SOIL SURVEY
Calvert County, Maryland

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

Major fieldwork for this soil survey was done in the period 1948–65. Soil names and descriptions were approved in 1967. Unless otherwise indicated, statements in this 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 Calvert 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 agriculture, industry, and recreation.

Locating Soils

All the soils of Calvert County are shown on the detailed map at the back of this survey. 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 and gives the capability classification and woodland classification of each. It also shows the page where each soil is described and the page for each classification.

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

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

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

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

Engineers and builders can 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 the Soils."

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

Cover picture: **A farm on an area of Matapeake silt loam, 5 to 10 percent slopes, moderately eroded. Well-sodded diversion terraces in foreground empty into sodded waterway in background.**

U.S. GOVERNMENT PRINTING OFFICE: 1971

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402

Contents

	Page
How this survey was made	1
General soil map	2
1. Sassafras-Marr-Westphalia association	2
2. Sassafras-Matapeake association	3
3. Mattapex-Othello-Sassafras association	3
4. Othello-Keyport-Elkton association	3
Descriptions of the soils	3
Beltsville series	5
Butlertown series	5
Coastal beaches	6
Elkton series	6
Eroded land, steep	8
Escarpments	8
Evesboro series	8
Fallsington series	9
Gravel and borrow pits	10
Howell series	10
Iuka series	11
Keyport series	11
Made land	12
Marr series	12
Matapeake series	14
Mattapex series	15
Mixed alluvial land	16
Ochlockonee series	16
Othello series	17
Rumford series	18
Sassafras series	19
Swamp	21
Tidal marsh	21
Westphalia series	21
Woodstown series	22
Use and management of the soils	23
Capability grouping	23
General management requirements	28
Drainage	28
Irrigation	29
Soil amendments	29
Tillage	29
Residue management	29
Estimated yields	30
Woodland	32
Woodland suitability groups	32
Wildlife	36
Engineering uses of the soils	40
Engineering test data	42
Engineering properties of the soils	42
Engineering interpretations	42
Use of the soils in community development	43
Formation, morphology, and classification of the soils	9
Factors of soil formation	69
Climate	69
Plant and animal life	69
Parent material	69
Relief	70
Time	70
Interrelationships of soil series	70
Morphology of soils	70
Classification of the soils	72
Climate	73
Literature cited	74
Glossary	75
Guide to mapping units	Following 76

Issued July 1971

SOIL SURVEY OF CALVERT COUNTY, MARYLAND

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

CALVERT COUNTY is in the south-central part of Maryland (fig. 1). It is bounded on the north by Anne Arundel County, on the west by the Patuxent River, on the east by the Chesapeake Bay, and on the south by the confluence of the Patuxent River and the Chesapeake Bay. The county has a total area of about 140,160 acres, or 219 square miles.

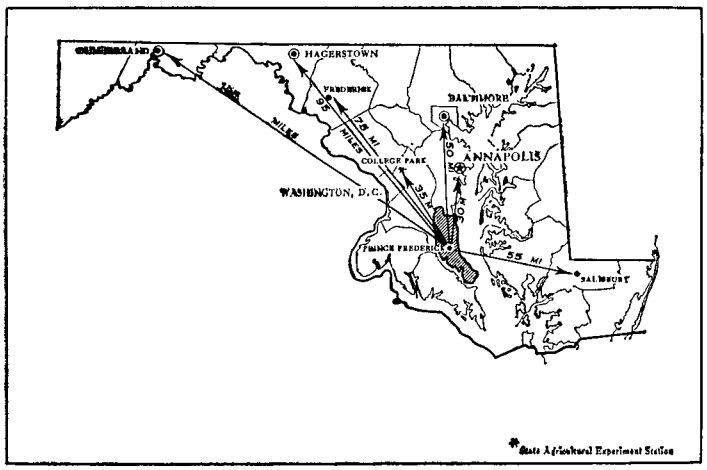

Figure 1.—**Location of Calvert County in Maryland.**

Tobacco is the most important farm crop; more acreage is used for it than for both of the next most extensive farm crops, corn and hay. Forest products are a significant source of income in the county.

Only about 2 percent of the county is suited to unlimited cultivation under ordinary good farm management. About 26 percent is suited to regular cultivation if appropriate soil and water conservation measures are applied, and nearly 16 percent is suited to limited cultivation only if complex, intensive conservation measures are practiced. About 32 percent of the land is suited to grazing or other less intensive uses but is severely limited for crops. Nearly 21 percent is well suited as woodland but is so steep, rough, droughty, or severely eroded that it is very limited for farming. The rest of the county, about 3 percent, is limited even for woodland but has value for recreational uses or as wildlife habitat.

Calvert County is essentially rural. Recently, however, there has been a considerable increase in construction of retirement homes, summer and year-round cottages, various buildings, and residences for commuters. The county's population of 15,826 in 1960 represented an increase of 24 percent over that in 1950.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Calvert 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. As they traveled over the county, they observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of native plants or crops, 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. Sassafras and Westphalia, 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, Sassafras loamy fine sand, 0 to 2 percent slopes, is one of several phases within the Sassafras 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 the 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. Two such kinds of mapping units are shown on the soil map of Calvert County: soil complexes and undifferentiated groups.

A soil complex consists of areas of two or more soils so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Sassafras-Westphalia gravelly fine sandy loams, 2 to 6 percent slopes, moderately eroded, is an example.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of 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 Westphalia soils, steep, 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. Eroded land, steep, is a land type in Calvert County.

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

The soil scientists set up trial groups of soils on the basis of yield and practice tables and other data they have collected. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. Then they adjust the groups according to the results of their studies and 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 Calvert 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 and in different proportions.

A map showing the soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. But such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, erosion, drainage, and other characteristics that affect management.

The four soil associations in Calvert County are described in the following pages.

1. Sassafras-Marr-Westphalia association

Rolling to steep, well-drained, mostly severely eroded soils that have a dominantly sandy clay loam to fine sandy loam subsoil

This association is characterized by fairly narrow, rounded, sloping ridgetops and more strongly sloping, irregular upper slopes, all of which are strongly dissected by steep-walled, mostly sandy ravines.

This association occupies about 43 percent of the county and is located in its northern half. Sassafras soils make up about 35 percent of the association; Marr soils, 20 percent; Westphalia soils, 15 percent; and minor soils, 30 percent.

The major soils of this association are deep and well drained. They formed chiefly in sands and fine sands. The Sassafras and the Marr soils have a thicker, more strongly expressed subsoil than the Westphalia soils. The sands in the Marr and Westphalia soils are of more uniform grain size and are much finer than the sands in the Sassafras soils.

Minor soils of this association are the well drained Howell soils, the excessively drained Evesboro soils, the somewhat excessively drained Rumford soils, the moderately well drained Woodstown soils, the poorly drained Fallsington soils, and Eroded land, steep.

Crops grown in the major soils respond well to good management, especially to large amounts of balanced fertilizer. These soils are all well suited to tobacco. The Howell soils may produce higher yields of tobacco than the major soils, but the quality may not be so good. Intensive cultivation has led to severe damage of the association by erosion. Erosion imposes rather severe limitations on farming, particularly the growing of clean-tilled crops.

The major soils of this association are suitable for residential development but are limited by slope and erosion.

2. *Sassafras-Matapeake association*

Gently sloping to steep, well-drained, moderately and severely eroded soils that have a dominantly sandy clay loam to silt loam subsoil

This association is characterized by an irregular landscape similar to that of the Sassafras-Marr-Westphalia association but generally has broader and more gently sloping ridgetops. The upper side slopes are steeper, and the entire area is strongly dissected by steep-walled ravines.

This association occupies about 48 percent of the county and is located in its southern half. Sassafras soils make up about 35 percent of the association; Matapeake soils, 25 percent; and minor soils, 40 percent.

The major soils of this association are deep and well drained. They formed chiefly in sandy materials containing moderate amounts of clay and silt, large areas of which were mantled with a layer of silt a few inches to a few feet thick. The Matapeake soils contain considerably more silt in the surface layer, and particularly in the subsoil, than the Sassafras soils.

The minor soils of this association are the moderately well drained Beltsville, Butlertown, Mattapex, and Woodstown soils, the well drained Westphalia soils, and Eroded land, steep.

Crops grown in the major soils respond well to good management. Tobacco yields are generally higher but quality is ordinarily lower than in the sandier soils in the northern part of the county. Intensive cultivation has led to severe damage of the association by erosion. This imposes severe limitations on farming, particularly the growing of clean-tilled crops.

The major soils of this association are suitable for residential development but are limited by slope and erosion. The minor soils, except for the Westphalia, are seasonally wet and therefore severely limited for septic tanks.

3. *Mattapex-Othello-Sassafras association*

Level to sloping, well-drained to poorly drained soils that have a dominantly silty clay loam to sandy clay loam subsoil

This association is the most nearly level in the county. Since few of the slopes are greater than about 5 percent, erosion is severe only in spots.

This association occupies about 7 percent of the county and consists of a narrow plain bordering the Patuxent River. Mattapex soils make up about 50 percent of the association; Othello soils, 25 percent; Sassafras soils, 15 percent; and minor soils, 10 percent.

The major soils of this association are all deep, but they differ in natural drainage. The Sassafras soils are well drained, the Mattapex soils are moderately well drained, and the Othello soils are poorly drained. These soils formed chiefly in sandy materials containing moderate amounts of clay and silt, most areas of which were mantled with a layer of silt a few feet thick.

Minor soils of this association are the well drained Matapeake soils, the moderately well drained Woodstown soils, and the poorly drained Fallsington soils.

Most of this association is intensively used for growing corn and forage, and it produces some excellent pasture. Some soybeans are grown, as well as a considerable amount of tobacco in places. The Mattapex soils are well suited to tobacco where artificial drainage is adequate, but quality is generally higher on sandier, better drained soils. The Sassafras soils may not produce so much tobacco as the Mattapex soils, but quality is usually higher. Little or no tobacco is grown on the poorly drained Othello soils.

Of the major soils of this association, only the Sassafras soils have little limitation for residential development. The Mattapex soils are limited by being seasonally wet, and the Othello soils are wet for much longer periods.

4. *Othello-Keyport-Elkton association*

Level to sloping, poorly drained and moderately well drained soils that have a dominantly silty clay loam to clay subsoil

This association is dominantly nearly level, but a few slopes range up to about 5 percent.

This association occupies about 2 percent of the county and is in one relatively small area in the southern part. Othello soils make up about 50 percent of the association; Keyport soils, 20 percent; Elkton soils, 15 percent; and minor soils, 15 percent.

Of the major soils of this association, the Keyport soils are moderately well drained and the Othello and Elkton soils are poorly drained. These major soils formed in silty to highly clayey sediments underlain in places by sandier materials. The Othello soils have a subsoil dominated by silt. The Keyport and the Elkton soils have a subsoil of clay or silty clay that is very slowly permeable by water and air.

Minor soils of this association are the moderately well drained Mattapex soils and the well drained Matapeake soils. There are also areas of the well drained Sassafras soils.

The soils of this association are little used for farming. The major soils are used to some degree for residential development and recreation but are limited by seasonal to prolonged wetness. The minor soils have no significant limitation other than stronger slopes, except that the Mattapex soils are limited by a seasonal high water table.

Descriptions of the Soils

In this section each of the soil series represented in Calvert County is discussed, a profile of a typical soil of each series is described in detail, and each mapping unit is briefly described. For full information on a particular mapping unit, it is necessary to read the description of the soil series as well as the description of the mapping unit. In alphabetic order with the series, the miscellaneous land types, which are not true soils, are also described. The approximate acreage and proportionate extent of each mapping unit are given in table 1.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres	Percent
Beltsville silt loam, 2 to 5 percent slopes, moderately eroded	454	0. 3
Beltsville silt loam, 5 to 10 percent slopes, severely eroded	156	. 1
Butlertown silt loam, 0 to 2 percent slopes	137	. 1
Butlertown silt loam, 2 to 5 percent slopes, moderately eroded	701	. 5
Butlertown silt loam, 5 to 10 percent slopes, severely eroded	168	. 1
Coastal beaches	288	. 2
Elkton silt loam	537	. 4
Eroded land, steep	27, 760	19. 9
Escarpments	60	(1)
Evesboro loamy sand, 0 to 6 percent slopes	1, 153	. 8
Evesboro loamy sand, 6 to 12 percent slopes	667	. 5
Evesboro loamy sand, 12 to 35 percent slopes	913	. 7
Fallsington sandy loam, 0 to 2 percent slopes	200	. 1
Fallsington sandy loam, 2 to 5 percent slopes	186	. 1
Gravel and borrow pits	138	. 1
Howell clay loam, 6 to 12 percent slopes, severely eroded	1, 200	. 9
Howell clay loam, 12 to 20 percent slopes, severely eroded	730	. 5
Howell fine sandy loam, 2 to 6 percent slopes, moderately eroded	1, 149	. 8
Howell fine sandy loam, 6 to 12 percent slopes, moderately eroded	315	. 2
Howell fine sandy loam, 12 to 20 percent slopes, moderately eroded	180	. 1
Howell silt loam, 2 to 6 percent slopes, moderately eroded	236	. 2
Iuka fine sandy loam, local alluvium, 2 to 5 percent slopes	193	. 1
Keyport silt loam, 0 to 2 percent slopes	334	. 2
Keyport silt loam, 2 to 5 percent slopes, moderately eroded	488	. 3
Made land	111	. 1
Marr fine sandy loam, 0 to 2 percent slopes	270	. 2
Marr fine sandy loam, 2 to 6 percent slopes, moderately eroded	2, 533	1. 8
Marr fine sandy loam, 6 to 12 percent slopes, moderately eroded	321	. 2
Marr fine sandy loam, 6 to 12 percent slopes, severely eroded	2, 951	2. 1
Marr fine sandy loam, 12 to 20 percent slopes, severely eroded	1, 895	1. 4
Matapeake fine sandy loam, 0 to 2 percent slopes	125	. 1
Matapeake fine sandy loam, 2 to 5 percent slopes, moderately eroded	172	. 1
Matapeake silt loam, 0 to 2 percent slopes	989	. 7
Matapeake silt loam, 2 to 5 percent slopes, moderately eroded	3, 762	2. 7
Matapeake silt loam, 5 to 10 percent slopes, moderately eroded	277	. 2
Matapeake silt loam, 5 to 10 percent slopes, severely eroded	1, 051	. 7
Matapeake silt loam, 10 to 15 percent slopes, severely eroded	462	. 3
Mattapex fine sandy loam, 0 to 2 percent slopes	616	. 4
Mattapex fine sandy loam, 2 to 5 percent slopes, moderately eroded	499	. 4
Mattapex silt loam, 0 to 2 percent slopes	2, 317	1. 7
Mattapex silt loam, 2 to 5 percent slopes, moderately eroded	1, 106	0. 8
Mattapex silt loam, 5 to 15 percent slopes, severely eroded	533	. 4
Mixed alluvial land	8, 152	5. 8
Ochlockonee fine sandy loam, local alluvium, 2 to 5 percent slopes	387	. 3
Othello silt loam, 0 to 2 percent slopes	1, 551	1. 1
Othello silt loam, 2 to 5 percent slopes	336	. 2
Rumford loamy sand, 2 to 5 percent slopes	274	. 2
Rumford loamy sand, 5 to 10 percent slopes, moderately eroded	241	. 2
Rumford loamy sand, 10 to 15 percent slopes, moderately eroded	154	. 1
Rumford-Evesboro gravelly loamy sands, 2 to 6 percent slopes	1, 295	. 9
Rumford-Evesboro gravelly loamy sands, 6 to 12 percent slopes	3, 547	2. 5
Rumford-Evesboro gravelly loamy sands, 12 to 20 percent slopes	4, 022	2. 9
Sassafras fine sandy loam, 0 to 2 percent slopes	949	. 7
Sassafras fine sandy loam, 2 to 5 percent slopes, moderately eroded	4, 428	3. 1
Sassafras fine sandy loam, 5 to 10 percent slopes, moderately eroded	1, 421	1. 1
Sassafras fine sandy loam, 5 to 10 percent slopes, severely eroded	6, 678	4. 8
Sassafras fine sandy loam, 10 to 15 percent slopes, moderately eroded	660	. 5
Sassafras fine sandy loam, 10 to 15 percent slopes, severely eroded	3, 873	2. 8
Sassafras loam, 0 to 2 percent slopes	281	. 2
Sassafras loam, 2 to 5 percent slopes, moderately eroded	489	. 3
Sassafras loam, 5 to 10 percent slopes, severely eroded	304	. 2
Sassafras loamy fine sand, 0 to 2 percent slopes	249	. 2
Sassafras loamy fine sand, 2 to 5 percent slopes, moderately eroded	2, 355	1. 7
Sassafras loamy fine sand, 5 to 10 percent slopes, moderately eroded	746	. 5
Sassafras-Westphalia gravelly fine sandy loams, 2 to 6 percent slopes, moderately eroded	272	. 2
Sassafras-Westphalia gravelly fine sandy loams, 6 to 12 percent slopes, severely eroded	857	. 6
Sassafras and Westphalia soils, steep	25, 965	18. 6
Swamp	130	. 1
Tidal marsh	2, 894	2. 1
Westphalia fine sandy loam, 2 to 6 percent slopes, moderately eroded	1, 006	. 7
Westphalia fine sandy loam, 6 to 12 percent slopes, moderately eroded	323	. 2
Westphalia fine sandy loam, 6 to 12 percent slopes, severely eroded	2, 225	1. 6
Westphalia fine sandy loam, 12 to 20 percent slopes, moderately eroded	258	. 2
Westphalia fine sandy loam, 12 to 20 percent slopes, severely eroded	3, 843	2. 7
Woodstown fine sandy loam, 0 to 2 percent slopes	578	. 4
Woodstown fine sandy loam, 2 to 5 percent slopes	1, 084	. 8
Total	140, 160	100. 0

