippable bedrock.	Moderate: less than 3 feet to rippable bedrock; slope.	Moderate: slope.
Moderate: less than 3 feet to bedrock; slope.	Moderate: less than 3 feet to rippable bedrock; slope.	Severe: slope	Severe: slope.
Moderate: less than 3 feet to bedrock; slope.	Severe: slope	Severe: slope	Severe: slope.
Moderate: less than 3 feet to bedrock.	Severe: 1 to 2 feet to rippable bedrock; slope.	Severe: slope	Severe: slope.
Severe: slope	Severe: slope; 1 to 2 feet to rippable bedrock.	Severe: slope	Severe: slope; severely eroded.
Severe: fluctuating water table; tidal flood hazard; poor stability.	Severe: fluctuating water table; tidal flood hazard; poor stability.	Severe: fluctuating water table; tidal flooding; poor stability.	Severe: extreme droughtiness and low fertility; salinity cutting by windblown sand.
Severe: flood hazard	Severe: flood hazard	Severe: flood hazard	Moderate: impeded to somewhat poor natural drainage; flood hazard.
Slight	Slight	Slight	Moderate: slope.
Slight	Moderate: slope	Severe: slope	Severe: slope.
Slight	Slight	Slight	Moderate: slope.
Slight	Moderate: slope	Severe: slope	Severe: slope.
Slight	Moderate: slope	Severe: slope	Severe: slope; severely eroded.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope; severely eroded.
Severe: flood hazard	Severe: flood hazard	Severe: flood hazard	Slight to moderate: flood hazard.
Severe: subsoil shrinkage and instability.	Severe: subsoil shrinkage and instability.	Severe: subsoil shrinkage and instability; slope.	Severe: surface layer cloddy and difficult to work; slowly permeable; slope.
Severe: high water table	Severe: high water table	Severe: highwater table	Severe: poor natural drainage.
Severe: high water table	Severe: high water table	Severe: highwater table	Severe: poor natural drainage.
Slight	Slight	Slight	Slight.
Slight	Slight	Moderate: slope	Moderate: slope.
Slight	Moderate: slope	Severe: slope	Severe: slope.
Slight	Slight	Moderate: slope	Severe: very low available moisture capacity; very low fertility; slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: very low moisture capacity; very low fertility; slope.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: poor natural drainage.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: poor natural drainage.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: poor natural drainage; slope.

TABLE 10.—*Degree and kind of limitations for*

Soil series and map symbols	Degree and kind of limitation for— Sewage disposal by— Onsite septic tanks [1]	Sewage lagoons
Glenelg:		
GeA	Slight	Moderate: moderate permeability
GeB2	Slight	Moderate: moderate permeability; slope
GeC2	Moderate: slope	Severe: slope
GeC3	Moderate: slope	Severe: slope
GeD2	Severe: slope	Severe: slope
GeD3	Severe: slope	Severe: slope
GeE	Severe: slope	Severe: slope
Glenville:		
GnA	Severe: moderately slow permeability; high water table.	Slight
GnB2	Severe: moderately slow permeability; high water table.	Moderate: slope
GnC2	Severe: moderately slow permeability; high water table.	Severe: slope
Hatboro: Ha	Severe: high water table; flood hazard; danger of polluting ground water.	Severe: flood hazard; danger of polluting ground water.
Keyport:		
KeA, KpA	Severe: slow permeability	Slight
KeB2, KpB2	Severe: slow permeability	Moderate: slope
KeC2, KpC2	Severe: slow permeability	Severe: slope
KpD2	Severe: slow permeability	Severe: slope
KsB3	Severe: slow permeability	Moderate: slope
KsC3	Severe: slow permeability	Severe: slope
Legore:		
LeB2	Slight	Moderate: moderate permeability; slope
LeC2	Moderate: slope	Severe: slope
LeD2	Severe: slope	Severe: slope
LgC3	Moderate: slope	Severe: slope
LgE3	Severe: slope	Severe: slope
Leonardtown:		
LoA	Severe: high water table; slow permeability	Slight
LoB	Severe: high water table; slow permeability	Moderate: slope
Loamy and clayey land:		
LyC	Severe: slow permeability	Severe: slope
LyD	Severe: slow permeability	Severe: slope
LyE	Severe: slow permeability	Severe: slope
Manor:		
MlB2	Slight	Severe: rapid permeability
MlC2	Moderate: slope	Severe: rapid permeability; slope
MlC3	Moderate: slope	Severe: rapid permeability; slope
MlD2	Severe: slope	Severe: rapid permeability; slope
MlD3	Severe: slope	Severe: rapid permeability; slope
MlE	Severe: slope	Severe: rapid permeability; slope
MmD	Severe: slope	Severe: slope

See footnotes at end of table.

stated uses in town and country planning—Continued

Degree and kind of limitation for—Continued			
Homesites, three stories or less, with basement	Roads and highways	Streets and parking lots	Home gardens
Slight	Slight	Slight	Slight.
Slight	Slight	Moderate: slope	Moderate: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope; severely eroded.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope; severely eroded.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: high water table	Moderate: high water table	Moderate: high water table	Moderate: impeded natural drainage.
Severe: high water table	Moderate: high water table	Moderate: high water table; slope.	Moderate: impeded natural drainage; slope.
Severe: high water table	Moderate: high water table; slope.	Severe: slope	Severe: slope.
Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: flood hazard; poor natural drainage.
Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: impeded natural drainage.
Moderate: moderately high water table.	Moderate: moderately high water table.	Moderately: moderately high water table; slope.	Moderate: slope; impeded natural drainage.
Moderate: moderately high water table.	Moderate: moderately high water table; slope.	Severe: slope	Severe: slope.
Moderate: moderately high water table; slope.	Moderate: moderately high water table; slope.	Severe: slope	Severe: slope.
Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: moderately high water table; slope.	Severe: severely eroded.
Moderate: moderately high water table.	Moderate: moderately high water table; slope.	Severe: slope	Severe: slope; severely eroded.
Slight	Slight	Moderate: slope	Moderate: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope; severely eroded.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope; severely eroded.
Severe: slope	Severe: slope	Severe: slope	Severe: slope; severely eroded.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: poor natural drainage.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: poor natural drainage.
Severe: subsoil shrinkage and instability.	Moderate: subsoil shrinkage and instability; slope.	Severe: subsoil shrinkage and instability; slope.	Severe: slope.
Severe: subsoil shrinkage and instability; slope.	Moderate: subsoil shrinkage and instability; slope.	Severe: subsoil shrinkage and instability; slope.	Severe: slope.
Severe: subsoil shrinkage and instability; slope.	Severe: slope	Severe: subsoil shrinkage and instability; slope.	Severe: slope.
Slight	Slight	Moderate: slope	Moderate: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope; severely eroded.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope; severely eroded.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate to severe: very stony; slope.	Severe: slope	Severe: slope	Severe: very stony; slope.

TABLE 10.—*Degree and kind of limitations for*

Soil series and map symbols	Degree and kind of limitation for—	
	Sewage disposal by—	
	Onsite septic tanks [1]	Sewage lagoons
Matapeake:		
MnA	Slight to moderate: moderate permeability	Moderate: moderate permeability
MnB2	Slight to moderate: moderate permeability	Moderate: moderate permeability; slope
MnC2	Slight to moderate: moderate permeability	Severe: slope
MnC3	Slight to moderate: moderate permeability	Severe: slope
MnD2	Moderate: slope; moderate permeability	Severe: slope
MnD3	Moderate: slope; moderate permeability	Severe: slope
MoA	Slight to moderate: moderate permeability	Moderate: moderate permeability
MoB2	Slight to moderate: moderate permeability	Moderate: slope; moderate permeability
Mattapex:		
MpA	Severe: moderately slow permeability	Slight
MpB2	Severe: moderately slow permeability	Moderate: slope
MpC2	Severe: moderately slow permeability	Severe: slope
Mixed alluvial land: Mr	Severe: high water table; flooding	Severe: flooding
Montalto:		
MtA	Severe: moderately slow permeability	Slight
MtB2	Severe: moderately slow permeability	Moderate: slope
MtC2	Severe: moderately slow permeability	Severe: slope
MvD	Severe: slope; very stony; moderately slow permeability.	Severe: slope
MyC3	Severe: moderately slow permeability	Severe: slope
MyD3	Severe: slope; moderately slow permeability.	Severe: slope
Neshaminy:		
NeA	Slight	Moderate: moderate permeability
NeB2	Slight	Moderate: moderate permeability; slope
NeC2	Moderate: slope	Severe: slope
NeD2	Severe: slope	Severe: slope
Othello:		
OhA	Severe: high water table; moderately slow permeability.	Slight
OhB	Severe: high water table; moderately slow permeability.	Moderate: slope
Rumford:		
RuB	Slight	Severe: moderately rapid permeability
RuC	Slight	Severe: slope; moderately rapid permeability
RuD	Moderate: slope	Severe: slope; moderately rapid permeability
Sassafras:		
SaA	Slight	Moderate: moderate permeability
SaB2	Slight	Moderate: moderate permeability; slope
SaC2	Slight	Severe: slope
SaC3, SgC3	Slight	Severe: slope
SaD2	Moderate: slope	Severe: slope
SaD3, SgD3	Moderate: slope	Severe: slope
SfB2	Slight	Moderate: moderate permeability; slope
SgB2	Slight	Moderate to severe: gravel content
SgC2	Slight	Severe: slope
SrE For properties of Aura part of SrE, refer to Aura series.	Severe: slope	Severe: slope

See footnotes at end of table.

stated uses in town and country planning—Continued

Degree and kind of limitation for—Continued			
Homesites, three stories or less, with basement	Roads and highways	Streets and parking lots	Home gardens
Slight	Slight	Slight	Slight.
Slight	Slight	Moderate: slope	Moderate: slope.
Slight	Moderate: slope	Severe: slope	Severe: slope.
Slight	Moderate: slope	Severe: slope	Severe: slope; severely eroded.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope; severely eroded.
Slight	Slight	Slight	Slight.
Slight	Slight	Moderate: slope	Moderate: slope.
Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: impeded natural drainage.
Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: moderately high water table; slope.	Moderate: impeded natural drainage; slope.
Moderate: moderately high water table.	Moderate: moderately high water table; slope.	Severe: slope	Severe: slope.
Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.	Severe: high water table; flood hazard.
Slight	Slight	Slight	Slight.
Slight	Slight	Moderate: slope	Moderate: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Moderate to severe: slope; very stony.	Severe: slope	Severe: slope	Severe: slope; very stony.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope; severely eroded; clayey surface layer.
Severe: slope	Severe: slope	Severe: slope	Severe: slope; severely eroded; clayey surface layer.
Slight	Slight	Slight	Slight.
Slight	Slight	Moderate: slope	Moderate: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: poor natural drainage.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: poor natural drainage.
Slight	Slight	Moderate: slope	Moderate: low available moisture capacity.
Slight	Moderate: slope	Severe: slope	Severe: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Slight	Slight	Slight	Slight.
Slight	Slight	Moderate: slope	Moderate: slope.
Slight	Moderate: slope	Severe: slope	Severe: slope.
Slight	Moderate: slope	Severe: slope	Severe: slope; severely eroded.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope.
Moderate: slope	Moderate: slope	Severe: slope	Severe: slope; severely eroded.
Slight	Slight	Moderate: slope	Moderate: slope.
Slight	Slight	Moderate: slope	Moderate: slope.
Slight	Moderate: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope; severely eroded in places.

TABLE 10.—*Degree and kind of limitations for*

Soil series and map symbols	Degree and kind of limitation for—	
	Sewage disposal by—	
	Onsite septic tanks [1]	Sewage lagoons
Stony land: St	Severe: very stony; danger of polluting ground water.	Severe: slope; rapid permeability
Tidal marsh: Tm	Severe: tidal flood hazard; danger of polluting ground water.	Severe: tidal flood hazard; danger of polluting ground water.
Watchung: Wa	Severe: slow permeability; high water table	Slight: moderate if slope is more than 3 percent.
Woodstown:		
WoA, WsA	Moderate: moderately high water table	Moderate: moderate permeability
WoB2, WsB2	Moderate: moderately high water table	Moderate: moderate permeability; slope
WoC2	Moderate: moderately high water table	Severe: slope
WoC3	Moderate: moderately high water table	Severe: slope
WoD	Moderate: moderately high water table slope.	Severe: slope

[1] Ratings apply to areas where home density is low. High-density housing requires sewage disposal systems other than septic tanks.

TABLE 11.—*Limitations of soils*

[Clay pits (Cp), Gravel and borrow pits (Gv), and

Soil series and map symbols	Degree and kind of limitation for—	
	Campsites	Athletic fields and other intensive play areas
Aldino: AdA, AdB2	Severe: slow permeability	Severe: slow permeability
Aura:		
AuB2	Moderate: gravel; moderately slow permeability.	Moderate: gravel; moderately slow permeability; slope.
AuC2	Moderate: gravel; moderately slow permeability; slope.	Severe: slope
AuD2	Moderate: gravel; moderately slow permeability; slope.	Severe: slope
Baile: BaA, BaB	Severe: high water table; slow permeability	Severe: high water table; slow permeability
Barclay: BcA, BcB	Severe: high water table	Severe: high water table
Beltsville:		
BeA, BeB2	Severe: slow permeability; seasonal perched water table.	Severe: slow permeability; seasonal perched water table.
BeC2	Severe: slow permeability; seasonal perched water table.	Severe: slow permeability; seasonal perched water table.
BeC3	Severe: slow permeability; seasonal perched water table.	Severe: slow permeability; slope; seasonal perched water table.

stated uses in town and country planning—Continued

Degree and kind of limitation for—Continued			
Homesites, three stories or less, with basement	Roads and highways	Streets and parking lots	Home gardens
Severe: slope; very stony	Severe: slope; very stony	Severe: very stony	Severe: slope; very stony.
Severe: tidal flood hazard	Severe: tidal flood hazard	Severe: tidal flood hazard	Severe: tidal flood hazard.
Severe: high water table	Severe: high water table	Severe: high water table	Severe: poor natural drainage.
Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: impeded natural drainage.
Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: moderately high water table; slope.	Moderate: impeded natural drainage; slope.
Moderate: moderately high water table.	Moderate: moderately high water table; slope.	Severe: slope	Severe: slope.
Moderate: moderately high water table.	Moderate: moderately high water table; slope.	Severe: slope	Severe: slope; severely eroded.
Moderate: moderately high water table; slope.	Moderate: moderately high water table; slope.	Severe: slope	Severe: slope.

for specified recreational uses

Made land (MaB and MaD) are omitted from this table]

Degree and kind of limitation for—Continued		
Parks, extensive play areas, and picnic areas	Lawns, fairways, and landscaping	Paths and trails
Slight: moderate where severely eroded	Slight	Slight.
Slight	Slight for lawns; moderate for fairways; gravelly.	Slight.
Slight	Slight for lawns; moderate for fairways; gravelly.	Slight.
Moderate: slope	Moderate: gravelly; slope	Slight.
Severe: high water table	Severe: high water table	Severe: high water table.
Moderate: high water table	Moderate: high water table	Moderate: high water table.
Slight	Slight	Slight.
Slight	Slight	Slight.
Slight	Moderate: slope; severely eroded	Slight.

TABLE 11.—*Limitations of soils*

Soil series and map symbols	Degree and kind of limitation for—	
	Campsites	Athletic fields and other intensive play areas
Butlertown:		
BuA	Moderate: moderately slow permeability; seasonal perched water table.	Moderate: moderately slow permeability; seasonal perched water table.
BuB2	Moderate: moderately slow permeability; seasonal perched water table.	Moderate: moderately slow permeability; seasonal perched water table; slope.
BuC2	Moderate: moderately slow permeability; seasonal perched water table; slope.	Severe: slope
BuC3	Moderate: moderately slow permeability; seasonal perched water table; slope.	Severe: slope
BuD2	Moderate: moderately slow permeability; seasonal perched water table; slope.	Severe: slope
Chester:		
CeA	Slight	Slight
CeB2	Slight	Moderate: slope
Chillum:		
ChB2	Slight	Moderate: slope
ChC2	Moderate: slope	Severe: slope
ChC3	Moderate: slope	Severe: slope
ChD2	Moderate: slope	Severe: slope
ChD3	Moderate: slope	Severe: slope
Christiana: ClB2	Severe: slow permeability	Severe: slow permeability
Chrome:		
CmB2	Slight	Moderate: less than 3 feet to rippable bedrock; slope.
CmC2	Moderate: slope	Severe: slope
CmD2	Severe: slope	Severe: slope
CnD3, CnE3	Severe: slope	Severe: slope
Coastal beaches: Co	Severe: fluctuating water table; subject to tidal flooding; loose sand.	Severe: fluctuating water table; subject to tidal flooding; loose sand.
Cordorus: Cr	Severe: flood hazard	Severe: flood hazard
Collington:		
CsB2	Slight	Moderate: slope
CsC2	Moderate: slope	Severe: slope
CtB2	Slight	Moderate: slope
CtC2	Moderate: slope	Severe: slope
CtC3	Moderate: slope	Severe: slope
CtD2	Moderate: slope	Severe: slope
CtD3	Moderate: slope	Severe: slope
Comus: Cu	Slight [1]	Slight [1]
Conowingo: CwC	Severe: slow permeability	Severe: slow permeability; slope
Elkton: ElA, ElB, EmA, EmB	Severe: high water table, slow permeability	Severe: high water table, slow permeability
Elsinboro:		
EoA	Slight	Slight
EoB2	Slight	Moderate: slope
EoC2	Moderate: slope	Severe: slope
Evesboro:		
EvB	Moderate: loose loamy sand	Moderate: loose loamy sand; slope
EvD	Moderate: loose loamy sand; slope	Severe: slope
EvE	Severe: slope	Severe: slope

See footnotes at end of table.

for specified recreational uses—Continued

Degree and kind of limitation for—Continued		
Parks, extensive play areas, and picnic areas	Lawns, fairways, and landscaping	Paths and trails
Slight	Slight	Slight.
Slight	Slight	Slight.
Slight	Slight	Slight.
Slight	Moderate: severely eroded	Slight.
Moderate: slope	Moderate: slope	Slight.
Slight	Slight	Slight.
Slight	Slight	Slight.
Slight	Slight	Slight.
Slight	Slight	Slight.
Slight	Moderate: severely eroded	Slight.
Moderate: slope	Moderate: slope	Slight.
Moderate: slope	Severe: slope; severely eroded	Slight.
Slight	Slight	Slight.
Slight	Moderate: less than 3 feet to rippable bedrock.	Slight.
Moderate: slope	Moderate: less than 3 feet to rippable bedrock; slope.	Slight.
Severe: slope	Severe: slope	Moderate: slope.
Severe: slope	Severe: slope; severely eroded	Moderate: slope.
Severe: subject to tidal flooding; loose sand.	Severe: subject to tidal flooding; loose sand.	Severe: loose sand.
Severe: flood hazard	Severe: flood hazard	Severe: flood hazard.
Slight	Moderate: moderate available moisture capacity.	Slight.
Slight	Moderate: moderate available moisture capacity.	Slight.
Slight	Slight	Slight.
Slight	Slight	Slight.
Slight	Moderate: severely eroded	Slight.
Moderate: slope	Moderate: slope	Slight.
Moderate: slope	Severe: slope; severely eroded	Slight.
Slight [1]	Slight [1]	Slight. [1]
Moderate: moderately high water table; sticky surface.	Moderate: moderately high water table; sticky surface.	Moderate: sticky surface.
Severe: high water table	Severe: high water table	Severe: high water table.
Slight	Slight	Slight.
Slight	Slight	Slight.
Moderate: slope	Moderate: slope	Slight.
Moderate: loose loamy sand	Severe: loose loamy sand	Moderate: loose loamy sand.
Moderate: loose loamy sand; slope	Severe: loose loamy sand	Moderate: loose loamy sand.
Severe: slope	Severe: loose loamy sand; slope	Severe: slope.