[1] Less than 0.01 percent.

on the detailed soil map. At the end of the description of each mapping unit are listed the capability unit and the woodland suitability group in which the mapping unit has been placed. The page on which each capability unit and woodland suitability group is described can be found in the "Guide to Mapping Units."

It should be noted that depth to bedrock is not given for any of the soils in Calvert County. This is because all of these soils are underlain by geologic materials that are unconsolidated sediments of very great but undetermined thickness.

Many terms used in this section and other sections of the survey are defined in the Glossary and in the "Soil Survey Manual" (*6*).[1]

Beltsville Series

The Beltsville series consists of moderately well drained, gently to moderately sloping soils that have a fragipan in the subsoil. These soils occur mainly on the summits of low hills in the uplands. They formed in very old silty sediments. The vegetation is chiefly scrub hardwoods and Virginia pine, and there is some loblolly pine.

In a representative profile, these soils have a surface layer of yellowish-brown silt loam about 7 inches thick. The upper subsoil is yellowish-brown light silty clay loam about 16 inches thick. The lower subsoil is a light yellowish-brown silt loam fragipan about 15 inches thick. It is extremely firm, dense, brittle, and platy, and water moves through it very slowly. The underlying material, a continuation of the fragipan, is paler in color and contains no roots.

The Beltsville soils are limited by impeded drainage, a seasonal perched water table, slow movement of moisture in the subsoil, slope, and erosion. They are strongly acid to extremely acid where unlimed. They have moderate available moisture capacity. Since water and roots do not readily penetrate the fragipan, these soils tend to dry out more quickly than more permeable and porous soils. The Beltsville soils are fairly easy to work at the right moisture content, but they are wet and late to warm in spring. This may delay planting dates slightly, at least for early crops. Some artificial drainage may be needed, especially in the more nearly level areas. Ditches or tile lines are used for drainage, but tile lines are not too effective when placed below the fragipan.

Profile of Beltsville silt loam in a gently sloping area of Virginia pine about 3 miles south-southwest of Huntingtown.

Ap—0 to 7 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, granular structure; slightly hard, friable, slightly sticky and slightly plastic; roots plentiful; very strongly acid; abrupt, smooth boundary. 6 to 10 inches thick.

B1—7 to 13 inches, yellowish-brown (10YR 5/6) light silty clay loam; moderate, medium, subangular blocky structure; hard, friable to firm, sticky and slightly plastic; roots common; very strongly acid; clear, wavy boundary. 6 to 10 inches thick.

B2t—13 to 23 inches, yellowish-brown (10YR 5/6) light silty clay loam with a few faint variegations of strong brown (7.5YR 5/8); weak, thick, platy structure; hard, firm, sticky and plastic; roots common; distinct clay coatings; very strongly acid; clear, wavy boundary. 10 to 12 inches thick.

Bx—23 to 38 inches, light yellowish-brown (10YR 6/4) heavy silt loam with common, fine, distinct mottles of reddish yellow (7.5YR 6/8); moderate, medium, platy structure; extremely hard, extremely firm, slightly sticky and slightly plastic; a few roots in upper part, none below; thick, widely spaced, continuous clay coatings; very strongly acid; clear, smooth boundary. 12 to 20 inches thick.

Cx—38 to 50 inches +, very pale brown (10YR 7/4) silt loam; very weak, thick, platy structure; extremely hard, extremely firm, slightly sticky but nonplastic; no roots; some very thin, discontinuous clay coatings; very strongly acid to extremely acid.

The thickness of the solum ranges from about 36 inches to 60 inches or more. In undisturbed areas there is a thin A1 and a somewhat thicker A2 horizon. The A horizons commonly have values and chromas of 3 to 6. The lower values and chromas are ordinarily confined to the A1 horizon. The hue is generally 10YR but ranges to 2.5Y in the lower horizons.

The B horizons range in texture from heavy silt loam to light silty clay loam, the B2t horizon having between 18 and 35 percent clay. In the B1 and B2t horizons, the color ranges from 4 to 6 in value and from 3 to 8 in chroma, and there are no gray colors resulting from wetness. The Bx horizon has matrix values and chromas in the same range as those in the B2t horizon. The mottles may be yellower than in the B2 horizon, or redder, or both, and value and chroma may be either lower or higher. If chroma is 2 or less in the Bx horizon, mottling may or may not occur.

The C horizon is ordinarily silt loam, but grades toward loam and in some places is somewhat gritty. The few, fine, smooth pebbles that may be in the profile are usually confined to this horizon. Generally the C horizon is without low-chroma mottling, has a higher matrix value than that in the solum, and has about the same range in chroma as the solum.

Beltsville soils have a denser, harder, more slowly permeable fragipan than the Butlertown soils, are generally a lighter brown that has a higher color value, and are lower in silt and higher in sand content in the B2t and Bx horizons.

Beltsville silt loam, 2 to 5 percent slopes, moderately eroded (BlB2).—This soil has the profile described as representative for the series. Practically all areas have had some loss of surface soil, and in many spots the loss has been severe. Included in mapping were a few relatively level areas and some spots where the surface layer is sandier than normal. (Capability unit IIe–13; woodland suitability group 3w2)

Beltsville silt loam, 5 to 10 percent slopes, severely eroded (BlC3).—All or nearly all of the original surface layer of this soil has been lost through erosion, and there are some shallow and deep gullies. The present plow layer is brighter in color and higher in clay content than the original, and tilth and structure are poorer. Included in mapping where a few areas not severely eroded and some spots with slopes a little greater than 10 percent.

This soil should be kept in sod most of the time, but if it is properly managed it is suitable for limited row cropping. (Capability unit IVe–9; woodland suitability group 3w2)

Butlertown Series

The Butlertown series consists of soils that occur in level to moderately sloping uplands. They are moderately well drained and are poorly aerated for a part of the year. The soils formed in old silty to very fine sandy sediments. The native vegetation is chiefly mixed upland hardwoods, but loblolly pine and Virginia pine grow in some cutover areas.

[1] Italic numbers in parentheses refer to Literature Cited, page 74.

In a representative profile, the surface layer of silt loam is about 13 inches thick. This layer is brown in the thicker upper part and yellowish brown in the lower part. The upper subsoil is rather sticky yellowish-brown silt loam about 18 inches thick. The lower subsoil is a yellowish-brown silt loam fragipan about 9 inches thick. The underlying material is light yellowish-brown loam that is firm, stratified, and mottled with various colors.

The Butlertown soils are limited by seasonal wetness, impeded drainage, slope, and erosion. They are medium acid to very strongly acid where unlimed. These soils have high available moisture capacity. They have friable or crumbly plow layers that are easy to work at the right moisture content, but they are somewhat wet and a little late to warm in spring. This may delay planting dates slightly, at least for early crops. Some artificial drainage may be needed, especially in the more nearly level areas. Tile lines usually function well in these soils.

Profile of Butlertown silt loam in a nearly level idle area close to Little Cove Point.

Ap—0 to 8 inches, brown (10YR 4/3) silt loam; moderate, medium, granular structure; slightly hard, very friable, slightly sticky but nonplastic; roots abundant; very strongly acid; abrupt, smooth boundary. 8 to 9 inches thick.

A2—8 to 13 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; roots common; very strongly acid; clear, wavy boundary. 6 to 8 inches thick.

B1—13 to 20 inches, dark yellowish-brown (10YR 4/4) heavy silt loam; moderate, fine, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; roots common; very strongly acid; clear, wavy boundary. 6 to 8 inches thick.

B2t—20 to 31 inches, yellowish-brown (10YR 5/6) heavy silt loam; moderate, coarse, subangular blocky structure; hard, friable, sticky and slightly plastic; roots common; distinct strong-brown (7.5YR 5/6) clay coatings; very strongly acid; clear, wavy boundary. 10 to 15 inches thick.

Bx—31 to 40 inches, yellowish-brown (10YR 5/4) silt loam with common, fine, faint mottles of light brownish gray (10YR 6/2); moderate, thin, platy structure; hard, firm and brittle, slightly sticky but nonplastic; very few roots; some dark yellowish-brown (10YR 4/4) clay coatings; strongly acid to very strongly acid; abrupt, smooth boundary. 8 to 12 inches thick.

Cx—40 to 60 inches +, light yellowish-brown (10YR 6/4) loam with common, medium, distinct mottles of light brownish gray (10YR 6/2) and reddish yellow (7.5YR 6/8); stratified; hard, firm, slightly sticky; no roots; gritty with fine sand; very strongly acid.

The thickness of the solum ranges from about 40 inches to 50 inches. Although there are usually no fragments in the profile, there are a few, fine, smooth pebbles in the Cx horizon in places. Hue throughout the profile is generally 10YR but ranges to 7.5YR in the B horizons.

The A horizons are most commonly silt loam but in places range almost to silt. In undisturbed areas there is an A1 horizon 2 to 4 inches thick and an A2 horizon 4 to 8 inches thick. The hue of the A1 horizon is generally dark gray (10YR 4/1). The Ap and A2 horizons range from 4 to 6 in value and from 2 to 4 in chroma.

The B horizons range in texture from silt loam to light silty clay loam. In the B2t horizon, value is ordinarily 5, but chroma ranges from 6 to 8. The fragipan Bx horizon is about 30 to 40 inches from the surface and generally has a matrix value of 5 or 6 and a chroma of 3 to 6. Mottling in this horizon has a chroma of 1 or 2. The Bx horizon is weakly to moderately defined.

The C horizon ranges from silt loam to a very fine sand; there are some pockets of fine sand, and stratification is evident in most places. In some profiles the C horizon is variegated and has low-chroma mottling, high-chroma mottling, or both.

The Butlertown soils resemble the Beltsville soils, but the Beltsville soils have a fragipan that is harder, denser, and more slowly permeable. The Butlertown soils also contain a little more silt and less sand in their B2t and Bx horizons.

Butlertown silt loam, 0 to 2 percent slopes (BtA).—This soil has the profile described as representative for the series. There is little hazard of erosion, but internal drainage is slow because of the fragipan. The water table is near the surface in spring and delays planting. If drained, however, this soil has few limitations. (Capability unit IIw–1; woodland suitability group 2o1)

Butlertown silt loam, 2 to 5 percent slopes, moderately eroded (BtB2).—Most areas of this soil have lost large amounts of the silty surface layer. Included in mapping were a few areas where erosion has been more severe and some spots where the surface layer is gritty with sand.

This soil is limited by impeded internal drainage and erosion, which are probably the most important concerns in management. Erosion can be controlled by planting on the contour, installing diversion terraces where feasible, and using rotations that include a clean-tilled crop no more often than 1 year in 3. (Capability unit IIe–16; woodland suitability group 2o1)

Butlertown silt loam, 5 to 10 percent slopes, severely eroded (BtC3).—This soil has had severe loss of the surface layer. The subsoil is exposed in places, and deep plowing turns up a large amount of subsoil and mixes it with any remaining surface soil.

Hay crops and pasture are generally safer and more suitable for this soil than are clean-tilled crops, which should be grown only occasionally and in long rotations. Erosion can be controlled by planting in narrowly contoured strips, installing adequate diversion terraces, and carefully disposing of excess water. (Capability unit IVe–9; woodland suitability group 2o1)

Coastal Beaches

Coastal beaches (Co) occur along most of the Chesapeake Bay and in places on the Patuxent River. These beaches are either smooth or somewhat hummocky (fig. 2).

Coastal beaches support little vegetation. American beachgrass, beach goldenrod, and clumps of switchgrass grow in places, and some Virginia pines are found in older, partly stabilized areas. These beaches are of no value for farming, but most of them are important for recreation. (Capability unit VIIIs–2)

Elkton Series

The Elkton series consists of poorly drained soils on upland flats. These soils formed in old, fine, marine sediments. The native vegetation is mixed wetland hardwoods, including oaks, gums, swamp maple, and holly. In some areas that are cut over or no longer cultivated, there are scattered to almost pure stands of loblolly pine and some pond pine.

In a representative profile, these soils have a surface layer of somewhat sticky silt loam about 9 inches thick. It is dark gray in the upper 2 inches, and light gray

Figure 2.—**Accelerated erosion of beach on the Chesapeake Bay.**

mottled with reddish yellow in the rest. The subsoil is about 51 inches thick. It grades from light-gray heavy silt loam in the upper part to very sticky and plastic, dark-gray silty clay in the lower part. All parts of the subsoil are mottled with brighter colors. The underlying material is massive sandy clay loam containing gray mottles.

Elkton soils are limited by poor natural drainage, by a high water table, and by the difficulty of artificial drainage. They have high available moisture capacity. These soils are strongly acid to extremely acid where unlimed. In rare instances, usually near salt water, the C horizon is not so strongly acid as the solum.

Elkton soils are moderately productive when well managed. The most commonly planted crops are corn and soybeans. Artificial drainage is necessary for most uses and crops, particularly during especially wet periods, and to permit farming to begin in spring. Ditches are generally more effective than tile lines and should be more closely spaced than normally.

Profile of Elkton silt loam in a wooded area just west of Route 521, about 3½ miles southwest of Huntingtown.

A1—0 to 2 inches, dark-gray (10YR 4/1) silt loam; weak, medium, granular structure; slightly hard, friable, slightly sticky; roots abundant; very strongly acid; abrupt, smooth boundary. 1 to 2 inches thick.

A2g—2 to 9 inches, light-gray (N 7/0) silt loam with a few, coarse, prominent mottles of reddish yellow (7.5YR 6/8); weak, fine, granular and subangular blocky structure; slightly hard, friable, sticky; roots abundant; very strongly acid; abrupt, smooth boundary. 4 to 9 inches thick.

B1g—9 to 17 inches, light-gray (N 7/0) heavy silt loam with common, medium, prominent mottles of reddish yellow (7.5YR 6/8); moderate, medium, subangular blocky structure; hard, friable, sticky and slightly plastic; roots plentiful; very strongly acid to extremely acid; gradual, smooth boundary. 3 to 10 inches thick.

B21tg—17 to 34 inches, gray (N 5/0) heavy silty clay loam with a few, fine, prominent mottles of yellowish brown (10YR 5/8); moderate to strong, coarse, blocky structure; very hard, very firm, sticky and plastic; few roots; thin, dark-gray (N 4/0) clay coatings; very strongly acid to extremely acid; gradual, smooth boundary. 10 to 20 inches thick.

B22tg—34 to 60 inches, dark-gray (N 4/0) silty clay with a few, fine, prominent mottles of dark brown (7.5YR 4/4); moderate, medium, blocky structure; extremely hard, very firm, very sticky and very plastic; no roots; thin, very dark gray (N 3/0) clay coatings; very strongly acid to extremely acid; abrupt, smooth boundary. 20 to 30 inches thick.

IICg—60 to 72 inches +, gray (N 5/0) sandy clay loam with a few, fine, prominent mottles of dark brown (7.5YR 4/4); structureless, massive; hard, firm, sticky and plastic; no roots; strongly acid to very strongly acid.

The Elkton soils generally contain no pebbles or other loose fragments. The solum is 10YR or yellower, and in places it is neutral. All horizons except the A1 have a matrix value of 4 to 7 and a chroma of 0 to 2, or rarely 3.

The thickness of the solum is ordinarily about 40 inches, but it is much thicker in places. Mottles in the solum range from faint to prominent in hues of 7.5YR or yellower, and they generally have a chroma of 4 to 8.

The A horizons are silt loam. The A1 horizon is ordinarily 3 or 4 in value, but chroma ranges from 0 to 2, or rarely 3.

The B2t horizon is ordinarily silty clay but ranges from heavy silty clay loam to clay. It has an average clay content well above 35 percent.

378-191—71——2

The C horizon is unconforming sandy material, as given for the profile just described, or conforming silty material.

The Elkton soils have finer textured and more slowly permeable B horizons than the poorly drained Fallsington and Othello soils. They formed in the same highly clayey materials as the moderately well drained Keyport soils.

Elkton silt loam (Ek).—This soil has the profile described as representative for the series. Most of the soil is nearly level, but a few small areas have slopes of 2 to 3 percent. There is practically no hazard of erosion.

Undrained areas are suited to water-tolerant trees, but artificial drainage is required for intensive use of this soil. Ditches are generally more effective than tile lines. After drainage, a large amount of lime and fertilizer is generally needed for crops and improved pasture. (Capability unit IIIw–9; woodland suitability group 3w3)

Eroded Land, Steep

Eroded land, steep (ErE) consists of steep areas that are merely remnants of soils. Most of the land has lost the surface soil and all or most of the subsoil, is severely gullied, or is both. Slopes range from about 12 percent to 40 percent or more. The adjacent soils are generally of the Sassafras and the Westphalia series, but areas of soils belonging to the Marr, Mattapex, Matapeake, Howell, and Rumford series also are present.

Eroded land, steep, is not suited to crops and generally is not suited even to grazing. It is a hazard to soils nearby because soil material washed from it can clog ditches and drainageways and silt up ponds or other bodies of water. Some areas have a cover of woodland that has grown up on what was once open cropland or pasture. Vegetation can be established in other areas through care and effort. If eroded areas are revegetated, they are less of a threat to farmland and residential land, and they can be of some value as wildlife shelter, woodlots, and protection for watersheds. (Capability unit VIIe–2; woodland suitability group 4r1)

Escarpments

Escarpments (Es) are raw, eroding cliffs separated from the Chesapeake Bay only by narrow strips of beach during normal tides. Most slopes are greater than 100 percent, and some of them are nearly vertical. The faces range from a few feet to more than 100 feet in height above the level of the Bay.

Escarpments consist of geologic materials, chiefly sands and clays of the Calvert Formation of the Miocene Series (*3*). The Calvert Cliffs are well known as generous sources of marine fossils, which are exposed on the faces of the cliffs in many places by more or less constant geologic erosion.

Escarpments are minor in area but great in extent. With some interruptions, they extend from just south of Plum Point almost to Drum Point along the Chesapeake Bay. Included also is a small area on Broomes Island, bordering the Patuxent River.

Escarpments have no agricultural importance but in many places afford recreation, particularly in conjunction with adjacent beach areas. (Capability unit VIIIs–1)

Evesboro Series

The Evesboro series consists of very deep, excessively drained soils that occur in the uplands. These are the sandiest upland soils in Calvert County. They formed primarily in old dunelike deposits of sand and loamy sand. The native vegetation is chiefly scrub hardwoods, but there has been a considerable local invasion by Virginia pine.

In a representative profile, the surface layer is loose, dark grayish-brown loamy sand about 6 inches thick. The underlying material grades from loamy sand to sand with increase in depth. This material ranges from yellowish brown to very pale brown.

The Evesboro soils are limited by erosion and excessive drainage. They have very low available moisture capacity, are low in natural plant nutrients, and are strongly acid to extremely acid where unlimed. These soils are easily worked over a wide range of conditions and are fairly productive if properly managed. Irrigation may be required in dry seasons. Although these soils are well suited to many crops, including tobacco, they are generally used for early vegetable crops and such summer crops as melons and cucumbers. A large amount of fertilizer is required for most crops. The Evesboro soils blow readily when they are not covered by protective vegetation, so hedges and windbreaks are useful; however, soil losses may be more damaging to areas where these soils are deposited than to the Evesboro soils themselves.

Profile of Evesboro loamy sand in a gently sloping idle area at the intersection of Route 260 and Brick House Road.

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) loamy sand; structureless, single grain; loose; roots common; very strongly acid; clear, smooth boundary. 6 to 10 inches thick.

C1—6 to 16 inches, yellowish-brown (10YR 5/6) loamy sand; structureless, single grain; loose; roots common; very strongly acid; gradual, wavy boundary. 9 to 32 inches thick.

C2—16 to 36 inches, very pale brown (10YR 8/4) sand or fine sand; loose and structureless; few roots; very strongly acid to extremely acid; clear, wavy boundary. 8 to 20 inches thick.

C3—36 to 60 inches +, yellowish-brown (10YR 5/4) sand; loose and structureless; no roots; very strongly acid to extremely acid.

Hue throughout the profile is generally 10YR but ranges to 2.5Y in some profiles.

The combined thickness of the A and C1 horizons ranges from about 15 inches to 42 inches. In undisturbed areas there is a very thin A11 horizon and a somewhat thicker A12 horizon. The A horizons range from 3 to 6 in value and from 2 to 4 in chroma. The lowest values are usually confined to the A11 horizon.

The C2 and C3 horizons commonly are sand or fine sand, but in places they are gravelly sand. The C1 horizon generally has a value of 5 or 6, and a chroma of 6 to 8. The C2 and C3 horizons are similar to the C1 in color but ordinarily have lower chroma, and in places, higher value.

Evesboro loamy sand, 0 to 6 percent slopes (EvB).—This soil has the profile described as representative for the series. Erosion is not serious, since a thick, deep deposit of essentially the same material still remains. Included in mapping were some areas containing fine, smooth gravel and some spots where the subsoil is brighter or slightly redder in color than normal.

The soil is low in fertility and seasonally droughty, which limits the choice of plants or crops. A large amount of fertilizer and perhaps a little lime are needed. Manure and crop residue are helpful if available. The most valuable treatment would be irrigation, but this would be economically feasible only for high-value crops. (Capability unit IVs–1; woodland suitability group 3s1)

Evesboro loamy sand, 6 to 12 percent slopes (EvC).—The profile of this soil resembles that described as representative for the series. Included with this soil in mapping were some areas containing fine, smooth gravel and some spots where the subsoil is brighter or slightly redder in color than normal.

This soil is not well suited to crops and is commonly too droughty for good grazing. It is better suited to woodland, wildlife shelter, parks, and other recreational uses. (Capability unit VIIs–1; woodland suitability group 3s1)

Evesboro loamy sand, 12 to 35 percent slopes (EvE).—The profile of this soil resembles the one described as representative for the series. Included with this soil in mapping were some areas containing fine, smooth gravel and some spots where the subsoil is brighter or slightly redder in color than normal.

This soil is suitable for pulpwood and Christmas tree production if properly managed. It is too steep and loose to be feasibly used for farming and is also severely limited for most nonfarm uses. The surface should be kept under vegetation or otherwise protected against erosion. (Capability unit VIIs–1; woodland suitability group 3s2)

Fallsington Series

The Fallsington series consists of level or nearly level, poorly drained soils that occur chiefly in the western part of the county. These soils formed in old sandy sediments containing a considerable amount of silt and clay. The native vegetation is mostly wetland hardwoods, including swamp maple, oaks, and holly, but a large amount of loblolly pine grows in some areas that are cut over or no longer cultivated.

In a representative profile, these soils have a surface layer of very friable sandy loam about 9 inches thick. It is dark grayish brown in the upper part and grayish brown in the lower part. The subsoil, about 21 inches thick, is light brownish-gray sandy clay loam that is mottled with strong brown and other colors. The underlying material is mottled, loose, light brownish-gray loamy sand that extends to a depth of 4 feet or more.

The Fallsington soils are limited by seasonal wetness, poor drainage, fluctuations in the water table, and erosion in gently sloping areas. They have moderate to high available moisture capacity. They are strongly acid to extremely acid where unlimed.

These soils are suited to many crops if they are properly managed. They are easy to work, but farming should be delayed in spring until the water table has been sufficiently lowered. These soils are not difficult to drain where there are adequate drainage outlets. Tile lines are usually more satisfactory than ditches. Ditches tend to cave in, especially if they penetrate into the looser sandy materials beneath the subsoil.

Profile of Fallsington sandy loam in a level pastured area near the Patuxent River, about 1 mile southwest of Wallville.

Ap—0 to 5 inches, dark grayish-brown (2.5Y 4/2) sandy loam; weak, fine, granular structure; slightly hard, very friable; roots abundant; medium acid (limed); abrupt, smooth boundary. 5 to 6 inches thick.

A2—5 to 9 inches, grayish-brown (2.5Y 5/2) sandy loam; weak, fine, granular structure; slightly hard, very friable; roots common; strongly acid to very strongly acid; abrupt, wavy boundary. 3 to 8 inches thick.

B21tg—9 to 18 inches, light brownish-gray (2.5Y 6/2) light sandy clay loam with a few, medium, distinct mottles of strong brown (7.5YR 5/8); weak, fine, subangular blocky structure; slightly hard, friable, slightly sticky; roots common; some faint, gray (N 5/0) clay coatings; extremely acid; clear, wavy boundary. 6 to 9 inches thick.

B22tg—18 to 23 inches, light brownish-gray (2.5Y 6/2) sandy clay loam with common, medium, prominent mottles of strong brown (7.5YR 5/8) and yellowish red (5YR 5/8); weak, medium, subangular blocky structure; hard, firm, sticky and plastic; few roots; thin clay coatings, most prominent in pores; extremely acid; clear, wavy boundary. 4 to 10 inches thick.

B3g—23 to 30 inches, light brownish-gray (2.5Y 6/2) light sandy clay loam with common, medium, prominent mottles of strong brown (7.5YR 5/8) and faint mottles of light yellowish brown (2.5Y 6/4); slightly hard, friable, slightly sticky; no roots; extremely acid; abrupt, smooth boundary. 5 to 12 inches thick.

Cg—30 to 48 inches +, light brownish-gray (2.5Y 6/2) loamy sand with common, medium, distinct mottles of strong brown (7.5YR 5/8); structureless; single grain; loose; no roots; extremely acid.

The thickness of the solum ranges from about 24 inches to 38 inches. A few, fine, smooth pebbles may occur anywhere in the profile. Matrix colors throughout the profile range in hue from 10YR to 2.5Y and in some places are neutral.

The A horizons are sandy loam. In undisturbed areas there is a thin, dark A1 horizon. The A horizons range from 3 to 5 in value and from 1 to 3 in chroma. The A1 horizon is lowest in value and chroma.

The B2t horizons range from loam or heavy sandy loam to sandy clay loam and have an average clay content between 18 and 35 percent. The C horizon is coarser in texture than the B horizons and ranges from light loamy sand to sandy loam. The B and C horizons range from 4 to 6 in value and are 0, 1, or 2 in chroma. Mottles, where present in these horizons, are generally olive brown to strong brown and yellowish red.

The Fallsington soils resemble the poorly drained Elkton and Othello soils except for their B horizons. Those horizons are highly clayey and very slowly permeable in the Elkton series, and highly silty and moderately slowly permeable in the Othello series. The Fallsington soils formed in the same kind of materials as the well drained Sassafras soils and the moderately well drained Woodstown soils.

Fallsington sandy loam, 0 to 2 percent slopes (FsA).—This soil has the profile described as representative for the series. Most undrained areas are still wooded and frequently contain stands of loblolly pine suitable for production of timber and pulpwood. Drained areas are suited to corn, soybeans, hay, or pasture. Since this soil is sandy, especially in the surface layers, it is easy to work and not difficult to drain. Tile lines are usually effective for drainage where adequate outlets can be provided. (Capability unit IIIw–6; woodland suitability group 2w1)

Fallsington sandy loam, 2 to 5 percent slopes (FsB).—This soil has fairly rapid runoff. Poor internal drainage, however, necessitates draining it for nearly all crops. Fairly simple erosion control practices, including crop rota-

tion and the careful disposal of runoff waters, should preserve this soil for continued cultivation. Included with this soil in mapping were some areas that have lost part of the plow layer and a few scattered areas having slopes slightly greater than 5 percent. (Capability unit IIIw–6; woodland suitability group 2w1)

Gravel and Borrow Pits

Gravel and borrow pits (Gp) include areas from which gravel, sand, or soil materials have been removed for use in highway construction and for other purposes. These areas are no longer of any use for farming. Some could be revegetated if filled and graded and, in some cases, provided with drainage outlets. Even then, they would be suitable only for wildlife or for recreational uses. Some ponds could be created. (Capability unit VIIIs–4)

Howell Series

The Howell series consists of deep, well-drained soils that occur in the uplands. These soils formed in old, fine-textured sediments that commonly contain small amounts of glauconite (greensand), diatomaceous earth, or both. Deposits of these materials are at moderate depths in most areas. The native vegetation was mixed upland hardwoods, but practically all areas have been cleared. Virginia pine grows in some areas no longer cultivated.

In a representative profile, these soils have a surface layer of dark yellowish-brown fine sandy loam about 8 inches thick. The upper 6 inches of the subsoil is strong-brown sandy clay loam. The next 11 inches is strong-brown clay loam, and below this is 14 inches of silty clay. The lower subsoil, extending to a depth of 60 inches or more, is pale-olive clay that is mottled with brighter colors and that shows evidence of stratification. All of the subsoil is sticky and plastic.

The Howell soils are limited by slope, erosion, and moderately slow movement of moisture in the subsoil. They are very strongly acid to extremely acid where unlimed. They have high available moisture capacity. The Howell soils are easy to work at the right moisture content, except in severely eroded areas where the plow layer is sticky when wet and hard and cloddy when dry.