TABLE 11.—*Limitations of soils*

Soil series and map symbols	Degree and kind of limitation for—	
	Campsites	Athletic fields and other intensive play areas
Fallsington: FaA, FaB, FaC, FmA, FmB.	Severe: high water table	Severe: high water table
Glenelg:		
GeA	Slight	Slight
GeB2	Slight	Moderate: slope
GeC2	Moderate: slope	Severe: slope
GeC3	Moderate: slope	Severe: slope
GeD2	Severe: slope	Severe: slope
GeD3	Severe: slope	Severe: slope
GeE	Severe: slope	Severe: slope
Glenville:		
GnA, GnB2	Severe: high water table	Severe: high water table.
GnC2	Severe: high water table	Severe: high water table; slope
Hatboro: Ha	Severe: high water table	Severe: high water table
Keyport:		
KeA, KeB2, KpA, KpB2	Severe: slow permeability; moderately high water table.	Severe: slow permeability; moderately high water table.
KeC2, KpC2	Severe: slow permeability; moderately high water table.	Severe: slow permeability; slope; moderately high water table.
KpD2	Severe: slow permeability	Severe: slow permeability; slope
KsB3	Severe: slow permeability; moderately high water table.	Severe: slow permeability; moderately high water table.
KsC3	Severe: slow permeability; moderately high water table.	Severe: slow permeability; slope
Legore:		
LeB2	Slight	Moderate: slope
LeC2	Moderate: slope	Severe: slope
LeD2	Severe: slope	Severe: slope
LgC3	Moderate: slope	Severe: slope
LgE3	Severe: slope	Severe: slope
Leonardtown: LoA, LoB	Severe: high water table slow; permeability	Severe: high water table slow; permeability
Loamy and clayey land:		
LyC	Severe: slow permeability	Severe: slow permeability
LyD	Severe: slow permeability	Severe: slow permeability; slope
LyE	Severe: slow permeability	Severe: slow permeability; slope
Manor:		
MlB2	Slight	Moderate: slope
MlC2	Moderate: slope	Severe: slope
MlC3	Moderate: slope	Severe: slope
MlD2	Severe: slope	Severe: slope
MlD3	Severe: slope	Severe: slope
MlE	Severe: slope	Severe: slope
MmD	Severe: slope	Severe: slope
Matapeake:		
MnA	Slight	Slight
MnB2	Slight	Moderate: slope
MnC2	Moderate: slope	Severe: slope
MnC3	Moderate: slope	Severe: slope
MnD2	Moderate: slope	Severe: slope
MnD3	Moderate: slope	Severe: slope
MoA	Moderate: moderately slow permeability	Moderate: moderately slow permeability
MoB2	Moderate: moderately slow permeability	Moderate: moderately slow permeability; slope.

See footnotes at end of table.

for specified recreational uses—Continued

Degree and kind of limitation for—Continued		
Parks, extensive play areas, and picnic areas	Lawns, fairways, and landscaping	Paths and trails
Severe: high water table	Severe: high water table	Severe: high water table.
Slight	Slight	Slight.
Slight	Slight	Slight.
Moderate: slope	Moderate: slope	Slight.
Moderate: slope	Moderate: slope; severely eroded	Slight.
Severe: slope	Severe: slope	Moderate: slope.
Severe: slope	Severe: slope; severely eroded.	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope.
Moderate: high water table	Moderate: high water table	Moderate: high water table.
Moderate: high water table; slope	Moderate: high water table; slope	Moderate: high water table; slope.
Severe: high water table	Severe: high water table	Severe: high water table.
Slight	Slight	Slight.
Slight	Slight	Slight.
Moderate: slope	Moderate: slope	Slight.
Moderate: silty clay loam surface	Moderate: silty clay loam surface; severely eroded.	Moderate: silty clay loam surface.
Moderate: silty clay loam surface	Moderate: silty clay loam surface; severely eroded.	Moderate: silty clay loam surface.
Slight	Slight	Slight.
Moderate: slope	Moderate: slope	Slight.
Severe: slope	Severe: slope	Moderate: slope.
Moderate: slope	Moderate: slope	Moderate: sticky surface.
Severe: slope	Severe: slope; severely eroded	Severe: sticky surface; slope.
Severe: high water table	Severe: high water table	Severe: high water table.
Slight: severe for clayey surface	Slight for silty surface; moderate for sandy surface; severe for clayey surface.	Slight: severe for clayey surface.
Moderate: slope; clayey surface in places.	Moderate: slope; severely eroded in places.	Slight to moderate: clayey surface.
Severe: slope; clayey surface in places	Severe: slope; severely eroded in places	Moderate: slope; clayey surface in places.
Slight	Slight	Slight.
Moderate: slope	Moderate: slope	Slight.
Moderate: slope	Moderate: slope; severely eroded	Slight.
Severe: slope	Severe: slope	Moderate: slope.
Severe: slope	Severe: slope; severely eroded	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: slope	Moderate: slope; very stony.
Slight	Slight	Slight.
Slight	Slight	Slight.
Slight	Slight	Slight.
Slight	Moderate: severely eroded	Slight.
Moderate: slope	Moderate: slope	Slight.
Moderate: slope	Moderate: slope; severely eroded	Slight.
Slight	Slight	Slight.
Slight	Slight	Slight.

TABLE 11.—*Limitations of soils*

Soil series and map symbols	Degree and kind of limitation for—	
	Campsites	Athletic fields and other intensive play areas
Mattapex:		
MpA	Moderate: moderately high water table; moderately slow permeability.	Moderate: moderately high water table; moderately slow permeability.
MpB2	Moderate: moderately high water table; moderately slow permeability.	Moderate: moderately high water table; moderately slow permeability; slope.
MpC2	Moderate: moderately high water table; moderately slow permeability.	Severe: slope
Mixed alluvial land: Mr	Severe: flood hazard	Severe: flood hazard [2]
Montalto:		
MtA	Moderate: moderately slow permeability	Moderate: moderately slow permeability
MtB2	Moderate: moderately slow permeability	Moderate: moderately slow permeability; slope.
MtC2	Moderate: moderately slow permeability; slope.	Severe: slope
MvD	Severe: very stony; slope	Severe: very stony; slope
MyC3	Moderate: moderately slow permeability; silty clay loam surface; slope.	Severe: slope
MyD3	Severe: slope	Severe: slope
Neshaminy:		
NeA	Slight	Slight
NeB2	Slight	Moderate: slope
NeC2	Moderate: slope	Severe: slope
NeD2	Severe: slope	Severe: slope
Othello: OhA, OhB	Severe: high water table	Severe: high water table
Rumford:		
RuB	Slight	Moderate: slope
RuC	Moderate: slope	Severe: slope
RuD	Moderate: slope	Severe: slope
Sassafras:		
SaA	Slight	Slight
SaB2	Slight	Moderate: slope
SaC2	Moderate: slope	Severe: slope
SaC3	Moderate: slope	Severe: slope
SaD2	Moderate: slope	Severe: slope
SaD3	Moderate: slope	Severe: slope
SfB2	Slight	Moderate: slope
SgB2	Moderate: gravel content	Moderate: gravel content; slope
SgC2	Moderate: gravel content; slope	Severe: slope
SgC3	Moderate: gravel content; slope	Severe: slope
SgD3	Moderate: gravel content; slope	Severe: slope
Sassafras and Aura soils: SrE. For Aura part, see Aura series.	Severe: slope	Severe: slope
Stony land: St	Severe: slope; very stony	Severe: slope; very stony
Tidal Marsh: Tm	Severe: marshy	Severe: marshy
Watchung: Wa	Severe: high water table; slow permeability	Severe: high water table; slow permeability

See footnotes at end of table.

for specified recreational uses—Continued

Degree and kind of limitation for—Continued		
Parks, extensive play areas, and picnic areas	Lawns, fairways, and landscaping	Paths and trails
Slight	Slight	Slight.
Slight	Slight	Slight.
Slight	Slight	Slight.
Severe: flood hazard [2]	Severe: flood hazard [2]	Severe: flood hazard. [2]
Slight	Slight	Slight.
Slight	Slight	Slight.
Moderate: slope	Moderate: slope	Slight.
Severe: very stony; slope	Severe: very stony; slope	Moderate: slope.
Moderate: slope	Severe: slope; severely eroded	Moderate: sticky surface.
Severe: slope	Severe: slope; severely eroded	Moderate: slope; sticky surface; severely eroded.
Slight	Slight	Slight.
Slight	Slight	Slight.
Moderate: slope	Moderate: slope	Slight.
Severe: slope	Severe: slope	Moderate: slope.
Severe: high water table	Severe: high water table	Severe: high water table.
Slight	Moderate: loamy sand surface	Moderate: loamy sand surface.
Slight	Moderate: loamy sand surface	Moderate: loamy sand surface.
Moderate: slope	Moderate: loamy sand surface; slope	Moderate: loamy sand surface.
Slight	Moderate: low available moisture capacity.	Slight.
Slight	Moderate: low available moisture capacity.	Slight.
Slight	Moderate: low available moisture capacity.	Slight.
Slight	Moderate: severely eroded	Slight.
Moderate: slope	Moderate: slope	Slight.
Moderate: slope	Severe: slope; severely eroded	Slight.
Slight	Slight	Slight.
Slight	Moderate: gravelly	Slight.
Slight	Moderate: gravelly	Slight.
Slight	Moderate: gravelly; severely eroded	Slight.
Moderate: slope	Severe: slope; severely eroded	Slight.
Severe: slope	Severe: slope; severely eroded in places	Moderate: slope; severe if slope is more than 30 percent.
Severe: slope; very stony	Severe: slope; very stony	Severe: slope; very stony.
Severe: marshy	Severe: marshy	Severe: marshy.
Severe: high water table	Severe: high water table	Severe: high water table.

TABLE 11.—*Limitations of soils*

Soil series and map symbols	Degree and kind of limitation for—	
	Campsites	Athletic fields and other intensive play areas
Woodstown:		
WoA	Moderate: moderately high water table	Moderate: moderately high water table
WoB2	Moderate: moderately high water table	Moderate: moderately high water table; slope
WoC2	Moderate: moderately high water table; slope	Severe: slope
WoC3	Moderate: moderately high water table; slope	Severe: slope
WoD	Moderate: moderately high water table; slope	Severe: slope
WsA	Moderate: moderately high water table	Moderate: moderately high water table
WsB2	Moderate: moderately high water table	Moderate: moderately high water table; slope

[1] Seldom, if ever, flooded during period of use.
[2] Mixed alluvial land (Mr) is variable. Most of it is wet, poorly drained, and moderately slowly permeable, and it floods at unpredictable ntervals. Some areas have limitations that are less severe than those given.

lengths of slopes on each kind of soil in the county. It can also provide suggestions as to kinds of sod plants, ground covers, shrubs, vines, or trees to use for stabilizing and protecting the soil.

The Cecil Soil Conservation District is a locally governed public service organization. It provides assistance to landowners of the county in planning and establishing soil and water conservation measures. It can help in determining and solving the problems and in developing the soil uses that have been discussed in this section of the survey. Applications for assistance should be forwarded to the District, in Elkton, Maryland.

Formation, Morphology, and Classification of Soils

This section discusses the factors of soil formation as they relate to the formation of soils in Cecil County. Interrelationships of soil series in the county are explained, and the morphology of soils in the county is discussed. Each soil series is placed in its respective family, subgroup, and order according to the current system for classifying soils and in the great soil group of the 1938 classification.

Factors of Soil Formation

Soils are the product of soil-forming processes acting upon materials formed, deposited, or accumulated by geologic forces. The five major factors of soil formation are: (1) climate, (2) plants and animals, (3) parent material, (4) relief, and (5) time. Climate and plants and animals are the active forces in soil formation. They act upon the geologic materials. The effects of climate and plants and animals are modified by the shape of the earth's surface and the length of time the geologic material is in place and subjected to active forces. The relative importance of each factor varies from place to place. In some places one factor dominates and fixes most of the properties of the soil. Generally, all five factors influence the kind of soil that forms in any given place.

Climate

Climate is an important factor in the formation of soils because it influences the rate of weathering of geologic materials. A warm, humid climate causes more rapid weathering of materials than a cold or dry climate. The kinds and abundance of vegetation are influenced by the amount of precipitation and the length of the warmer seasons. Precipitation also affects the translocation and leaching of the products of weathering in places. Hard rains and frequent showers cause excessive erosion of surface soil materials. Information about the climate of Cecil County is given in the section "Climate."

Plants and animals

Prior to settlement of Cecil County in the early 17th century, the native vegetation consisted mainly of oak and hickory. Chestnut, yellow-poplar, ash, walnut, and elm were associated species. Maple was dominant on wet bottom lands in the Piedmont area, and sweetgum was dominant on similar sites in the Coastal Plain.

As chemical and physical weathering processes occurred, the trees absorbed nutrients from the soils. Yellow-poplar that grew in the Coastal Plain absorbed sufficient quantities of iron compounds from the soil to strain the heartwood. Eastern red cedar grew in bases weathered from gabbro, and serpentine grew in the northwestern part of the county. Nutrients not held by vegetation were removed, or were subject to removal, from the soil by the flow of soil moisture.

Decaying vegetation returned nutritive elements to the soil. Humic acids produced by decay helped the chemical weathering of the mineral matter. The products of decay and weathering were mixed, and stones were brought to the surface mechanically when trees were uprooted and blown over. Passageways for air and water were formed as roots penetrated the soil to various depths.

Microorganisms, larvae, grubbs, worms, and burrowing rodents are extremely important in soil formation. Many organisms digest organic matter, and some fix nitrogen from the air into a form suited to plants. Others open passageways in which water and air can move, and burrowing animals mix the soil layers.

for specified recreational uses—Continued

Degree and kind of limitation for—Continued		
Parks, extensive play areas, and picnic areas	Lawns, fairways, and landscaping	Paths and trails
Slight	Moderate: moderate available moisture capacity.	Slight.
Slight	Moderate: moderate available moisture capacity.	Slight.
Slight	Moderate: moderate available moisture capacity.	Slight.
Slight	Moderate: severely eroded	Slight.
Moderate: slope	Moderate: slope	Slight.
Slight	Slight	Slight.
Slight	Slight	Slight.

As farming developed in Cecil County, man's activities influenced the formation of soils. Many of the soils were stripped of their protective cover of plants. They then became susceptible to erosion by fast-moving wind and water. Several distinct surface horizons were mixed into one homogeneos layer by plows and bulldozers. The acidity of soils was changed by applications of lime. Originally, crop yields were small because nutrients that were removed by crops were not replaced. Applying plant nutrients in the form of commercial fertilizer and managing water through use of drainage and irrigation systems were practices used to help to increase crop yields.

The present condition of the soils in the county shows the changes that have taken place as a result of man's activity. About 25 percent of the acreage of nearly level soils is slightly eroded. About 64 percent of the acreage of gently sloping to moderately sloping soils on uplands is moderately eroded. About 11 percent of the acreage of moderately sloping to steep soils that are cultivated or are in pasture is severely eroded. In most places the surface layer and subsoil are washed away, and gullies have formed in places.

Parent material

The parent material in which the soils of Cecil County formed is made up of two markedly different kinds of geologic material(*8*). The Piedmont soils in the northern part of the county formed in material weathered in place from hard igneous and metamorphic crystalline rocks of the Pre-Cambrian age. The soils in the south formed in the soft, unconsolidated, water-lain Cretaceous and Pleistocene sediment of the Atlantic Coastal Plain.

Metamorphic crystalline rock is the most extensive single formation in the Piedmont part of the county. Medium-textured soils of the Glenelg, Chester and Glenville series formed in material weathered from this acid rock. Manor soils formed in areas of this rock that were more resistant to weathering. They also formed in places where erosion kept a close pace with soil formation.

Other rocks intrusive in the Pre-Cambrian metamorphic basement rocks were pegmatite dikes, serpentine, metadiorite, and gabbro. Medium-textured Aldino, Conowingo, and Neshaminy soils formed in material weathered from these basic rocks. The Legore soils formed in areas of these rocks that were more resistant to weathering. They also formed in places where erosion kept close pace with soil formation. The fine-textured Montalto soils formed in places where the products of weathering of the basic trap rock were more clayey.

The strike of the rocks in the Piedmont section generally is northeast to southwest all across the county. The dip is very strong to the southeast.

Old Cretaceous series sediments are exposed in the northern part of the Coastal Plain and form the backbone of Elk Neck. These brilliantly colored, very strongly acid sand, silt, and clay sediments weathered to form the Beltsville, Christiana, Elkton, Evesboro, Keyport, Leonardtown, Rumford, and Sassafras soils.

The gravelly, brown to yellowish red, very strongly acid Brandywine formation weathered to form the Aura soils. This formation is a remnant of the Tertiary system, possibly Pliocene. It extends from Pleasant Hill, south to Elk Neck State Park and southwest to Port Deposit.

Water-lain sediments deposited prior to the formation of the Pleistocene Wicomico terrace were removed by erosion from most of the northern part of the county. A few deposits are left. Discontinuous remnants of Coastal Plain deposits are common on top of crystalline rock-cored hills in the central part of the county.

Pleistocene sediment are continuous deposits east of the Elk River. They form a discontinuous rim of low marine terraces, irregular in width, around Elk Neck, the head of Chesapeake Bay, and the mouth of the Susquehanna River.