Profile of Howell fine sandy loam in a gently sloping cultivated area on Route 4, just south of its intersection with Route 260.

Ap—0 to 8 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; weak, medium, granular structure; soft, very friable; roots abundant; slightly acid (limed); abrupt, smooth boundary. 8 to 10 inches thick.

B1—8 to 14 inches, strong-brown (7.5YR 5/6) fine sandy clay loam; weak, medium, subangular blocky structure; hard, firm, sticky and plastic; roots plentiful; very strongly acid; clear, wavy boundary. 0 to 10 inches thick.

B21t—14 to 25 inches, strong-brown (7.5YR 5/6) clay loam; moderate, medium, subangular blocky structure; hard, firm, sticky and plastic; roots common; thin clay coatings, mostly in pores; very strongly acid; clear, wavy boundary. 10 to 16 inches thick.

B22t—25 to 39 inches, strong-brown (7.5YR 5/8) silty clay, with a few medium, distinct variegations of pale olive (5Y 6/3) below a depth of 31 inches; moderate, medium, subangular blocky structure; hard, firm, sticky and plastic; few roots; thin, distinct clay coatings; very strongly acid to extremely acid; clear, wavy boundary. 10 to 20 inches thick.

B3—39 to 60 inches +, pale-olive (5Y 6/3) clay, with common, medium, distinct variegations of strong brown (7.5YR 5/6); moderate, thick, platy structure reflecting stratification; hard, firm, sticky and plastic; very few roots; extremely acid.

The combined thickness of the A and B horizons ranges from about 40 inches to 60 inches or more. The A horizon normally is fine sandy loam or silt loam. In severely eroded areas, however, the Ap horizon includes enough of the B horizon to have a clay loam texture. In undisturbed areas there is an A1 horizon up to 2 inches thick and an A2 horizon 5 to 8 inches thick. Hue of the A horizon in these areas grades from 10YR toward 7.5YR. Value ranges from 3 to 5, and chroma from 2 to 4. The A1 horizon has lower value and chroma than the A2.

The B1 horizon, not present in all places, is fine sandy clay loam, clay loam, or silty clay loam. The B2t horizons ordinarily are silty clay but range to clay loam and heavy silty clay loam. The upper 20 inches of the B2t horizons contains, on the average, at least 35 percent clay. Hue in the B2 horizons, and the B1 where present, ranges from 10YR through 7.5YR, toward 5YR; value is 5, or rarely 6, and chroma is 6 to 8. The B3 horizon ranges from silt to clay and includes clay loam and, locally, sandy clay loam. Traces of glauconite or diatomaceous earth are usually more apparent in the B3 horizon than in the upper part of the solum. Colors in the B3 horizon range from gray or dark gray through olive to brown or pale brown, and in places there is variegation of reticulated mottling caused by differential oxidation. The materials underlying the B3 horizon commonly are stratified, and fine, smooth gravel occurs in some of the strata.

Howell soils have a B horizon that is of finer texture and is less readily permeable than that of the Marr, Rumford, and Westphalia soils.

Howell fine sandy loam, 2 to 6 percent slopes, moderately eroded (HoB2).—This soil has the profile described as representative for the series. Included with this soil in mapping were small areas where loss of soil material has been severe and a few areas having slopes of less than 2 percent.

Erosion is a moderate hazard. Fairly simple conservation measures and an adequate crop rotation can control erosion and enable regular cultivation. (Capability unit IIe–28; woodland suitability group 2c1)

Howell fine sandy loam, 6 to 12 percent slopes, moderately eroded (HoC2).—This soil is suited to all general crops and to deep-rooted crops if control of erosion is adequate. Good practices for erosion control are use of a suitably long rotation and cropping in strips narrow enough to fit the slope of the soil. Waterways need to be well sodded. (Capability unit IIIe–28; woodland suitability group 2c1)

Howell fine sandy loam, 12 to 20 percent slopes, moderately eroded (HoD2).—This soil is subject to severe erosion, but most of it is still wooded and therefore has not been severely damaged.

This soil is marginal for most crops except hay and pasture. It can be cultivated when it is necessary to renew a stand of hay or pasture, but careful disposal of runoff is necessary. (Capability unit IVe–3; woodland suitability group 2c2)

Howell silt loam, 2 to 6 percent slopes, moderately eroded (HwB2).—This soil has a profile that resembles the one described as representative for the series, but the surface layer is floury silt loam instead of fine sandy loam. Included with this soil in mapping were some nearly

level spots and some areas that are severely eroded rather than moderately eroded.

This soil is suited to all general crops and to deep-rooted crops. Tobacco, however, is generally not of so good quality as on sandier soils. Runoff on this soil is accelerated because its subsoil does not absorb water rapidly. This runoff can be controlled by closely spaced diversion terraces and by protecting waterways with sod. Cropping can be on the contour between the diversion terraces. (Capability unit IIe–29; woodland suitability group 2c1)

Howell clay loam, 6 to 12 percent slopes, severely eroded (HyC3).—All or nearly all of the surface layer has been washed away, but the profile of this soil otherwise is like that described for the series. The new plow layer, consisting largely of what was once subsoil, is difficult to work because it is hard when dry and sticky and easily puddled when wet. Rapid runoff has produced gullies in this soil, some of them quite deep.

This soil might be suitable for a clean-tilled crop about 1 year in 5 if sod or other highly protective vegetation is kept on it the rest of the time. (Capability unit IVe–3; woodland suitability group 2c1)

Howell clay loam, 12 to 20 percent slopes, severely eroded (HyD3).—All or nearly all of the surface layer of this soil has been washed away, but the rest of its profile is like that described for the series. The new plow layer, consisting largely of what was once subsoil, is difficult to work. Some areas are gullied.

Some hay or pasture can be grown on this soil if special care is taken to prevent overgrazing. The hazard of continued erosion is too great to permit cultivation of this soil. (Capability unit VIe–2; woodland suitability group 2c2)

Iuka Series

The Iuka series consists of moderately well drained soils that occur in Calvert County only in local accumulations of alluvial materials deposited in depressions and at the bases of slopes. The native vegetation is mostly hardwoods, dominantly oaks, but in places there is a considerable amount of yellow-poplar. Some areas have been invaded by loblolly pine, by Virginia pine, or by both.

In a representative profile, the surface layer is light olive-brown fine sandy loam about 8 inches thick. The subsoil, about 19 inches thick, is yellowish-brown fine sandy loam mottled with grayish colors in the lower part. The underlying material is loose, brownish-yellow sand containing some faint mottles of other colors.

The Iuka soils are limited by seasonal wetness, impeded drainage, and some erosion in most areas. They have moderate to high available moisture capacity. They are strongly acid to extremely acid where unlimed.

These soils are suited to many crops when properly managed. They are rather easy to work but have a high water table during wet periods and are slow to warm in spring. These soils are not difficult to drain. Tile lines are usually more satisfactory than ditches, which cave in and clog readily.

Profile of Iuka fine sandy loam, local alluvium, in a gently sloping cultivated area near St. Edmonds Church, about 2 miles northwest of Willows.

Ap—0 to 8 inches, light olive-brown (2.5Y 5/4) fine sandy loam; weak, fine, granular structure; slightly hard, very friable; roots abundant; extremely acid; abrupt, smooth boundary. 8 to 10 inches thick.

B1—8 to 18 inches, yellowish-brown (10YR 5/6) fine sandy loam; very weak, fine, subangular blocky structure; hard. friable, slightly sticky; roots common; extremely acid; clear, wavy boundary. 10 to 16 inches thick.

B2—18 to 27 inches, yellowish-brown (10YR 5/6) fine sandy loam with common, medium, distinct mottles of light brownish gray (2.5Y 6/2); very weak, fine, subangular blocky structure; hard, friable, slightly sticky; few roots; very strongly acid to extremely acid; clear, wavy boundary. 6 to 14 inches thick.

C—27 to 48 inches +, brownish-yellow (10YR 6/6) sand with a few coarse, faint mottles of yellow (2.5Y 7/6) and brownish gray (2.5Y 6/2); structureless, single grain; loose; no roots; contains some pockets of light olive-brown (2.5Y 5/6) sandy gravel; strongly acid to very strongly acid.

The combined thickness of the A and B horizons generally ranges from 24 inches to 40 inches. In undisturbed areas there is an A1 horizon only 2 inches to 4 inches thick. These horizons are ordinarily fine sandy loam and have hues ranging from 10YR to 2.5Y. The A horizons range from 3 to 6 in value and from 1 to 4 in chroma. The lowest values and chromas are confined to the thin A1 horizon. The B horizon has a matrix value of 4 or 5 and a chroma of 3 to 6, or rarely 8. The upper 10 inches of the B horizon is free of low-chroma mottling. Below this depth it has some mottling with a chroma of 2 or less.

The C horizon is generally coarser in texture than the horizons above; however, it may be of almost any material and texture, either conforming or not conforming with the A and B horizons. Although in some places these soils have a few fine pebbles throughout, pebbles ordinarily occur only in the C horizon. The C horizons are variable in color and range from light gray to yellow or brown; in places they are mottled with various colors.

The Iuka soils resemble the Beltsville, Butlertown, Keyport, Mattapex, and Woodstown soils, but the Iuka soils do not have finer textured B horizons than A horizons. Iuka soils formed in the same kind of alluvial materials as the well-drained Ochlockonee soils, but those soils have no mottling in the subsoil.

Iuka fine sandy loam, local alluvium, 2 to 5 percent slopes (ImB).—Since this soil occupies depressions and the foot of slopes, there is hazard of erosion in places, particularly because of runoff from higher land. A more important factor in management, however, is drainage. Tile lines may be used where needed, and tile and ditches may be used to intercept runoff and seepage from other areas. Air drainage is not good in some areas, and there are frost pockets in places. Included with this soil in mapping were some very sandy spots and some small areas a little siltier than as described for the soil, particularly in the surface layers. (Capability unit IIw–7; woodland suitability group 1o1)

Keyport Series

The Keyport series consists of deep, moderately well drained soils that occur in the uplands. These soils formed in old deposits of clays and silty clays. The native vegetation is mostly mixed hardwoods, but some areas have been invaded by Virginia pine, by loblolly pine, or by both.

In a representative profile, these soils have a surface layer of silt loam about 14 inches thick. It is grayish brown in the upper part and light yellowish brown in the lower part. The upper subsoil, about 14 inches thick, is brownish-yellow silty clay that is firm and sticky. The

lower subsoil, about 15 inches thick, is pale-yellow clay that is mottled with gray and other colors and that is very firm, very sticky, and very plastic. The underlying material is massive, mottled, pale-yellow light sandy clay loam.

The Keyport soils are limited by impeded drainage, slow moisture movement, slope, erosion, and poor aeration for at least a part of the year. They have high available moisture capacity. They are strongly acid to extremely acid where unlimed. These soils are moderately productive if properly managed. They are not too difficult to work at the right moisture content, but planting is delayed in the spring due to wetness. Some artificial drainage may be needed, especially in the more nearly level areas. Ditches are generally more suitable for drainage than tile lines because the subsoils are so slowly permeable.

Profile of Keyport silt loam in an almost level idle area about 1 mile east of Dunkirk.

Ap—0 to 8 inches, grayish-brown (2.5Y 5/2) silt loam; weak, coarse, granular structure; slightly hard, friable, slightly sticky; roots plentiful; very strongly acid; abrupt, smooth boundary. 8 to 10 inches thick.

A2—8 to 14 inches, light yellowish-brown (2.5Y 6/4) silt loam; weak, very coarse, granular structure; slightly hard, friable, slightly sticky and slightly plastic; roots common; extremely acid; clear, smooth boundary. 5 to 7 inches thick.

B21t—14 to 28 inches, brownish-yellow (10YR 6/6) silty clay variegated with reddish yellow (7.5YR 6/8); strong, medium, subangular blocky structure; very hard, firm, sticky and plastic; roots common in upper part; discontinuous clay coatings; extremely acid; abrupt, smooth boundary. 10 to 20 inches thick.

B22t—28 to 43 inches, pale-yellow (5Y 7/3) clay with common, coarse, prominent mottles of reddish yellow (7.5YR 6/8) and common, coarse, faint mottles of light brownish gray (2.5Y 6/2); strong, coarse, blocky and subangular blocky structure; extremely hard, very firm, very sticky and very plastic; few roots; yellowish-brown (10YR 5/4) clay coatings; extremely acid; abrupt, wavy boundary. 12 to 20 inches thick.

IIC—43 to 56 inches +, pale-yellow (2.5Y 7/4) light sandy clay loam with a few, coarse, prominent mottles of strong brown (7.5YR 5/8); structureless, massive; hard, friable, slightly sticky; no roots; extremely acid.

The solum ranges from about 36 inches to more than 50 inches in thickness. Matrix hue throughout the profile is 10YR or yellower. The A horizons are silt loam. In undisturbed areas there is an A1 horizon 2 to 4 inches thick. The A horizons range from 3 to 6 in value and from 1 to 4 in chroma. The A1 horizon has the lower value and chroma.

The B2t horizons range from heavy silty clay loam to clay and generally have a clay content of more than 40 percent. The B21t horizon has a value of 5 or 6 and a chroma of 6 or more, and in places it has high-chroma mottling or variegation. In places the B22t horizon has higher value and lower chroma than the B21t horizon, and mottling with a chroma of 2 or less. Also, the B22t horizon can have low chroma in the matrix and high chroma in the mottles. Whatever the situation, there are always some grayish colors that have a chroma of 2 or less in the B22t horizon.

The C horizon, which lacks structure and clay coatings, is in some places as fine textured as the B horizon, and in other places, it is coarser textured. Where the C horizon is of fine texture, the boundary between it and the B horizon tends to be diffuse or indistinct; that is, the B horizon grades almost imperceptibly into the upper part of the C horizon. The C horizon has about the same range of colors in the matrix and mottles as the B22t horizon.

The Keyport soils resemble the Mattapex and Woodstown soils but have a fine clay or silty clay B horizon that is more slowly permeable. The Keyport soils formed in the same kind of old clayey sediments as the wet, gray, poorly drained Elkton soils.

Keyport silt loam, 0 to 2 percent slopes (KpA).—This soil has the profile described as representative for the series. The surface layer has a soft floury feel, but in spots it is slightly gritty. Included in mapping were some depressions where the surface layer is thicker than normal.

This soil is suited to all adapted crops, but it is not generally used for tobacco. Slow movement of water through the heavy clay subsoil necessitates artificial drainage during wet seasons. Ditches are best for this purpose because the soil is too slowly permeable for tile systems to function properly. (Capability unit IIw–8; woodland suitability group 3w1)

Keyport silt loam, 2 to 5 percent slopes, moderately eroded (KpB2).—The gentle slope of this soil promotes runoff, and since water moves so slowly into and through the subsoil, there is a real hazard of erosion. Included in mapping were a few areas with slopes of slightly more than 5 percent and some spots where the surface layer is sandier than normal.

Improved drainage may be necessary for some crops. Generally, however, erosion is a greater problem than drainage. Both runoff and erosion can be controlled by using contour strips with diversion terraces and sodded waterways. (Capability unit IIe–13; woodland suitability group 3w1)

Made Land

Made land (Ma) consists of areas that have been so disturbed or modified that the soils cannot be properly classified. Most of these areas are built up with fill material or are areas from which the soil has been entirely removed by leveling. Also included are buried garbage and refuse dumps located in low areas or excavations. Made land is almost always used for residential, commercial, or other nonfarm purposes (fig. 3).

Marr Series

The Marr series consists of well-drained soils that occur in the uplands. These soils formed in old sediments that contained mainly fine sands of remarkably uniform size and smoothness but included some clay and some silt. Practically all areas have been cleared and used, but some have gone back to woodland. The native vegetation is mixed upland hardwoods dominated by oaks; some areas have scattered to fairly pure stands of Virginia pine and some shortleaf pine.

In a representative profile, these soils have a surface layer of dark yellowish-brown fine sandy loam about 10 inches thick. The upper 7 inches of the subsoil is yellowish-brown heavy fine sandy loam. The remaining subsoil, about 18 inches thick, is strong-brown and yellowish-brown sandy clay loam. The underlying material, which extends to a depth of 60 inches or more, is brownish-yellow loose fine sand or loamy fine sand.

The Marr soils are limited by slope and erosion. They are strongly acid to very strongly acid where unlimed. They have moderate to high available moisture capacity. These soils are well suited to crops if they are properly

Figure 3.—**Made land consisting of hydraulic fill behind a bulkhead. On right, high protective turf established in 1 year by planting and fertilization; on left, natural revegetation.**

managed. They are usually easy to work and warm up early enough in the spring for all normal farming operations. Marr soils produce high yields of high-quality tobacco. Their long-continued use for growing tobacco and other clean-tilled crops has produced severe erosion in those places that have a considerable degree of slope.

Profile of Marr fine sandy loam in a nearly level idle area just east of Route 4 and 1½ miles north of Dunkirk.

Ap—0 to 10 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; moderate, fine, granular structure; slightly hard, very friable; roots plentiful; medium acid (limed); abrupt, smooth boundary. 6 to 10 inches thick.

B1—10 to 17 inches, yellowish-brown (10YR 5/6) heavy fine sandy loam; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky; roots common; medium acid; gradual, smooth boundary. 6 to 8 inches thick.

B21t—17 to 27 inches, strong-brown (7.5YR 5/6) heavy fine sandy clay loam; moderate, coarse, subangular blocky structure; hard, firm, sticky and slightly plastic; roots fairly common; thin but distinct clay coatings; strongly acid; gradual, smooth boundary. 9 to 12 inches thick.

B22t—27 to 35 inches, yellowish-brown (10YR 5/8) fine sandy clay loam; weak, medium, subangular blocky structure; hard, friable, slightly sticky; roots fairly common; thin, strong-brown (7.5YR 5/6) clay coatings; some pockets of fine sand; strongly acid; clear, wavy boundary. 6 to 10 inches thick.

C—35 to 60 inches +, brownish-yellow (10YR 6/8) loamy fine sand to fine sand; structureless, single grain; loose; a few roots in the upper part; strongly acid to very strongly acid.

The combined thickness of the A and B horizons ranges from about 30 inches to 40 inches. The A horizon is fine sandy loam. Few areas have undisturbed A1 or A2 horizons. The Ap horizon generally has a value of 4 or 5 and a chroma of 2 to 4 in hue 10YR.

The B2t horizon ordinarily is fine sandy clay loam with an average clay content between 18 and 35 percent. Most of the remaining percentage of the B2t horizon is fine sand that contains comparatively little silt. The B2t horizon ranges from 7.5YR to 10YR in hue; value is 5 or 6, and chroma is 6, or more commonly 8.

The C horizon ranges from fine sand to light fine sandy loam and is coarser in texture than any part of the solum. Generally there are no pebbles or other coarse fragments in the profile. In places there is a IIC horizon at a depth of 5 or 6 feet that contains some glauconite. The C horizon is high in value and chroma and in places is variegated.

The Marr soils resemble the Howell, Rumford, and Westphalia soils. The Marr soils, however, have a coarser textured, more permeable B horizon than the Howell soils. They have thicker A and B horizons than the Westphalia soils, and these horizons contain more than 18 percent clay. Marr soils have a finer textured A horizon than Rumford soils.

Marr fine sandy loam, 0 to 2 percent slopes (MlA).—This soil has the profile described as representative for the series.

This soil is suited to practically all crops, and especially to the growing of high-quality tobacco. It ordinarily can be kept in safe condition for regular cultivation if properly managed. Sodded buffer strips or some other means

of checking runoff may be needed on some slopes. (Capability unit I–5; woodland suitability group 3o3)

Marr fine sandy loam, 2 to 6 percent slopes, moderately eroded (MlB2).—This soil has had significant losses of soil material from most areas. Included in mapping were some spots where there are shallow gullies and some areas where part of the subsoil has been turned up and mixed with the surface layer.

If properly managed this soil is well suited to truck crops, tobacco, corn, small grains, hay, and pasture. It usually produces tobacco of high quality. Methods for controlling erosion include crop rotation, the planting of winter cover crops, and the use of contour strips and sodded waterways. (Capability unit IIe–5; woodland suitability group 3o3)

Marr fine sandy loam, 6 to 12 percent slopes, moderately eroded (MlC2).—This soil has lost some of the surface layer, and there are some shallow gullies.

If properly managed this soil is suited to most uses, and it produces high-quality tobacco. Rotation of crops and the use of contour strips, diversion terraces, and sodded waterways help to check further erosion. (Capability unit IIIe–5; woodland suitability group 3o3)

Marr fine sandy loam, 6 to 12 percent slopes, severely eroded (MlC3).—This soil is eroded so severely that the plow layer now consists mostly of the brown, rather sticky subsoil. In places gullies have formed, some of them deep.

This soil has long been used for growing tobacco, but it is now critical or marginal for cultivated crops. No more than one clean-tilled crop should be grown in 5 years. If properly managed, some good crops, including high-quality tobacco, can be grown. Most of the time, however, the soil should be kept under a close cover of vegetation. (Capability unit IVe–5; woodland suitability group 3o3)

Marr fine sandy loam, 12 to 20 percent slopes, severely eroded (MlD3).—This soil is eroded so severely that the plow layer now consists mostly of the brown, rather sticky subsoil. In places gullies have formed, some of them so deep that they penetrate into the loose, sandy substratum. Included in mapping were a few areas where there has been better protection and soil losses have been less severe.

This soil has been used in farming for many years, but its condition is now so poor that it should no longer be used for cultivated crops. Well-established grasses or legumes could be grazed, and with proper management the soil is still suitable for wood-crop production. The soil is severely limited for nonfarm uses. (Capability unit VIe–2; woodland suitability group 3r1)

Matapeake Series

The Matapeake series consists of deep, well-drained soils that occur in the uplands. These soils formed in a thin mantle of silty and fine sandy materials that lie over older sediments consisting mainly of coarser sands. The native vegetation is primarily mixed hardwoods, dominantly oaks, but there are some stands of loblolly pine, shortleaf pine, and Virginia pine.

In a representative profile, these soils have a surface layer of light silt loam about 8 inches thick. The upper 2 inches is black, and the rest is brown. The subsoil, about 27 inches thick, is yellowish-brown to dark-brown silt loam that grades to loam as depth increases. The underlying material is yellowish-red sandy loam in the upper part but becomes browner and sandier with depth.

Matapeake soils have high available moisture capacity. They are strongly acid to extremely acid where unlimed. They are fairly easy to work, and they warm up readily in the spring. These soils are well suited to crops commonly grown in the area, including truck crops and tobacco.

Profile of Matapeake silt loam in a gently sloping area of hardwoods about 3 miles east of Prince Frederick.

A1—0 to 2 inches, black (10YR 2/1) light silt loam; moderate, fine, granular structure; very friable; roots abundant; many wormholes; strongly acid; clear, smooth boundary. 2 to 3 inches thick.

A2—2 to 8 inches, brown (10YR 5/3) light silt loam; moderate, medium, subangular blocky structure; friable; roots numerous; abundant wormholes; strongly acid to very strongly acid; abrupt, smooth boundary. 5 to 8 inches thick.

B1—8 to 12 inches, yellowish-brown (10YR 5/4) silt loam; moderate, coarse, subangular blocky structure; friable to firm, slightly sticky and slightly plastic; few roots; strongly acid; clear, wavy boundary. 0 to 6 inches thick.

B21t—12 to 24 inches, dark-brown (7.5YR 4/4) heavy silt loam; moderate, medium and coarse, subangular blocky structure; firm, sticky and plastic; very few roots; faint yellowish-brown (10YR 5/4) clay coatings; very strongly acid; abrupt, smooth boundary. 10 to 15 inches thick.

B22t—24 to 35 inches, dark-brown (7.5YR 4/4) heavy loam; moderate, coarse, blocky structure, faintly platy in the upper part; hard, friable to firm, slightly sticky; no roots; faint yellowish-brown (10YR 5/4 and 10YR 5/6) clay coatings; very strongly acid; abrupt, smooth boundary. 10 to 15 inches thick.

IIC1—35 to 46 inches, yellowish-red (5YR 4/8) sandy loam; structureless, massive to very weak, coarse, subangular blocky structure; hard, friable, slightly sticky; no roots; very strongly acid; clear, smooth boundary. 0 to 12 inches thick.

IIC2—46 to 60 inches +, variegated dark-brown (7.5YR 4/4) and yellowish-brown (10YR 6/6) loamy sand; structureless, single grain; loose; no roots; very strongly acid.

The combined thickness of the A and B horizons ranges from about 28 inches to 40 inches. The A horizon is silt loam or fine sandy loam. In the A horizon hue ranges from 10YR to 2.5Y, value from 3 to 6, and chroma from 2 to 4. The lowest value and the lowest chroma are usually confined to the A1 horizon. In some places the A1 horizon has a value of 2 and a chroma of 1, which may be the result of woodland burning. A value of 6 occurs, but it is always in the A2 horizon.

The B21t horizon ranges from heavy silt loam to light silty clay loam. The B22t horizon, which may be in the transitional zone between the silty mantle and the underlying sandy material (as in the profile just described), ranges from loam to sandy clay loam. The B2t horizon has a clay content of 18 to 35 percent. In places there is a IIB3 horizon between the B22t and IIC horizons, and in other places there is a conforming C horizon above the IIC, which is generally of silt loam. In the B2t horizon hue ranges from 10YR to 7.5YR, value is 4 or 5, and chroma ranges from 4 to 8. Chroma is always less than 6 in some part of the B2t horizon, and a chroma of 8 is rare.

The IIC horizon is dominantly sand, but in places it contains some fine, smooth pebbles. The C horizon, especially the IIC, is more variable in hue than the A and B horizons. In places the C horizon is variegated or streaked.

The Matapeake soils resemble the Sassafras soils but have a finer textured A horizon and have a B horizon of silt loam

or silty clay loam rather than sandy clay. Some soils in the Matapeake series have more sand and less silt in the lower part of the B horizon than is typical for the series in other survey areas. The Matapeake soils formed in the same kind of silty materials as the poorly drained Othello soils and the moderately well drained Mattapex soils.

Matapeake fine sandy loam, 0 to 2 percent slopes (MmA).—This soil has a profile that resembles the one described as representative for the series, but the plow layer is fine sandy loam instead of silt loam. The plow layer is crumbly and very easy to work.

This soil is well suited to more or less continuous use for crops ordinarily grown in the county if it is properly managed. Generally it produces tobacco of better quality than do the Matapeake silt loams. (Capability unit I–5; woodland suitability group 3o1)

Matapeake fine sandy loam, 2 to 5 percent slopes, moderately eroded (MmB2).—This soil has a profile that resembles the one described as representative for the series, but the plow layer is fine sandy loam. Appreciable loss of soil has occurred in most places, and in these deep plowing turns up some of the finer textured dark-brown subsoil.

This is an excellent soil for tobacco. Good practices for the control of erosion include cropping on the contour and the planting of close-growing crops or sod crops about 2 years in 3. (Capability unit IIe–5; woodland suitability group 3o1)

Matapeake silt loam, 0 to 2 percent slopes (MnA).—This soil has the profile described as representative for the series. It is one of the best soils in the county and has almost no limitations, although tobacco grown on it is not so high in quality as on sandier soils. (Capability unit I–4; woodland suitability group 3o1)

Matapeake silt loam, 2 to 5 percent slopes, moderately eroded (MnB2).—This soil has lost significant amounts of the surface soil in most places. In a few places, plowing to a normal depth turns up some of the subsoil.

This is one of the better soils in the county, although tobacco grown on it is not so high in quality as on sandier soils. Contour farming is one of the fairly simple conservation measures that will help keep this soil in suitable condition for continued safe, regular cultivation. (Capability unit IIe–4; woodland suitability group 3o1)

Matapeake silt loam, 5 to 10 percent slopes, moderately eroded (MnC2).—This soil has undergone uniform, but not yet severe, loss of surface soil. Included in mapping were a few areas where the plow layer contains a little less silt and more fine sand than is ordinary for Matapeake silt loams.

This soil is well suited to all common crops, but tobacco is not of the highest quality. Intensively applied conservation measures are needed to keep this soil in condition for regular cultivation. (Capability unit IIIe–4; woodland suitability group 3o1)

Matapeake silt loam, 5 to 10 percent slopes, severely eroded (MnC3).—The crumbly, silty surface layer has been almost entirely removed from this soil by erosion. Shallow gullies have been formed in many places, and in some places deep gullies have cut into the sandy substratum. Large areas of soil have been lost through undercutting and caving of these gullies.

This soil is suitable for continuous hay or for improved pasture, but a clean-tilled crop might be grown about 1 year in 5. Because air drainage generally is good, orchards should do well on this soil if it is protected by cover crops or sod. Gullies should be checked and mended. (Capability unit IVe–3; woodland suitability group 3o1)

Matapeake silt loam, 10 to 15 percent slopes, severely eroded (MnD3).—Most if not all of the original surface layer of this soil has been lost, and some areas have been gullied. Included in mapping were spots that are slightly sandy in the surface layer and have impeded air drainage.

This soil can no longer be safely cultivated. If properly managed it provides good hay crops and pasture. Pastures must be protected from overgrazing, which would destroy the sod and allow further severe erosion. The soil is well suited to the growing of pines for Christmas trees, timber, and pulpwood. (Capability unit VIe–2; woodland suitability group 3o1)

Mattapex Series

The Mattapex series consists of deep, moderately well drained soils that occur chiefly at low elevation along the western side of the county. The soils formed in a thin mantle of silty and fine sandy materials over older sediments dominated by coarser sands. The native vegetation consists of mixed hardwoods, and there is some loblolly pine.

In a representative profile, the surface layer is brown or dark-brown silt loam about 9 inches thick. The upper subsoil, about 15 inches thick, is yellowish-brown to light olive-brown heavy silt loam and silty clay loam that has some yellow and strong-brown mottles in the lower part. The lower subsoil, about 5 inches thick, is light olive-brown sandy clay loam mottled with gray and strong brown. The underlying material is yellowish-brown fine sandy loam mottled with yellow and strong brown; this material becomes sandier and less mottled with depth.

The Mattapex soils are limited mainly by impeded drainage and seasonal wetness. These soils have high available moisture capacity and are fairly well suited to crops if well managed. They are easy to work but tend to warm up late in spring, and for this reason, planting is delayed. Artificial drainage is necessary for some crops, particularly in the more nearly level areas. Drainage can be done by either ditches or tile lines, where adequate outlets are available. Ditches should not be dug so deep that they reach into the loose material beneath the solum.

Profile of Mattapex silt loam in a level cultivated area about 3 miles south-southwest of Lusby.

Ap—0 to 9 inches, brown or dark-brown (10YR 4/3) light silt loam; weak, coarse, granular structure; slightly hard, very friable, slightly sticky; roots plentiful; medium acid (limed); abrupt, smooth boundary. 8 to 10 inches thick.

B1—9 to 13 inches, yellowish-brown (10YR 5/4) heavy silt loam; weak, medium, subangular blocky structure; hard, friable to firm, slightly sticky and slightly plastic; roots common; medium acid; clear, wavy boundary. 3 to 6 inches thick.