The brown to yellowish-brown, medium-acid, Wicomico formation silt of the Pleistocene weathered to form the Barclay, Butlertown, Matapeake, Mattapex and Othello soils. Elkton and Keyport soils formed in these deposits in places that had a higher clay content. The silt material is underlain by sand and gravel. Sassafras

and Woodstown soils formed where sandy material and silt material were mixed. These soils have a loam and sandy loam surface layer and a sandy clay loam and sandy loam subsoil.

The Pleistocene sediment are underlain by the glauconitic sand of the Upper Cretaceous system. The glauconitic sands, common called "green sands," cropped out as a discontinuous fringe around many necks of land south of the Chesapeake and Delaware Canal and in the deep draws dissecting the flat Wicomico formation.

The younger Talbot formation of loamy brown and yellowish-red micaceous terrace material weathered to form the Elsinboro soils. They are most extensive in the northeast and to the north and northeast of Elkton.

Relief

The surface relief of Cecil County ranges from the steep, hilly northwest corner, across the gently rolling Piedmont section, down through the hilly and steep central section, to the nearly level southern section.

The northwest corner of the county is steep and hilly. The major streams cut deeply into the country rock. These streams flow southwesterly into the Susquehanna River. The uplands are about 200 feet above the valley floors and 400 to 500 feet above mean sea level.

Most of the Piedmont section of the county is a gently rolling, partial dissected peneplain. The peneplain stands between 400 to 450 feet above mean sea level and slopes gently toward the southeast. The major streams flow south in moderately broad valleys out of the Piedmont.

The Coastal Plain sediment on Elk Neck and west to the Susquehanna River is hilly and steep. The hills range up to 300 feet in height on Elk Neck. Some of these hills slope directly to the shoreline cliffs that rise 100 feet above the beach. The hilly steep land west-southwest from Pleasant Hill to the Susquehanna River ranges in elevation from 100 to 400 feet above mean sea level. A Pleistocene terrace 60 to 80 feet above mean sea level separates most of the hills from the shore. A radical drainage pattern carries water from the hills to major streams flowing south out of the Piedmont. These streams cut through the coastal plain sediment and gouge deep narrow valleys into the underlying crystalline country rock. The stream outlets are in tidal marshes at the head of Chesapeake Bay.

East of the Elk River the Pleistocene sediment forms a nearly level plain 60 to 80 feet above mean sea level. This plain is dissected by major streams flowing west into the Elk River and the Chesapeake Bay. The necks of land between the major streams drain north and south through deep gullies or ravines spaced less than a mile apart along the sides of the necks. Tidal marshes occupy the mouths of many of the ravines.

Shallow depressions that have sandy rims, possibly Carolina Bays, are on the broad flats south of Warwick and between Elkton and the Chesapeake and Delaware Canal.

The water table topography is similar to the surface topography, but it is more gradual. Water table topography strongly affects the foundation of soils. Narrow and moderately wide ridges on uplands separate the drainageways in most of the county. Well-drained, bright-colored soils formed on the tops and sides of these ridges in places where the water table was deep. Some moderately drained soils that have mottles in the lower part of the solum, formed at the heads of drainageways and along the lower slopes parallel to drainageways where the water table is near the surface. These soils are duller or yellower than well-drained counterpart soils. Poorly drained gray soils that have mottles throughout the solum formed at the bases of slopes and in the bottoms of drainageways in places where the table emerged at the surface.

Broad, extensive, flats separate the major drainageways in the nearly level coastal plain part of the county. The water table is relatively close to the surface. Moderately well drained, somewhat poorly drained, and poorly drained soils formed toward the middle of the flats. Well-drained soils formed toward the edges of the flats and on the top and sides of the narrow ridges between the closely spaced deep ravines.

Time

The soils of Cecil County range from old to very young in age and from mature to immature in development.

Aura, Chester, Glenelg, Glenville, and Montalto soils are examples of soils that are both old in age and mature in development. The soil-forming factors operated long enough to develop genetic differences between the soil horizons within each of these soils. Climate and living organisms brought about more changes in the geologic material in these soils than in younger or immature soils. There was more time to leach the soluble minerals out of the solum and to move the fine clay particles down out of the surface horizons into the subsoil. There was time to oxidize and reduce other elements in the soil and to incorporate organic matter into the soil.

Legore and Manor soils are not mature soils. They are exposed to the soil-forming factors for about the same length of time as Chester soils. This geologic material, however, more strongly resisted weathering, or the products of weathering were more quickly and completely eroded away, than that in Chester soils.

The geologic material from which all these soils formed has been exposed to weathering and erosion continually since toward the end of the Tertiary period.

Matapeake soils are mature but they are younger than Chester soils. The parent material in which they formed was deposited in the Quaternary period.

Coastal beaches, Mixed alluvial land, Tidal marsh, Codorus, Comus, and Hatboro soils are examples of soils that are both young and immature. The characteristics of the soil profiles are affected more by stratification than by the movement of fine clays and the leaching through the profile of the products of weathering. The geologic material in which these soils formed is still being deposited.

In table 12 the soil series of Cecil County are arranged to show the relationship in position, relative time, and geologic materials. The degree of natural drainage characteristics of each series is shown as it occurs. Most of the soils are on uplands, but a few are in depressions or on foot slopes.

TABLE 12.—*Soil series arranged to show relationships in position, parent material, and drainage*

Topographic position and parent material	Excessively drained	Somewhat excessively drained	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained
SOILS OF THE PIEDMONT PROVINCE						
Uplands:						
Material weathered from—						
Baltimore gneiss and Wissahicken mica gneiss with intrusions of granodiorite and metadacite.		Manor	Chester, Manor, Glenelg.	Glenville		Baile.
Acid and basic rocks (contact zone)			Neshaminy			
Gabbro (diabase dikes)			Legore, Neshaminy, Montalto.	Aldino		Watchung.
Serpentine			Chrome	Conowingo	Conowingo	
Flood plains:						
Alluvium			Comus	Codorus	Codorus	Hatboro.
SOILS OF THE ATLANTIC COASTAL PLAIN						
Uplands:						
Formed in—						
Sand	Evesboro					
Sand with limited amounts of clay and silt.		Rumford				
Sand with moderate amounts of clay and silt.			Sassafras	Woodstown		Fallsington.
Silt over gravel			Chillum			
Silt and silt over gravelly silt				Beltsville		Leonardtown.
Clay			Christiana	Keyport		Elkton.
Silt and sand over greensand (glauconite).			Collington			
Quartz gravel with a few fines			Aura			
Silt over sand (older sediment)			Matapeake	Butlertown, Mattapex, Beltsville.	Barclay	Othello.
Silt over micaceous sand			Elsinboro			
Flood plains:						
Alluvium					Mixed alluvial land.[1]	Mixed alluvial land.[1]

[1] Not a soil series, but a miscellaneous land type that is included for comparison. Drainage is variable, but the land type generally is not well drained.

Morphology of Soils

The soils of Cecil County generally have distinct layers or horizons. Soils that have weak genetic horizons are the Barclay, Codorus, Comus, Evesboro, Hatboro, and Manor soils.

The differentiation of horizons in soils is the result of several soil-forming processes, the most important of which are: (1) accumulation or organic matter, (2) leaching of carbonates and salts more soluble than calcium carbonate, (3) chemical weathering of the primary minerals of parent material into silicate clay minerals, (4) translocation of silicate clay minerals and probably of some silt-sized particles, from one horizon to another, and (5) chemical changes, including oxidation, reduction, and hydration and transfer of iron.

Organic matter is incorporated in the surface horizons in varying amounts of all the soils in the county. It provides organic compounds useful in the other processes. Organic matter provides good physical conditions for the intake of water and air necessary for plant growth.

Large amounts of carbonates are presently being leached from the lower parts of the Aldino, Conowingo, Legore, Montalto, Neshaminy, and Watchung soils. The other soils in the county are acid throughout and formed in parent material that does not contain an appreciable amount of carbonates. The crystalline rocks were low in basic minerals. The soft sediment was leached of carbonates before it was deposited.

Chemical weathering has changed primary minerals to clays, to some degree, in all the soils in the county except Evesboro soils. The highly silicious Evesboro soils strongly resist chemical weathering. Clay minerals are formed with extreme difficulty, if at all, from the dominantly quartzitic sand. Clays are being formed in the young soils on flood plains—Codorus, Comus, and Hatboro soils. No evidence of movement and concentration of the clays is seen in any one horizon. New alluvial material is acumulating periodically on top of the old.

Barclay soils are beginning to show a little evidence of clay formation and accumulation in the subsoil. In

Manor soils erosion has almost kept pace with chemical weathering. A small amount of translocation and accumulation of silicate clay is visible in some Manor soils.

Translocation and development in place of silicate clay minerals contribute greatly to the formation of subsoil horizons. Twenty-four of the 34 soil series in this county exhibit this characteristic. Silicate clay formed in the A horizon is translocated into the B horizon by percolating water, where it is immobilized, at least in part. This process contributes to the formation of a B2t horizon that is more clayey and finer textured than the A horizon.

Gleying, or the chemical reduction and transfer of iron, occurs in soils that have impeded drainage. The reduced iron is mobile and can move from horizon to horizon. The Baile, Elkton, Fallsington, Hatboro, Leonardtown, Othello, and Watchung soils are strongly affected by gleying and have a gray subsoil. They have a high water table during much of the year.