B21t—13 to 24 inches, light olive-brown (2.5Y 5/4) silty clay loam variegated with pale yellow (2.5Y 7/4); a few, fine, prominent mottles of strong brown (7.5YR 5/8); moderate, coarse, subangular blocky structure; hard, firm, sticky and plastic; roots fairly common; brown (10YR 5/3) to dark yellowish-brown (10YR 4/4) clay coatings; medium acid; abrupt, smooth boundary. 10 to 16 inches thick.

IIB22t—24 to 29 inches, light olive-brown (2.5Y 5/6) sandy clay loam with a few, medium, distinct mottles of light gray (10YR 7/2) and medium, prominent mottles of strong brown (7.5YR 5/8); weak, medium, platy and subangular blocky structure; hard, firm, sticky and slightly plastic; very few roots; patchy, brown (10YR 4/3) clay coatings; medium acid to slightly acid; abrupt, smooth boundary. 3 to 10 inches thick.

IIC1—29 to 38 inches, light yellowish-brown (10YR 6/4) fine sandy loam with a few, coarse, distinct mottles of pale yellow (2.5Y 7/4) and strong brown (7.5YR 5/8); stratified; hard; friable, slightly sticky; no roots; medium acid to slightly acid; abrupt, smooth boundary. 6 to 10 inches thick.

IIC2—38 to 50 inches +, yellowish-brown (10YR 5/4) loamy sand; structureless, single grain; loose; no roots; medium acid to strongly acid.

The thickness of the solum ranges from about 24 inches to 42 inches. There are generally no coarse fragments in the profile, but in places the C horizon contains a few, fine, smooth pebbles. Matrix hue is 10YR or 2.5Y, but unconforming (II) horizons in some places have a hue of 7.5YR.

The A horizon ranges from fine sandy loam to silt loam. In undisturbed areas there is a thin, dark A1 horizon and a somewhat thicker A2 horizon. The A horizon generally ranges from 3 to 5 in value and from 1 to 4 in chroma. Lower values and chromas are confined to the A1 horizon.

The B21t horizon is ordinarily light silty clay loam but ranges to heavy silt loam and silty clay loam. In places the B22t horizon is in the transitional zone between the silty mantle and the underlying sandy material (as in the profile just described), and in such places it may be sandy clay loam or loam. The clay content in the B2t horizons ordinarily ranges from 18 to 35 percent. The B horizons generally have a matrix value of 5 and a chroma of 3 to 6, but there are always chromas of less than 6 in some part of the B2t horizons. In places there is either high-chroma or low-chroma mottling, but the upper 10 inches of the B2t horizon has no mottling with a chroma of 2 or less. Such mottling occurs however, somewhere in the B2t horizon at a depth of more than 10 inches.

The C horizons are dominantly sands. In places the C horizons have gray colors (chroma of 2 or less), and in places there is a high-chroma mottling.

Mattapex soils have a B horizon with a higher silt content than the B horizons of the Beltsville, Butlertown, Iuka, Keyport, and Woodstown soils. They formed in the same kind of silty materials as the well drained Matapeake soils, the moderately well drained Butlertown soils that have a hardpan in the lower part of the subsoil, and the poorly drained Othello soils.

Mattapex fine sandy loam, 0 to 2 percent slopes (MtA).—The surface layer of this soil contains more fine sand and less silt than the surface layer in the profile described as representative for the series. Because the surface layer contains more sand, it is easier to turn and cultivate.

This soil is so nearly level that it is generally not affected by erosion, but seasonally excess water should be removed to allow full use. Alfalfa and tobacco may not do so well as on better drained soils. (Capability unit IIw–5; woodland suitability group 3o2)

Mattapex fine sandy loam, 2 to 5 percent slopes, moderately eroded (MtB2).—The profile of this soil resembles that described as representative for the series, but the surface layer is fine sandy loam. Included in mapping were a few severely eroded spots.

The hazard of erosion is a more serious limitation than impeded drainage. This soil is little used either for alfalfa or for tobacco, although it produces tobacco of higher quality than the Mattapex silt loams. (Capability unit IIe–36; woodland suitability group 3o2)

Mattapex silt loam, 0 to 2 percent slopes (MuA).—This soil has the profile described as representative for the series.

With proper management, including drainage during abnormally wet periods, this soil is well suited to most crops. (Capability unit IIw–1; woodland suitability group 3o2)

Mattapex silt loam, 2 to 5 percent slopes, moderately eroded (MuB2).—A significant part of the surface layer of this soil has been lost through erosion, and there are a few severely eroded spots. Although erosion is the greater problem, drainage should be improved to enable full use for crops. (Capability unit IIe–16; woodland suitability group 3o2)

Mattapex silt loam, 5 to 15 percent slopes, severely eroded (MuD3).—The surface soil is gone in most places, and there are some gullies. Plowing will turn up much of the subsoil.

This soil should be used more extensively for hay, pasture, and wood crops than for tilled crops. Shallower working and the use of a large amount of crop residue help to restore structure and workability. (Capability unit VIe–2; woodland suitability group 3o2)

Mixed Alluvial Land

Mixed alluvial land (My) consists of soil materials washed from uplands and deposited on flood plains and along drainageways. This material ranges from sand and gravel to silt and clay.

Many areas of this land are wet and poorly drained. They are generally strongly acid to extremely acid, but in some places near salt water they are neutral to mildly alkaline.

This land is still subject to flooding in most places and is seldom farmed. Most of it is wooded, and it provides shelter for many kinds of wildlife. Many areas have been used for constructing ponds and lakes, and more areas could be used for recreational purposes. (Capability unit VIw–1; woodland suitability group 2w2)

Ochlockonee Series

The Ochlockonee series consists of well-drained soils that formed in alluvial material that accumulated in depressions and at the base of slopes. The native vegetation is mostly hardwoods, but there are some loblolly, shortleaf, and Virginia pines.

In a representative profile, the surface layer is brown or dark-brown fine sandy loam about 8 inches thick. The subsoil is yellowish-brown fine sandy loam about 24 inches thick. The underlying material is brownish-yellow loose sand.

The Ochlockonee soils have moderate available moisture capacity. Water moves through them readily. They are easily worked, and since they are well drained, can be worked early in spring. These soils are well suited to most common crops and produce good quality tobacco if they are properly managed. They respond well to liming and fertilizing.

Profile of Ochlockonee fine sandy loam, local alluvium, in a very gently sloping cultivated area about half a mile south of Mt. Hope Church.

Ap—0 to 8 inches, brown or dark-brown (10YR 4/3) fine sandy loam; weak, very fine, granular structure; slightly hard, very friable, slightly sticky; roots plentiful; very strongly acid; clear, smooth boundary. 8 to 10 inches thick.

B2—8 to 32 inches, yellowish-brown (10YR 5/6, variegated toward 10YR 5/4) fine sandy loam; weak, very fine, subangular blocky to coarse, granular structure; slightly hard, very friable, very slightly sticky; roots common; very strongly acid; clear, wavy boundary. 20 to 30 inches thick.

IIC—32 to 42 inches +, brownish-yellow (10YR 6/8) sand; loose and structureless; very few roots; extremely acid.

These soils in places have fine, smooth pebbles in the profile. Hue is generally 10YR in the entire profile but in some places grades toward 2.5Y or 7.5YR.

The combined thickness of the A and B horizons normally ranges from 38 inches to 40 inches. These horizons are fine sandy loam. In unplowed areas there is an A1 horizon 2 to 4 inches thick that has a value of 3 or 4 and a chroma of 1 to 3. The Ap horizon has a value of 4 or 5, a chroma of 4 to 6, or both.

The B horizon has a value of 4 or 5, a chroma of 4 to 6, or both.

The C horizon ranges from sand to silt loam but is generally sandy loam or coarser. The C horizon in most places resembles the B horizon in color but may be higher in value and chroma. Ordinarily there is no mottling, but in places there is some low-chroma mottling at depths below about 40 inches.

The Ochlockonee soils formed in the same kind of local alluvial materials as the moderately well drained Iuka soils.

Ochlockonee fine sandy loam, local alluvium, 2 to 5 percent slopes (OcB).—This soil is well drained and has no limitations caused by excess water. Included in mapping were some small nearly level areas, spots where the soil is a little less sandy and more silty than described for the series, and a few scattered areas where slopes are slightly more than 5 percent.

Control of soil erosion generally is the most important concern in management, but this should not be difficult on these gentle slopes. Diversion terraces can be used to protect the soil against runoff from nearby higher lands. Since air drainage is poor in places, this soil may be late to warm in spring. (Capability unit IIe–6; woodland suitability group 1o1)

Othello Series

The Othello series consists of poorly drained soils that occur chiefly at low elevations in the western and southern parts of the county. The soils formed in a thin mantle of silt over older sediments dominated by sands. The vegetation is mostly wetland hardwoods, including oak, gum, swamp maple, and holly, but there are good stands of loblolly pine in areas no longer cultivated.

In a representative profile, these soils have a surface layer of silt loam about 10 inches thick. It is dark grayish brown in the thinner upper part and olive gray in the thicker lower part. The subsoil, about 19 inches thick, is gray or light gray mottled with brown. It is silty clay loam in the upper part and sandy clay loam in the lower part. The underlying material is light-gray sandy loam mottled with strong brown. This material becomes sandier, somewhat gravelly, and less mottled with depth.

The Othello soils are limited by drainage and a seasonal high water table. They have high available moisture capacity. They are strongly acid to extremely acid where unlimed. These soils are fairly well suited to crops if properly managed. They are not difficult to work at the right moisture content. Drainage is required to lower the water table, particularly during wet periods in spring so that farming can begin. Drainage is usually not difficult because water moves through the subsoil fairly readily. Either tile lines or ditches can be used, but ditches should not penetrate into the sandy material beneath the solum.

Profile of Othello silt loam in a level wooded area about 3 miles north of Solomons.

A1—0 to 2 inches, dark grayish-brown (2.5Y 4/2) silt loam; moderate, medium, granular structure; hard, friable, sticky and slightly plastic; roots abundant; very strongly acid; gradual, smooth boundary. 1 to 2 inches thick.

A2g—2 to 10 inches, olive-gray (5Y 5/2) silt loam with abundant fine specks of dark brown, possibly of organic origin; moderate, fine, granular structure; hard, friable, slightly sticky and slightly plastic; roots common; very strongly acid; clear, smooth boundary. 5 to 10 inches thick.

B21g—10 to 24 inches, gray or light-gray (5Y 6/1) light silty clay loam with common, medium, distinct mottles of brown (10YR 5/3) and light yellowish brown (10YR 6/4); moderate, medium, blocky and subangular blocky structure; very hard, firm, sticky and plastic; roots common; thin but distinct, pale-olive (5Y 6/3) clay coatings; extremely acid; clear, smooth boundary. 10 to 18 inches thick.

IIB22tg—24 to 29 inches, gray or light-gray (N 6/0) sandy clay loam with common, coarse, distinct mottles of brown (10YR 5/3); weak, medium, blocky structure; hard, friable to firm, sticky and plastic; very few roots; thin, indistinct clay coatings; extremely acid; abrupt, smooth boundary. 4 to 10 inches thick.

IIC1g—29 to 35 inches, light-gray (N 7/0) light sandy loam with abundant, very coarse, prominent mottles of strong brown (7.5YR 5/6); massive to very weak, medium, blocky structure; slightly hard, friable, slightly sticky; very few roots; extremely acid; abrupt, smooth boundary. 6 to 12 inches thick.

IIIC2g—35 to 48 inches +, gray or light-gray (5Y 6/1) loamy sand; loose and structureless; no roots; 10 to 15 percent fine, smooth gravel; extremely acid.

The combined thickness of the A and B horizons ranges from about 20 to 36 inches. The A horizon is silt loam. Its hue ranges from 10YR to 5Y and in places is neutral; value is 3 to 6, and chroma is 0 to 3. The lowest values and chromas are confined to the thin A1 horizon.

The B2t horizon is ordinarily light silty clay loam, but it ranges from heavy silt loam to silty clay loam. This horizon ordinarily contains 18 to 35 percent clay. It has a matrix value of 5 or 6 and a chroma of from 0 to 2 or 3 in hue 5Y. Mottling ranges from 10YR to 7.5YR in hue and has a value of 5 or 6 and a chroma of 3 to 8. In places the B22t horizon is the transitional zone between the silty mantle and the underlying sandy material (as in the profile just described) and is sandy clay loam.

The C horizon is dominantly sand but in places contains some fine, smooth pebbles. Some C horizons have gray matrices with high-chroma mottling, high-chroma matrices with gray mottling, or gray matrices without mottling.

The Othello soils resemble the Elkton and Fallsington soils in their natural drainage. The Elkton soils, however, have a finer textured, more slowly permeable B horizon, and the Fallsington soils have a sandier, more rapidly permeable B horizon. The Othello soils formed in the same type of silty materials as the well drained Matapeake soils, the moderately well drained Butlertown soils with fragipans, and the moderately well drained Mattapex soils without fragipans. In Calvert County, some soils of the Othello series have more sand and less silt in the lower part of the B horizons than is characteristic for the series in other survey areas.

Othello silt loam, 0 to 2 percent slopes (OtA).—This soil has the profile described as representative for the series. There is ordinarily no hazard of erosion. Undrained areas are still mostly in woodland.

This soil is limited primarily by wetness and drainage. Drainage usually can be accomplished best with ditches, but tile lines may be adequate in some areas. After drainage the soil is suited to corn, soybeans, hay, and pasture. Loblolly pine, an important native tree for timber and pulpwood production, may be planted in areas no longer used for crops. (Capability unit IIIw–7; woodland suitability group 3w3)

Othello silt loam, 2 to 5 percent slopes (OtB).—Significant amounts of soil have been lost through erosion, but erosion has been severe in only a few spots. Although this soil is poorly drained, it has enough slope for water to drain off. Included in mapping were some spots where the surface layer is somewhat sandy and a few scattered areas where slopes are slightly greater than 5 percent.

Erosion should not be a serious hazard if crops are rotated or if hay or other close-growing crops are grown. Open ditches that have interceptors to trap runoff and seepage are usually most effective in improving drainage. (Capability unit IIIw–7; woodland suitability group 3w3)

Rumford Series

The Rumford series consists of deep, somewhat excessively drained soils that occur in the uplands. These soils formed in beds of sandy old sediments containing small amounts of clay and little silt. The native vegetation consists of hardwoods, chiefly scrub types, but most areas have been severely cut over and have been invaded by Virginia pine.

In a representative profile, these soils have a surface layer of loamy sand about 17 inches thick. It is grayish brown in the upper part and yellowish brown in the lower part. The subsoil is strong-brown sandy loam about 11 inches thick. The underlying material is reddish-yellow loose sand or coarse sand containing some fine pebbles.

The Rumford soils have low available moisture capacity. They are strongly acid to extremely acid where unlimed. Base saturation is very low in these soils. They are low in natural plant nutrients. These soils are easy to work and early to warm in spring. Some of the earliest crops, particularly truck and home garden crops, may be grown on them. Supplemental irrigation may be needed for full production, and large amounts of fertilizer are used for most crops.

Profile of Rumford loamy sand in a gently sloping cultivated area about ¼ mile southeast of Barstow.

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) loamy sand; structureless, single grain; loose to very friable; roots plentiful; slightly acid (limed); abrupt, smooth boundary. 8 to 10 inches thick.

A2—9 to 17 inches, yellowish-brown (10YR 5/4) loamy sand; structureless, single grain; loose to very friable; roots common; about 5 percent smooth pebbles; strongly acid; clear, smooth boundary. 5 to 10 inches thick.