The Aldino, Barclay, Beltsville, Butlertown, Cordorus, Conowingo, Glenville, Keyport, Mattapex, and Woodstown soils are moderately affected by gleying. The water table is high only part of the year. Part of the reduced iron is reoxidized and forms streaks, patches, and mottles of red, yellow, and brown in various shades.

Clay acts as cement between silt particles in the subsoil of many silty soils and forms a fragipan. A fragipan is designated by the symbol Bx in the subsoil or B horizon and Cx in the substratum or C horizon. A fragipan is slowly permeable. A temporary perched water table can form above it in wet seasons, while deeper horizons remain dry. The strength of the fragipan decreases as the moisture content increases, and the hydrostatic tension between the clay and silt particles is reduced. The Aldino, Beltsville, Glenville, and Leonardtown soils have a strongly expressed fragipan. Butlertown soils have a weaker fragipan.

Clay formation frees the reddish, hydrated oxides of iron from the primary minerals. Even small amounts of the oxides can cause the soils to be reddish. Christiana, Montalto, and Neshaminy soils are redder than other soils in the county.

The morphology of each soil series in Cecil County is described in detail in the section, "Description of the Soils."

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

Thus, in classification, soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and applied in managing farms, fields, and woodland, in developing rural areas, in engineering work, and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 and later revised (*2*, *4*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965 (*6*). The current system is under continual study. Therefore, readers interested in developments of the current system should search the latest literature available. (*3*). In table 13 the soil series of Cecil County are placed in some categories of the current system and in the great soil groups of the older systems.

Ten soil orders are recognized in the current system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate these soil orders are those that tend to give broad climatic groupings to soils. The two exceptions to this are the Entisols and Histosols, that occur in many different kinds of climate. The four soil orders in Cecil County are the Entisols, the Inceptisols, the Alfisols, and the Ultisols.

Entisols are essentially recent or very young soils. They have been very slightly modified from the geologic material in which they have formed. In Cecil County the principal modification is a very weakly developed A1 horizon.

Inceptisols (from the Latin *inceptum*, or beginning) are mineral soils in which horizons have started to develop. At the current stage of their development their profile development is still incomplete.

Alfisols (from Marbet's *Pedalfer*, Al and Fe) are strongly weathered and developed soils that have base saturation, by sum of cations, of 35 percent or more. This is at about 72 inches below the surface depth, depending upon other soil characteristics. In Cecil County Alfisols are the second most common soils, and they range from well drained to poorly drained.

Ultisols (from the Latin *ultimus*, or last)) are strongly weathered and developed soils. In Cecil County they are the most common soils, and they range from somewhat excessively drained to poorly drained. Ultisols commonly represent the ultimate in soil development in which the processes have not been prevented or blocked by lack of weatherable minerals or by some unaccountable variation in the environment.

Literature Cited

(1) American Association of State Highway Officials.
1961. standard specifications for highway materials and methods of sampling and testing. Ed. 8, 2 v., illus. Washington, D.C.

(2) Baldwin, M., Kellogg, C. E., and Thorp, James.
1938. soil classification. U.S. Dept. Agr. Ybk. 979–1001, illus.

(3) Simonson, Roy W.
1962. soil classification in the united states. Sci. 137: 1027–1034.

(4) Thorp, James, and Smith, Guy D.
1949. higher categories of soil classification: order, suborder, and great soil groups. Soil Sci. 67: 117–126.

(5) United States Department of Agriculture.
1951. soil survey manual. U.S. Dept. Agr. Handbk. 18, 503 pp., illus.

TABLE 13.—*Soil series classified according to the current and 1938 classification*

Series	Current classification [1]			1938 classification
	Family	Subgroup	Order	Great soil group
Aldino [2]	Fine-silty, mixed, mesic	Typic Fragiudalfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Plomosols soils.
Aura	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Baile	Fine-loamy, mixed, mesic	Typic Ochraquults	Ultisols	Low-Humic Gley soils.
Barclay	Coarse-silty, mixed, thermic	Aquic Dystrochrepts	Inceptisols	Low-Humic Gley soils.
Beltsville	Fine-loamy, mixed, mesic	Typic Fragiudults	Ultisols	Gray-Brown Podzolic soils.
Butlertown	Fine-silty, mixed, mesic	Typic Fragiudults	Ultisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Chester	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Chillum [3]	Fine-silty, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Christiana	Clayey, kaolinitic, mesic	Typic Paleudults	Ultisols	Red-Yellow Podzolic soils.
Chrome	Fine, mixed, mesic	Typic Hapludalfs	Alfisols	Grey-Brown Podzolic soils intergrading toward Lithosols.
Codorus	Fine-loamy, mixed mesic	Aquic Fluventic Dystrochrepts.	Inceptisols	Alluvial soils.
Collington	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils.
Comus	Coarse-loamy, mixed mesic	Fluventic Dystrochrepts.	Inceptisols	Alluvial soils.
Conowingo	Fine-loamy, mixed, mesic	Aquic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Elkton	Clayey, mixed, mesic	Typic Ochraquults	Ultisols	Low-Humic Gley soils.
Elsinboro	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils.
Evesboro	Mesic coated	Typic Quarzipsamments.	Entisols	Regosols.
Fallsington	Fine-loamy, siliceous, mesic	Typic Ochraquults	Ultisols	Low-Humic Gley soils.
Glenelg	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils.
Glenville	Fine-loamy, mixed, mesic	Aquic Fragiudults	Ultisols	Gray-Brown Podzolic soils.
Hatboro	Fine-loamy, mixed, acid, mesic	Fluventic Haplaquept	Inceptisols	Low-Humic Gley soils.
Keyport	Clayey, mixed, mesic	Aquic Hapludults	Ultisols	Red-Yellow Podzolic soils intergrading toward Gray-Brown Podzolic soils.
Legore	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Lithosols.
Leonardtown	Fine-silty, mixed, mesic	Typic Fragiaquults	Ultisols	Planosols.
Manor	Coarse-loamy, micaceous, mesic	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides.
Matapeake	Fine-silty, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Mattapex	Fine-silty, mixed, mesic	Aquic Hapludults	Ultisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Montalto	Fine-mixed, mesic	Ultic Hapludalfs	Alfisols	Red-Yellow Podzolic soils intergrading toward Reddish-Brown Lateritic soils.
Neshaminy	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Red-Yellow Podzolic soils.
Othello	Fine-silty, mixed, mesic	Typic Ochraquults	Ultisols	Low-Humic Gley soils.
Rumford	Coarse-loamy, siliceous, thermic.	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Sassafras	Fine-loamy, siliceous, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.
Watchung	Fine, mixed, mesic	Typic Ochraqualfs	Alfisols	Planosols.
Woodstown	Fine-loamy, siliceous, mesic	Aquic Hapludults	Ultisols	Gray-Brown Podzolic soils intergrading toward Red-Yellow Podzolic soils.

[1] Placement of some series in the current system of classification, particularly into families, may change as more precise information becomes available.

[2] The Aldino soils in Cecil County are taxadjuncts to the series because their color is redder than that in the defined range.

[3] The Chillum soils in Cecil County have a thicker solum that the defined range for the series.

(6) ———
1960. SOIL CLASSIFICATION, A COMPREHENSIVE SYSTEM, 7TH APPROXIMATION. Soil Survey Staff, Soil Conservation Service, 265 pp., illus. [Supplements issued in March 1967 and September 1968]

(7) UNITED STATES DEPARTMENT OF DEFENSE.
1968. UNIFIED SOIL CLASSIFICATION SYSTEM FOR ROADS, AIRFIELDS, EMBANKMENTS, AND FOUNDATIONS. MIL-STD-619B, 30 pp., illus.

(8) UNITED STATES DEPARTMENT OF THE INTERIOR.
1920. GEOLOGIC ATLAS OF THE UNITED STATES. Elkton-Wilmington folio 211, p. 16.

Glossary

Acidity. See Reaction, soil.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere, but that in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

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

Available moisture capacity (also termed available water capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Chroma. See Color, Munsell notation.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: Clay coat, clay skin.

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

Color, Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, value of 6, and a chroma of 4.

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

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Cover crop. A close-growing crop grown primarily to improve and to protect the soil between periods of regular crop production; or a crop grown between trees and vines in orchards and vineyards.

Diversion, or diversion terrace. A ridge of earth, generally a terrace, that is built to divert runoff from its natural course and, thus, to protect areas downslope from the effects of such runoff.

Drainage See Natural soil drainage.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

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

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic matter and clay but is rich in silt or very fine sand. The layer is seemingly cemented. When dry, it is hard or very hard and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface.

Gleization. The reduction, translocation, and segregation of soil compounds, notably of iron, usually in the lower horizons, as a result of waterlogging with poor aeration and drainage; expressed in the soil by mottled colors dominated by gray. The soil-forming processes leading to the development of a gley soil.

Gleyed soil. A soil in which waterlogging and a lack of oxygen have caused the material in one or more horizons to be neutral gray in color. The term "gleyed" is applied to soil horizons with yellow and gray mottling caused by intermittent waterlogging.

Green manure (agronomy). A crop grown for the purpose of being turned under in an early stage of maturity or soon after maturity for soil improvement.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Hue. See Color, Munsell notation.

Mature soil. Any soil with well-developed soil horizons having characteristics produced by the natural processes of soil formation and in near equilibrium with its present environment.