B2t—17 to 28 inches, strong-brown (7.5YR 5/6) sandy loam; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky; roots common; clay coatings in pores, and distinct clay bridging; 5 to 10 percent fine, smooth pebbles; strongly acid; gradual, smooth boundary. 10 to 20 inches thick.

C—28 to 48 inches +, reddish-yellow (7.5YR 6/6) sand and coarse sand; loose; structureless, single grain; few roots; 5 to 20 percent fine, smooth pebbles; very strongly acid.

The combined thickness of the A and B horizons ranges from about 24 inches to 40 inches, but in eroded areas it is as thin as 18 inches. The A horizon is loamy sand. It generally is 10YR in hue, 3 to 5 in value, and 1 to 4 in chroma. The lowest values and chromas are confined to the very thin A1 horizon.

The B2t horizon is ordinarily sandy loam but ranges to light sandy clay loam. It has an average clay content of less than 18 percent. In places there is a thin transitional B1 horizon, a B3 horizon, or both. The B horizon ordinarily has a hue of 7.5YR but ranges to 5YR. In some places the transitional B1 and B3 horizons have a hue of 10YR. The B horizon is 5 or 6 in value and 6 to 8 in chroma.

The C horizon is sand or loamy sand. Although smooth pebbles, generally less than 1 inch in diameter, are found in places throughout the profile, they occur most frequently in the C horizon. The C horizon generally has the same color range as the B horizon, but in places it is yellower in hue and has higher value.

The Rumford soils resemble the Howell, Marr, and Westphalia soils, but the Howell soils have a thicker solum and a finer B horizon. Rumford soils formed in coarser sandy materials than Westphalia soils and are ordinarily not so yellow in hue, though the color range of the two series overlaps.

Rumford loamy sand, 2 to 5 percent slopes (RdB).—This soil has the profile described as representative for the series. Included in mapping were a few areas that are nearly level.

This soil is limited by slope, erosion, sandiness, low available moisture capacity, and low fertility. If properly managed, however, it is suited to many kinds of crops. Tobacco grown on this soil is generally of good quality, although yields may be low. Fertility and moisture-conserving practices, including irrigation, are needed. Fairly simple practices, such as planting hedges and windbreaks, are needed to control soil blowing. (Capability unit IIs–4; woodland suitability group 3o3)

Rumford loamy sand, 5 to 10 percent slopes, moderately eroded (RdC2).—This soil has lost some of its original surface layer either by water or soil blowing, and in a few spots some of the subsoil is turned up by plowing.

This soil is limited by slope, erosion, low available moisture capacity, and low fertility. If proper management, including irrigation, is practiced, this soil is suitable for growing truck crops and tobacco. Yields may not be high, however. Rotation of crops, planting on the contour, and the use of windbreaks help control soil loss and damage. (Capability unit IIIe–33; woodland suitability group 3o3)

Rumford loamy sand, 10 to 15 percent slopes, moderately eroded (RdD2).—A good part of the loamy sand surface layer has been lost through erosion, but none of the subsoil has been exposed.

This soil is severely limited for most crops by erosion. Supplemental irrigation may not be economically feasible. Perhaps a tilled crop can be grown once in 5 years if the soil is kept under hay, pasture, or similar cover the rest of the time. (Capability unit IVe–5; woodland suitability group 3o3)

Rumford-Evesboro gravelly loamy sands, 2 to 6 percent slopes (ReB).—This mapping unit consists mainly (about 70 percent) of a soil that resembles Rumford loamy sand but partly (about 30 percent) of a soil resembling

Evesboro loamy sand. The Rumford soil of this mapping unit, however, is 15 to 20 percent gravel through its entire profile. The gravel is smooth quartz less than an inch in diameter. The Rumford areas grade into Evesboro loamy sand that is also gravelly. In many places, particularly on slight knolls or ridges, the surface layer of the Rumford soil in this mapping unit is even thicker than the thick surface layer normal for Rumford soils.

The soils of this mapping unit are limited by sandiness, droughtiness, and erosion, particularly soil blowing. Tobacco is of good quality, but yields of all crops are generally low. Irrigation is important if tobacco or a similar crop requiring high production cost is grown. (Capability unit IIs–4; woodland suitability group 3o3)

Rumford-Evesboro gravelly loamy sands, 6 to 12 percent slopes (ReC).—This mapping unit consists mainly (about 60 percent) of a soil that resembles Rumford loamy sand but partly (about 40 percent) of a soil resembling Evesboro loamy sand. Both soils in this mapping unit are gravelly. In some areas these soils have lost a large part of the sandy surface layer through soil blowing and water erosion. There are some sandy gullies, and in spots a part of the subsoil of the Rumford soil would be turned up by plowing. Large areas of this unit have not been eroded.

These soils are little used in farming, except for some tobacco. Tobacco is generally of good quality, but yields may be low. Erosion should be controlled, and supplemental irrigation made available for tobacco, truck crops, and similar crops requiring high costs for production. (Capability unit IIIe–33; woodland suitability group 3o3)

Rumford-Evesboro gravelly loamy sands, 12 to 20 percent slopes (ReD).—Most of this mapping unit consists of about equal parts of a soil resembling Rumford loamy sand and a soil similar to Evesboro loamy sand. Both soils in this mapping unit are gravelly. Much of the sandy surface layer has been eroded from these soils in many areas. There are some sandy gullies, a few of them deep. Freshly disturbed areas have a spotty appearance caused by differential erosion. Included in mapping were some areas where the subsoil is finer and stickier than is normal for Rumford or Evesboro soils, and some areas containing comparatively little gravel.

These soils are marginal for farming, although in a few areas tobacco is grown, and occasionally other crops. Clean-tilled crops should be grown not more than 1 year in 5. The surface should be protected by close-growing vegetation most of the time, and intensive conservation measures should be taken. Irrigation may be economically feasible only for tobacco or other crops requiring intensive management. (Capability unit IVe–5; woodland suitability group 3r1)

Sassafras Series

The Sassafras series consists of deep, well-drained soils that occur in the uplands. These soils formed in beds of old sandy sediments containing moderate amounts of silt and clay. The native vegetation is mostly mixed hardwoods, but pines are common in areas that are cut over or no longer under cultivation.

In a representative profile, these soils have a surface layer of brown loamy fine sand about 9 inches thick. The upper subsoil, about 10 inches thick, is yellowish-brown heavy loamy fine sand or light fine sandy loam. The lower subsoil, about 22 inches thick, is sandy clay loam that is brown, strong brown, or dark brown. The underlying material is yellowish-brown loamy fine sand that contains small amounts of fine, smooth gravel.

The Sassafras soils are limited by slope and erosion. They have moderate available moisture capacity. They are strongly acid to extremely acid where unlimed. These soils are well suited to crops if properly managed, and some high-quality tobacco is grown on them. They are easy to work and warm up early in the spring.

Profile of Sassafras loamy fine sand in a gently sloping cultivated area just off Route 2, about ¼ mile west of Quakers Swamp Creek.

Ap—0 to 9 inches, brown (10YR 5/3) loamy fine sand; structureless, single grain to very weak, fine, granular structure; very friable; roots abundant; strongly acid; abrupt, smooth boundary. 7 to 10 inches thick.

B1—9 to 19 inches, yellowish-brown (10YR 5/4) heavy loamy fine sand or light fine sandy loam; weak, coarse, subangular blocky structure; slightly hard, very friable; roots plentiful; very strongly acid; clear, wavy boundary. 7 to 11 inches thick.

B21t—19 to 31 inches, brown or dark-brown (7.5YR 4/4) light fine sandy clay loam; moderate, medium, subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; roots common; faint to distinct clay coatings, which are most evident in pores; strongly acid to very strongly acid; clear, wavy boundary. 9 to 15 inches thick.

B22t—31 to 41 inches, strong-brown (7.5YR 5/8) fine sandy clay loam; moderate, medium, subangular blocky structure; hard, friable to firm, sticky and slightly plastic; few roots; a few widely spaced clay flows; strongly acid to very strongly acid; clear, smooth boundary. 7 to 12 inches thick.

C—41 to 60 inches +, yellowish-brown (10YR 5/8) loamy fine sand; structureless, single grain; no roots; some fine, smooth gravel in upper 6 inches; very strongly acid to extremely acid.

The combined thickness of the A and B horizons ranges from about 30 inches to 42 inches. The A horizon is loamy fine sand, loam, sandy loam, or fine sandy loam. Hue of the A horizon generally is 10YR, value ranges from 3 to 5, and chroma ranges from 1 to 4. The lowest values and chromas are usually confined to those places where the A1 horizon is thinnest.

The B2t horizon ranges from fine sandy clay loam to sandy loam; its clay content is ordinarily 18 to 30 percent. Hue in the B horizon ranges from 5YR to 10YR but is ordinarily 7.5YR. The value is most commonly 5, but in places is 4 or 6, and chroma is 4 to 8. There is always a chroma of less than 6 in some part of the B2t horizon.

The C horizon is coarser in texture than the B horizon and in places is coarser than the A horizon. The C horizon generally contains some fine, smooth gravel, and in places these soils are moderately gravelly through most of the profile. The C horizon is similar to the B horizon in hue but in places has higher value and chroma.

Sassafras soils resemble the Matapeake, Marr, Rumford, and Westphalia soils, but the Matapeake soils are dominantly silty instead of sandy in the solum, and the Marr, Rumford, and Westphalia soils are higher in chroma throughout the B2t horizon. The Sassafras soils formed in the same kinds of materials as the moderately well drained Woodstown soils and the poorly drained Fallsington soils.

Sassafras loamy fine sand, 0 to 2 percent slopes (SaA).—This soil is suited to all common crops and is especially well liked for tobacco. The plow layer is low

in available moisture, but the thick subsoil stores and supplies adequate moisture for most crops. This soil has no particular limitation. (Capability unit I–5; woodland suitability group 3o3)

Sassafras loamy fine sand, 2 to 5 percent slopes, moderately eroded (SaB2).—This soil has the profile described as representative for the series. Included in mapping were some scattered areas where the subsoil is nearly exposed and where there are a few shallow sand gullies.

This soil is suited to the regular cultivation of crops if simple conservation measures are taken. (Capability unit IIe–5; woodland suitability group 3o3)

Sassafras loamy fine sand, 5 to 10 percent slopes, moderately eroded (SaC2).—Most areas of this soil have lost a part of their surface layer. Careful erosion control is required if this soil is kept in regular cultivation. (Capability unit IIIe–5; woodland suitability group 3o3)

Sassafras fine sandy loam, 0 to 2 percent slopes (ShA).—This soil has a profile that resembles the one described as representative for the series, but the plow layer contains more silt and clay and less fine sand.

This soil is suited to crops commonly grown in the county and is an especially good soil for tobacco. It has no important limitations. (Capability unit I–5; woodland suitability group 3o3)

Sassafras fine sandy loam, 2 to 5 percent slopes, moderately eroded (ShB2).—This soil has a profile that resembles the one described as representative for the series but contains more silt and clay and less fine sand. It has lost a part of the original plow layer through erosion. Included in mapping were a few severely eroded spots and occasional gullies.

This soil can be kept in good condition for regular cultivation by easily applied conservation measures. (Capability unit IIe–5; woodland suitability group 3o3)

Sassafras fine sandy loam, 5 to 10 percent slopes, moderately eroded (ShC2).—Erosion has not yet been severe on this soil, but intensive erosion control will be required if it is to be kept in regular cultivation. (Capability unit IIIe–5; woodland suitability group 3o3)

Sassafras fine sandy loam, 5 to 10 percent slopes, severely eroded (ShC3).—This soil has had a severe loss of the surface layer through erosion. Gullies are fairly common, and some of them are deep. Included in mapping were a few gravelly areas.

This soil is marginal for tilled crops. Since the subsoil has been exposed in some places, even between the gullies, plowing to a normal depth is mostly in subsoil. Clean cultivation can be done if contour stripcropping is used, crop rotations are long, and sod or other close-growing vegetation is kept on the soil most of the time. (Capability unit IVe–5; woodland suitability group 3o3)

Sassafras fine sandy loam, 10 to 15 percent slopes, moderately eroded (ShD2).—This soil has lost a large part of the surface layer through erosion, and it must be carefully managed to avoid more severe losses. Erosion can be controlled by keeping the soil in woodland. Included in mapping were a few gravelly spots. (Capability unit IVe–5; woodland suitability group 3o3)

Sassafras fine sandy loam, 10 to 15 percent slopes, severely eroded (ShD3).—This soil is severely eroded as a result of improper management. In some areas there are many gullies, some of them deep. Included in mapping were a few areas that are somewhat gravelly. (Capability unit VIe–2; woodland suitability group 3o3)

Sassafras loam, 0 to 2 percent slopes (SlA).—This soil has a profile that resembles the one described as representative for the series but has a surface layer of intermediate loam texture, is much lower in sand and higher in silt, and is usually a little higher in clay.

This soil is well suited to crops but is not so highly valued for tobacco as some of the sandier soils of this and other well-drained series. With proper management there are no particular hazards to use. (Capability unit I–4; woodland suitability group 3o3)

Sassafras loam, 2 to 5 percent slopes, moderately eroded (SlB2).—This soil has a profile that resembles the one described as representative for the series but has a surface layer of loam, is much lower in sand and higher in silt, and is usually a little higher in clay. Included in mapping were a few spots where the subsoil has been almost or entirely exposed.

Much of the original plow layer has been lost through erosion caused by improper management. Further soil losses can be avoided by the use of fairly simple conservation measures. (Capability unit IIe–4; woodland suitability group 3o3)

Sassafras loam, 5 to 10 percent slopes, severely eroded (SlC3).—In most places all or nearly all of the original plow layer has been lost from this soil through erosion, and plowing to a normal depth will turn up a large amount of subsoil.

This soil can be more safely used for hay, pasture, or sodded orchards than for tilled crops, which can be grown infrequently. The hazard of severe erosion necessitates the use of intensive soil and water conservation measures. (Capability unit IVe–3; woodland suitability group 3o3)

Sassafras-Westphalia gravelly fine sandy loams, 2 to 6 percent slopes, moderately eroded (SpB2).—This unit consists of about 70 percent Sassafras soil and 30 percent Westphalia soil. Both soils of this mapping unit are deep, very well drained, and gravelly, and both have the same textures. Soil losses have not been severe, but there are a few shallow, sandy gullies. Some areas have been mined for gravel.

These soils have moderate to low moisture capacity. They are not important in farming, except for growing tobacco, which is usually of good quality. A large amount of fertilizer is required for most crops, and irrigation is needed for tobacco and truck crops. Erosion can be controlled with fairly simple conservation measures. (Capability unit IIe–5; woodland suitability group 3o3)

Sassafras-Westphalia gravelly fine sandy loams, 6 to 12 percent slopes, severely eroded (SpC3).—This unit consists of about 60 percent Sassafras soil and 40 percent Westphalia soil. These soils occur on many knolls or hillocks, and on some short, irregular, and complex slopes. As a result of improper management, the original surface layer has been washed away in all but a few scattered areas. There are many gullies, some of which have cut deep into the loose underlying material. Some areas have been mined for gravel.

These soils are marginal for most cultivated crops but can most safely be used for hay, pasture, or sodded orchards. If properly managed, however, they are still useful in farming. (Capability unit IVe–5; woodland suitability group 3o3)

Sassafras and Westphalia soils, steep (SrE).—This unit consists of about two-thirds Sassafras soil and one-third Westphalia soil. These soils include all Sassafras and Westphalia soils in the county that are steeper than about 15 percent. Slopes range to 35 percent or more. Small areas of Marr, Matapeake, and Howell soils also occur, and there are a few wet spots and some seepage. Most areas have never been cleared of timber, but practically all of them have been severely cut over.