Miscellaneous land type. A mapping unit for areas of land that have little or no natural soil; or that are too nearly inaccessible for orderly examination; or that occur where, for other reasons, it is not feasible to classify the soil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineralogical, and biological properties of the various horizons, and their thickness and arrangement in the soil profile.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Natural soil drainage. Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and in Podzolic soils commonly have mottlings below 6 to 16 inches, in the lower A horizon and in the B and C horizons.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

pH value. A numerical means for designating relatively weak acidity and alkalinity in soils. A pH value of 7.0 indicates precise neutrality; a higher value, alkalinity; and a lower value, acidity.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Sheet erosion. The removal of a fairly uniform layer of soil or material from the land surface by the action of rainfall and runoff water.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeters). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stone line. A concentration of coarse rock fragments in soils that generally represents an old weathering surface. In a cross section, the line may be one stone or more thick. The line generally overlies material that weathered in place, and it is ordinarily overlain by sediment of variable thickness.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically, the part of the soil below the solum.

Surface layer. A term used in nontechnical soil descriptions for one or more layers above the subsoil. Includes A horizon and part of B horizon; has no depth limit.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surplus runoff so that it may soak into the soil or flow slowly to a prepared outlet without causing harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportions of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Value (color). See Color, Munsell notation.

GUIDE TO MAPPING UNITS

For a complete description about a mapping unit, read both the description of the mapping unit and that of the soil series to which it belongs. A technical description of a profile that is representative of the soil series is part of the series description. For complete information about a capability unit, refer to the subsection "Management by Capability Units" beginning on page 47. For facts about woodland suitability groups of soils, see the discussion that begins on page 59. Other information is given in tables as follows:

Acreage and extent of soils, table 3, p. 9.
Predicted yields, table 4, p. 56.
Soils and their suitability for wildlife, table 5, p. 68.
Engineering uses of the soils, tables 6, 7, 8, and 9, pp. 76 to 93.
Soil uses in town and country planning, table 10, p. 96.
Recreational uses of the soils, table 11, p. 104.

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group	
			Symbol	Page	Number	Page
AdA	Aldino silt loam, 0 to 3 percent slopes	11	IIw-8	49	3o12	64
AdB2	Aldino silt loam, 3 to 8 percent slopes, moderately eroded	11	IIe-13	48	3o12	64
AuB2	Aura gravelly sandy loam, 2 to 5 percent slopes, moderately eroded	12	IIs-9	49	3d16	63
AuC2	Aura gravelly sandy loam, 5 to 10 percent slopes, moderately eroded	12	IIIe-9	50	3d16	63
AuD2	Aura gravelly sandy loam, 10 to 15 percent slopes, moderately eroded	12	IVe-7	51	3d16	63
BaA	Baile silt loam, 0 to 3 percent slopes	13	Vw-1	53	1w3	59
BaB	Baile silt loam, 3 to 8 percent slopes	13	Vw-1	53	1w3	59
BcA	Barclay silt loam, 0 to 2 percent slopes	14	IIIw-1	51	2w7	62
BcB	Barclay silt loam, 2 to 5 percent slopes	14	IIIw-1	51	2w7	62
BeA	Beltsville silt loam, 0 to 2 percent slopes	14	IIw-8	49	3w16	67
BeB2	Beltsville silt loam, 2 to 5 percent slopes, moderately eroded	15	IIe-13	48	3w16	67
BeC2	Beltsville silt loam, 5 to 10 percent slopes, moderately eroded	15	IIIe-13	50	3w16	67
BeC3	Beltsville silt loam, 5 to 10 percent slopes, severely eroded	15	IVe-9	52	3w16	67
BuA	Butlertown silt loam, 0 to 2 percent slopes	16	IIw-1	48	2o7	61
BuB2	Butlertown silt loam, 2 to 5 percent slopes, moderately eroded	16	IIe-16	48	2o7	61
BuC2	Butlertown silt loam, 5 to 10 percent slopes, moderately eroded	16	IIIe-16	50	2o7	61
BuC3	Butlertown silt loam, 5 to 10 percent slopes, severely eroded	16	IVe-9	52	2o7	61
BuD2	Butlertown silt loam, 10 to 15 percent slopes, moderately eroded	16	IVe-9	52	2r7	62
CeA	Chester silt loam, 0 to 3 percent slopes	17	I-4	47	2o4	60
CeB2	Chester silt loam, 3 to 8 percent slopes, moderately eroded	17	IIe-4	47	2o4	60
ChB2	Chillum silt loam, 2 to 5 percent slopes, moderately eroded	18	IIs-7	49	3o10	64
ChC2	Chillum silt loam, 5 to 10 percent slopes, moderately eroded	18	IIIe-7	50	3o10	64
ChC3	Chillum silt loam, 5 to 10 percent slopes, severely eroded	18	IVe-7	51	3o10	64
ChD2	Chillum silt loam, 10 to 15 percent slopes, moderately eroded	18	IVe-7	51	3o10	64
ChD3	Chillum silt loam, 10 to 15 percent slopes, severely eroded	18	VIIe-2	53	3o10	64
ClB2	Christiana fine sandy loam, 2 to 5 percent slopes, moderately eroded	18	IIe-41	48	3c10	63
CmB2	Chrome silt loam, 3 to 8 percent slopes, moderately eroded	19	IIe-10	47	4c11a	67
CmC2	Chrome silt loam, 8 to 15 percent slopes, moderately eroded	19	IIIe-10	50	4c11a	67

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group	
			Symbol	Page	Number	Page
CmD2	Chrome silt loam, 15 to 25 percent slopes, moderately eroded	19	IVe-10	52	4c11b	67
CnD3	Chrome clay loam, 8 to 25 percent slopes, severely eroded	19	VIe-3	53	4c11b	67
CnE3	Chrome clay loam, 25 to 45 percent slopes, severely eroded	20	VIIe-3	53	4c11b	67
Co	Coastal beaches	20	VIIIs-2	54	------	
Cp	Clay pits	20	VIIIs-4	54	------	
Cr	Codorus silt loam	21	IIw-7	49	1w9	60
CsB2	Collington sandy loam, 2 to 5 percent slopes, moderately eroded	21	IIe-5	47	2o5	61
CsC2	Collington sandy loam, 5 to 10 percent slopes, moderately eroded	22	IIIe-5	49	2o5	61
CtB2	Collington loam, 2 to 5 percent slopes, moderately eroded	22	IIe-4	47	2o5	61
CtC2	Collington loam, 5 to 10 percent slopes, moderately eroded	22	IIIe-4	49	2o5	61
CtC3	Collington loam, 5 to 10 percent slopes, severely eroded	22	IVe-3	51	2o5	61
CtD2	Collington loam, 10 to 15 percent slopes, moderately eroded	22	IVe-3	51	2o5	61
CtD3	Collington loam, 10 to 15 percent slopes, severely eroded	22	VIe-2	53	2o5	61
Cu	Comus silt loam	22	I-6	47	1o9	59
CwC	Conowingo silt loam, 3 to 15 percent slopes	23	IIIe-13	50	3w12	66
ElA	Elkton loam, 0 to 2 percent slopes	24	IIIw-9	51	3w13	66
ElB	Elkton loam, 2 to 5 percent slopes	24	IIIw-9	51	3w13	66
EmA	Elkton silt loam, 0 to 2 percent slopes	24	IIIw-9	51	3w13	66
EmB	Elkton silt loam, 2 to 5 percent slopes	24	IIIw-9	51	3w13	66
EoA	Elsinboro silt loam, 0 to 2 percent slopes	25	I-4	47	2o5	61
EoB2	Elsinboro silt loam, 2 to 5 percent slopes, moderately eroded	25	IIe-4	47	2o5	61
EoC2	Elsinboro silt loam, 5 to 10 percent slopes, moderately eroded	25	IIIe-4	49	2o5	61
EvB	Evesboro loamy sand, 0 to 5 percent slopes	26	IVs-1	52	3s14a	65
EvD	Evesboro loamy sand, 5 to 15 percent slopes	26	VIIs-1	53	3s14a	65
EvE	Evesboro loamy sand, 15 to 40 percent slopes	26	VIIs-1	53	3s14b	65
FaA	Fallsington sandy loam, 0 to 2 percent slopes	26	IIIw-6	51	2w7	62
FaB	Fallsington sandy loam, 2 to 5 percent slopes	27	IIIw-6	51	2w7	62
FaC	Fallsington sandy loam, 5 to 10 percent slopes	27	IIIe-36	51	2w7	62
FmA	Fallsington loam, 0 to 2 percent slopes	27	IIIw-7	51	2w7	62
FmB	Fallsington loam, 2 to 5 percent slopes	27	IIIw-7	51	2w7	62
GeA	Glenelg silt loam, 0 to 3 percent slopes	27	I-4	47	2o4	60
GeB2	Glenelg silt loam, 3 to 8 percent slopes, moderately eroded	27	IIe-4	47	2o4	60
GeC2	Glenelg silt loam, 8 to 15 percent slopes, moderately eroded	28	IIIe-4	49	2o4	60
GeC3	Glenelg silt loam, 8 to 15 percent slopes, severely eroded	28	IVe-3	51	2o4	60
GeD2	Glenelg silt loam, 15 to 25 percent slopes, moderately eroded	28	IVe-3	51	2r4	61
GeD3	Glenelg silt loam, 15 to 25 percent slopes, severely eroded	28	VIe-2	53	2r4	61
GeE	Glenelg silt loam, 25 to 45 percent slopes	28	VIe-2	53	2r4	61
GnA	Glenville silt loam, 0 to 3 percent slopes	29	IIw-3	48	2w12	62
GnB2	Glenville silt loam, 3 to 8 percent slopes, moderately eroded	29	IIe-13	48	2w12	62
GnC2	Glenville silt loam, 8 to 15 percent slopes, moderately eroded	29	IIIe-13	50	2w12	62
Gv	Gravel and borrow pits	29	VIIIs-4	54	------	

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group	
			Symbol	Page	Number	Page
Ha	Hatboro silt loam	30	IIIw-7	51	3w3	65
KeA	Keyport loam, 0 to 2 percent slopes	31	IIw-8	49	3w13	66
KeB2	Keyport loam, 2 to 5 percent slopes, moderately eroded	31	IIe-13	48	3w13	66
KeC2	Keyport loam, 5 to 10 percent slopes, moderately eroded	31	IIIe-13	50	3w13	66
KpA	Keyport silt loam, 0 to 2 percent slopes	31	IIw-8	49	3w13	66
KpB2	Keyport silt loam, 2 to 5 percent slopes, moderately eroded	31	IIe-13	48	3w13	66
KpC2	Keyport silt loam, 5 to 10 percent slopes, moderately eroded	31	IIIe-13	50	3w13	66
KpD2	Keyport silt loam, 10 to 15 percent slopes, moderately eroded	31	VIe-2	53	3w13	66
KsB3	Keyport silty clay loam, 2 to 5 percent slopes, severely eroded	31	IVe-9	52	3w13	66
KsC3	Keyport silty clay loam, 5 to 10 percent slopes, severely eroded	32	VIe-2	53	3w13	66
LeB2	Legore silt loam, 3 to 8 percent slopes, moderately eroded	32	IIe-10	47	2o4	60
LeC2	Legore silt loam, 8 to 15 percent slopes, moderately eroded	32	IIIe-10	50	2o4	60
LeD2	Legore silt loam, 15 to 25 percent slopes, moderately eroded	32	IVe-10	52	2r4	61
LgC3	Legore silty clay loam, 8 to 15 percent slopes, severely eroded	32	IVe-10	52	2o4	60
LgE3	Legore silty clay loam, 15 to 45 percent slopes, severely eroded	32	VIIe-3	53	2r4	61
LoA	Leonardtown silt loam, 0 to 2 percent slopes	33	IVw-3	52	3w13	66
LoB	Leonardtown silt loam, 2 to 5 percent slopes	33	IVw-3	52	3w13	66
LyC	Loamy and clayey land, sloping	34	IVe-3	51	3c16a	63
LyD	Loamy and clayey land, moderately steep	34	VIe-2	53	3c16b	63
LyE	Loamy and clayey land, steep	34	VIIe-2	53	3c16b	63
MaB	Made land, gently sloping	34	--------	--	-----	--
MaD	Made land, moderately steep	34	--------	--	-----	--
MlB2	Manor loam, 3 to 8 percent slopes, moderately eroded	35	IIe-25	48	2o11	61
MlC2	Manor loam, 8 to 15 percent slopes, moderately eroded	35	IIIe-25	50	2r11	62
MlC3	Manor loam, 8 to 15 percent slopes, severely eroded	35	IVe-25	52	2r11	62
MlD2	Manor loam, 15 to 25 percent slopes, moderately eroded	35	IVe-25	52	2r11	62
MlD3	Manor loam, 15 to 25 percent slopes, severely eroded	35	VIe-3	53	2r11	62
MlE	Manor loam, 25 to 45 percent slopes	36	VIIe-3	53	2r11	62
MmD	Manor very stony loam, 3 to 25 percent slopes	36	VIs-3	53	2r11	62
MnA	Matapeake silt loam, 0 to 2 percent slopes	36	I-4	47	3o10	64
MnB2	Matapeake silt loam, 2 to 5 percent slopes, moderately eroded	36	IIe-4	47	3o10	64
MnC2	Matapeake silt loam, 5 to 10 percent slopes, moderately eroded	36	IIIe-4	49	3o10	64
MnC3	Matapeake silt loam, 5 to 10 percent slopes, severely eroded	37	IVe-3	51	3o10	64
MnD2	Matapeake silt loam, 10 to 15 percent slopes, moderately eroded	37	IVe-3	51	3o10	64
MnD3	Matapeake silt loam, 10 to 15 percent slopes, severely eroded	37	VIe-2	53	3o10	64
MoA	Matapeake silt loam, silty substratum, 0 to 2 percent slopes	37	I-4	47	3o10	64
MoB2	Matapeake silt loam, silty substratum, 2 to 5 percent slopes, moderately eroded	37	IIe-4	47	3o10	64
MpA	Mattapex silt loam, 0 to 2 percent slopes	38	IIw-1	48	3o13	64
MpB2	Mattapex silt loam, 2 to 5 percent slopes, moderately eroded	38	IIe-16	48	3o13	64
MpC2	Mattapex silt loam, 5 to 10 percent slopes, moderately eroded	38	IIIe-16	50	3o13	64
Mr	Mixed alluvial land	38	VIw-1	53	2w7	62

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group	
			Symbol	Page	Number	Page
MtA	Montalto silt loam, 0 to 3 percent slopes	39	I-4	47	2c4a	60
MtB2	Montalto silt loam, 3 to 8 percent slopes, moderately eroded	39	IIe-4	47	2c4a	60
MtC2	Montalto silt loam, 8 to 15 percent slopes, moderately eroded	39	IIIe-4	49	2c4a	60
MvD	Montalto very stony silt loam, 3 to 25 percent slopes	39	VIs-3	53	2c4b	60
MyC3	Montalto silty clay loam, 8 to 15 percent slopes, severely eroded	39	IVe-3	51	2c4a	60
MyD3	Montalto silty clay loam, 15 to 25 percent slopes, severely eroded	39	VIe-2	53	2c4b	60
NeA	Neshaminy silt loam, 0 to 3 percent slopes	40	I-4	47	2o4	60
NeB2	Neshaminy silt loam, 3 to 8 percent slopes, moderately eroded	40	IIe-4	47	2o4	60
NeC2	Neshaminy silt loam, 8 to 15 percent slopes, moderately eroded	40	IIIe-4	49	2o4	60
NeD2	Neshaminy silt loam, 15 to 25 percent slopes, moderately eroded	40	IVe-3	51	2r4	61
OhA	Othello silt loam, 0 to 2 percent slopes	41	IIIw-7	51	3w13	66
OhB	Othello silt loam, 2 to 5 percent slopes	41	IIIw-7	51	3w13	66
RuB	Rumford loamy sand, 2 to 5 percent slopes	42	IIs-4	49	3o14	65
RuC	Rumford loamy sand, 5 to 10 percent slopes	42	IIIe-33	50	3o14	65
RuD	Rumford loamy sand, 10 to 15 percent slopes	42	IVe-5	51	3o14	65
SaA	Sassafras sandy loam, 0 to 2 percent slopes	42	I-5	47	3o10	64
SaB2	Sassafras sandy loam, 2 to 5 percent slopes, moderately eroded	42	IIe-5	47	3o10	64
SaC2	Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded	43	IIIe-5	49	3o10	64
SaC3	Sassafras sandy loam, 5 to 10 percent slopes, severely eroded	43	IVe-5	51	3o10	64
SaD2	Sassafras sandy loam, 10 to 15 percent slopes, moderately eroded	43	IVe-5	51	3o10	64
SaD3	Sassafras sandy loam, 10 to 15 percent slopes, severely eroded	43	VIe-2	53	3o10	64
SfB2	Sassafras fine sandy loam, 2 to 5 percent slopes, moderately eroded	43	IIe-5	47	3o10	64
SgB2	Sassafras gravelly loam, 2 to 5 percent slopes, moderately eroded	43	IIe-4	47	3o10	64
SgC2	Sassafras gravelly loam, 5 to 10 percent slopes, moderately eroded	43	IIIe-4	49	3o10	64
SgC3	Sassafras gravelly loam, 5 to 10 percent slopes, severely eroded	43	IVe-3	51	3o10	64
SgD3	Sassafras gravelly loam, 10 to 15 percent slopes, severely eroded	43	VIe-2	53	3o10	64
SrE	Sassafras and Aura soils, 15 to 40 percent slopes	43	VIIe-2	53	3r10	65
St	Stony land	43	VIIIs-1	54	-----	--
Tm	Tidal marsh	44	VIIIw-1	54	-----	--
Wa	Watchung very stony silt loam	45	VIIs-4	53	1w3	59
WoA	Woodstown sandy loam, 0 to 2 percent slopes	45	IIw-5	48	2o7	61
WoB2	Woodstown sandy loam, 2 to 5 percent slopes, moderately eroded	45	IIe-36	48	2o7	61
WoC2	Woodstown sandy loam, 5 to 10 percent slopes, moderately eroded	46	IIIe-36	51	2o7	61
WoC3	Woodstown sandy loam, 5 to 10 percent slopes, severely eroded	46	IVe-5	51	2o7	61
WoD	Woodstown sandy loam, 10 to 15 percent slopes	46	IVe-5	51	2o7	61
WsA	Woodstown loam, 0 to 2 percent slopes	46	IIw-1	48	2o7	61
WsB2	Woodstown loam, 2 to 5 percent slopes, moderately eroded	46	IIe-16	48	2o7	61

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