These soils are so steep that they will be subject to severe erosion if cleared for general cultivation. If properly managed, some spots could be used for such intensive purposes as some gardens, and some areas might be used for improved pasture or for hay. These soils are best suited to wood crops, although intensive management is needed to make the most of their potential as woodland. (Capability unit VIe–2; woodland suitability group 3r1)

Swamp

Swamp (Sx) consists of very wet land that stands under water for the greater part of the year. The soils in these areas have not been classified. They may consist of almost any kind of material, including sand, silt, clay, gravel, muck, or peat, or of a mixture of any of these. In Calvert County there are a number of relatively small fresh-water swamps. The most extensive one is southeast of Long Beach, at Flag Ponds. Smaller but still important areas are found north of Cove Point and elsewhere.

Swamps are usually wooded, but generally produce little usable timber and are too wet for normal woodland management. Thus, they are generally suitable only for wildlife habitat. With some degree of management, parts of these swamps, particularly those containing cypress trees, could be used for recreation. (Capability unit VIIw–1)

Tidal Marsh

Tidal marsh (Tm) consists of many small and a few large areas that flood at unusually high tides. Most of these border the Patuxent River or the Chesapeake Bay, or occur along tidal parts of streams and their estuaries. The soil materials in these areas have not been examined in detail but are known to range from sand to clay, and in some places they may be mucky or peaty. Some marshes are as salty as the Chesapeake Bay, but many are only brackish to moderately salty. These marsh areas generally support only some grasses and sedges, but there are some miscellaneous herbaceous plants, and in places some shrubs. Usually there are no trees except for some willows in the less salty marshes.

These marsh areas are now of no use in farming, but they could be reclaimed. Their only practical present use is for wildlife shelter and for recreational purposes. (Capability unit VIIIw–1)

Westphalia Series

The Westphalia series consists of deep, well-drained soils that occur in the uplands. These soils are low in silt and high in fine and very fine sands of remarkably uniform grain size. The native vegetation is mixed hardwoods, but stands of Virginia pine frequently grow in wooded areas that are cut over or are no longer cultivated.

In a representative profile, the surface layer is dark yellowish-brown fine sandy loam about 8 inches thick. The subsoil, about 13 inches thick, is yellowish-brown fine sandy loam that contains a little more clay and is a little stickier than the surface layer. The underlying material is loose, yellowish-brown fine sand.

The Westphalia soils are limited by slope and erosion. They have moderate to low available moisture capacity. These soils are strongly acid to extremely acid where unlimed. They are very easy to work and warm up quickly in spring. The Westphalia soils are suited to most crops if properly managed. Supplemental irrigation may be necessary for full crop production.

Profile of Westphalia fine sandy loam in a gently sloping tobacco field east of Route 4 at Chaneyville.

Ap—0 to 8 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; weak, medium, granular structure; soft, very friable; roots plentiful; very strongly acid; abrupt, smooth boundary. 8 to 10 inches thick.

B2t—8 to 16 inches, yellowish-brown (10YR 5/8) heavy fine sandy loam with distinctly more clay than the Ap horizon; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky; roots common; some faint clay coatings, most evident in pores; strongly acid to very strongly acid; gradual, wavy boundary. 5 to 10 inches thick.

B3—16 to 21 inches, yellowish-brown (10YR 5/8) light fine sandy loam; weak, medium, subangular blocky structure; slightly hard, very friable; roots fairly common; about 2 percent fine, smooth gravel; strongly acid; clear, wavy boundary. 0 to 10 inches thick.

C—21 to 48 inches +, yellowish-brown (10YR 5/8) fine sand; loose; structureless, single grain; a few roots; very strongly acid.

The solum ranges from about 15 inches to 36 inches or more in thickness. In places these soils contain a considerable amount of fine, smooth gravel. In some of the areas the gravelly sand is not quite so fine as that in areas where the profile is not gravelly. In some places there are faint traces of glauconite (greensand) in the profile.

The A horizon is normally fine sandy loam. Undisturbed areas have a thin A1 horizon and a thicker A2 horizon, and in places there is a transitional B1 horizon. Hue of the A horizon is 10YR. Value ranges from 3 to 5, and chroma ranges from 2 to 4. The lowest value and chroma are in the A1 horizon, and the highest value and chroma are ordinarily in the A2 horizon.

The B2t horizon is fine sandy loam to heavy fine sandy loam. The clay content is greater than in the A horizon and generally ranges from about 10 percent to 18 percent. Illuvial clay occurs in places in the form of thin, faint, clay bridges between sand grains. Structural grade in the B2t horizon is usually weak but may be moderate in those areas where the B2t approaches its greatest thickness and finest texture. Hue in the B2t horizon ranges from 7.5YR to 10YR, value is 4 or 5, and chroma is 6 to 8.

The C horizon ranges from fine sand to loamy very fine sand and contains from nearly 0 percent to about 10 percent clay. In places the C horizon is about the same color as the B horizon. The C horizon in places has a higher value and a hue of 2.5Y, and in some places, the C horizon is variegated or streaked.

The Westphalia soils resemble the Howell, Marr, and Rumford soils, but the Howell and Marr soils have a thicker solum and a finer textured, less rapidly permeable B horizon, and the Rumford soils formed in coarser sandy materials and are generally redder in hue, although the color range of the two series overlaps.

Westphalia fine sandy loam, 2 to 6 percent slopes, moderately eroded (WaB2).—This soil has the profile described as representative for the series. Most areas of this soil have already lost a large part of the original plow layer, and there are some small gullies and galled spots where the subsoil is exposed.

This soil is limited by slope, erosion, a thin subsoil underlain by sands, and low available moisture capacity. The soil is suited to many crops, and it produces fine-quality tobacco. High-value crops such as tobacco benefit greatly from irrgation in dry seasons. This soil is easily eroded and should be farmed on the contour. (Capability unit IIe–5; woodland suitability group 3o3)

Westphalia fine sandy loam, 6 to 12 percent slopes, moderately eroded (WaC2).—This soil has already lost a large part of the plow layer through erosion, and there are some shallow gullies.

This soil is severely limited by erosion but can be continued in cultivation if properly managed. Rotations should last at least 4 years, and a clean-cultivated crop should be grown no more often than 1 year in 4. Some tobacco of good quality is produced, and more could be produced with supplemental irrigation. (Capability unit IIIe–5; woodland suitability group 3r1)

Westphalia fine sandy loam, 6 to 12 percent slopes, severely eroded (WaC3).—This soil has lost its original surface layer, and in a few places most of the subsoil has been washed away. There are some shallow gullies and a few deep, caving gullies.

This soil can be used more safely for permanent hay, pasture, sodded orchards, or other tree crops than for tilled crops. Tilled crops should be grown no more than 1 year in 5. The soil should be protected by close-growing vegetation most of the time. With proper management, occasional crops of tobacco can still be grown. (Capability unit IVe–5; woodland suitability group 3r1)

Westphalia fine sandy loam, 12 to 20 percent slopes, moderately eroded (WaD2).—This soil has been protected and therefore has not been badly damaged, although there are some shallow gullies. Most of the soil is wooded.

This soil is limited by erosion. With proper management, however, an occasional crop such as tobacco can be produced. Wooded areas probably should remain so, and any cleared areas should be kept under vegetation most of the time. (Capability unit IVe–5; woodland suitability group 3r1)

Westphalia fine sandy loam, 12 to 20 percent slopes, severely eroded (WaD3).—This soil has lost practically all of the surface layer, and in places most of the subsoil as well. There are numerous gullies, many of them deep and caving.

This soil should not be used for crops but should be kept in a protective cover, such as hay or pasture, lawns, and woodland. (Capability unit VIe–2; woodland suitability group 3r1)

Woodstown Series

The Woodstown series consists of deep, moderately well drained soils that occur in the uplands. These soils formed in old sandy sediments containing moderate amounts of silt and clay. The native vegetation consists chiefly of water-tolerant hardwoods, but some loblolly pine grows in cutover areas.

In a representative profile, these soils have a surface layer of fine sandy loam about 14 inches thick. This layer is light olive brown in the upper part and light yellowish brown in the lower. The subsoil is about 19 inches thick; it is light olive-brown sandy clay loam that has light-gray mottles in the lower part. The underlying material is yellow loose sand.

Woodstown soils are limited mainly by impeded drainage, but in sloping areas erosion is a hazard. They are strongly acid to extremely acid where unlimed. These soils have high available moisture capacity and are fairly well suited to crops if well managed. They are easy to work, but they tend to warm up late in spring, and for this reason, planting is delayed. Artificial drainage is necessary for some crops, particularly in the more nearly level areas. Where adequate outlets are available, drainage can be done by either ditches or tile lines. Ditches should not be dug so deep that they reach into the loose sandy material beneath the solum.

Profile of Woodstown fine sandy loam in a cultivated, gently sloping area about 1 mile west of Barstow.

Ap—0 to 9 inches, light olive-brown (2.5Y 5/4) fine sandy loam; weak, fine, granular structure; soft, very friable; roots abundant; strongly acid to very strongly acid; abrupt, smooth boundary. 8 to 10 inches thick.

A2—9 to 14 inches, light yellowish-brown (2.5Y 6/4) fine sandy loam; weak, fine, granular structure; slightly hard, friable, slightly sticky; roots plentiful; very strongly acid; clear, wavy boundary. 4 to 10 inches thick.

B21t—14 to 26 inches, light olive-brown (2.5Y 5/6) light sandy clay loam slightly variegated with yellow (2.5Y 7/6); weak to moderate, medium, subangular blocky structure; hard, friable, slightly sticky and slightly plastic; roots common; thin clay films most evident in pores; extremely acid; clear, wavy boundary. 10 to 14 inches thick.

B22t—26 to 33 inches, light olive-brown (2.5Y 5/6) sandy clay loam with common, medium, distinct mottles of light gray (5Y 7/2) and strong brown (7.5YR 5/8); moderate, medium, subangular blocky structure; hard, firm, sticky and slightly plastic; few roots; pale-olive (5Y 6/3) clay coatings; extremely acid; abrupt, smooth boundary. 5 to 15 inches thick.

IIC—33 to 48 inches +, yellow (2.5Y 7/6) sand; loose and structureless; no roots; extremely acid.

The thickness of the solum ranges from about 28 inches to 42 inches. The hue in all horizons ranges from 10YR to 2.5Y. A hue of 5Y occurs in the lower B horizon and in the C horizon in some places.

The A horizon is loam or fine sandy loam. In undisturbed areas there is an A1 horizon 2 to 5 inches thick. The A horizon has a value of 3 to 6 and a chroma of 1 to 4. The lower value and chroma are confined to the A1 horizon.

The B2t horizons range from heavy sandy loam to sandy clay loam, have an average clay content between 18 and 25 percent, and have a matrix value of 5 to 7 and a matrix chroma of 6 to 8. The B21t horizon is at least 10 inches thick and is not mottled. The B22t horizon is mottled with grayish colors of chromas of 2 or less and in places has some high-chroma mottling. Some profiles have a thin, transitional B1 horizon, a B3 horizon, or both.

The C horizon is coarser than the B horizon and usually coarser than the A horizon. In some places the C horizon is of uniform color, in others it is variegated, and in yet others it has low-chroma mottles, high-chroma mottles, or both.

Woodstown soils resemble the Beltsville, Butlertown, Iuka, Keyport, and Mattapex soils in their natural drainage. Woodstown soils formed in the same kind of materials as the well-drained Sassafras soils and the poorly drained Fallsington soils.

Woodstown fine sandy loam, 0 to 2 percent slopes (WoA).—This soil has the profile described as representative for the series.

If excess surface water is removed during abnormally wet periods, and other management is good, this soil is well suited to most crops. Tobacco is ordinarily planted in the better drained areas. (Capability unit IIw-5; woodland suitability group 2o1)

Woodstown fine sandy loam, 2 to 5 percent slopes (WoB).—Some areas have lost a part of the surface layer, and a few spots are severely eroded. In wet seasons some means for adequate subsoil drainage is needed, although erosion is the greater hazard. Included with this soil in mapping are a few areas having slopes greater than 5 percent. (Capability unit IIe–36; woodland suitability group 2o1)

Use and Management of the Soils

The first part of this section explains how soils are grouped according to their capability and describes the capability units in Calvert County. The second part deals with practices of management that are suitable for all the soils in the county. The third part gives estimated yields of the principal crops. In addition, this section discusses the use of the soils as woodland and wildlife habitat and in engineering and community development.

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 land-forming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, forest trees, or engineering.

In the capability system, the kinds of soils are grouped at three levels: the capability class, subclass, and unit. These are discussed in the following paragraphs.

Capability Classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

Class I soils have few limitations that restrict their use.

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

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

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife. (None of the soils in this county are in Class V.)

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife.

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

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

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 some parts of the United States but not in Calvert 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, 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–5. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraphs; and the Arabic numeral specifically identifies the capability unit within each subclass.

In Calvert County the capability units are set up and

numbered within a system of capability classification that is used throughout the State. Not all the capability units in this system are applicable in this county, and for this reason the number of the capability units is not consecutive in all cases.

The names of the soil series represented are mentioned in the description of each capability unit, but the listing of the series name does not necessarily indicate that all the soils of a series are in the same capability unit. The capability classification of any given soil can be learned by referring to the "Guide to Mapping Units."

In the following pages the capability units in Calvert County are described, and suggestions for the use and management of the soils are given.

CAPABILITY UNIT I–4

This unit consists of soils of the Matapeake and Sassafras series. These are deep, well-drained, medium-textured, nearly level soils of the uplands. They are no more than slightly eroded. They retain moisture well and are fairly easy to work.

These soils are excellent for general crops, forage crops, pasture, orchards, and some truck crops. Tobacco yields are high, but quality is medium to low. With proper management these soils are suited to intensive cultivation. Proper management includes minimum tillage, use of all available crop residue, keeping the supply of plant nutrients high, growing legumes and green-manure crops, and use of a considerable amount of lime as needed. Neither artificial drainage nor special practices for erosion control are needed.

CAPABILITY UNIT I–5

This unit consists of soils of the Marr, Matapeake, and Sassafras series. These are deep, well-drained, moderately coarse textured, nearly level soils of the uplands. They are easier to work throughout a wider range of moisture content than the medium textured soils of the Matapeake and Sassafras series, but average yields are lower. They are no more than slightly eroded.

These soils are well suited to most common crops, particularly to truck crops. They are especially well suited to tobacco, and the crop is usually of high to very high quality. Proper management includes minimum tillage; use of all available residue; keeping the supply of plant nutrients high; growing legumes, green-manure crops, and cover crops; and use of lime as needed. Neither artificial drainage nor special practices for erosion control are needed.

CAPABILITY UNIT IIe–4

This unit consists of soils of the Matapeake and the Sassafras series. These are deep, well-drained, medium-textured, gently sloping soils of the uplands. They are no more than moderately eroded.

These soils are well suited to general crops, forage crops, pasture, orchards, and some truck crops. In places better air drainage makes them even better suited to orchards than the soils of unit I–4. Tobacco yields are good, but quality may not be so high as that of tobacco grown on soils that have a sandier surface layer. Proper management includes minimum tillage, tilling on the contour wherever the landscape permits, and rotation grazing where these soils are used for pasture. A suitable crop rotation is at least 3 years long and includes hay or some other close-growing crop for 2 of the 3 years.

CAPABILITY UNIT IIe–5

This unit consists of soils of the Marr, Matapeake, Sassafras, and Westphalia series. These are deep, well-drained, moderately coarse textured, gently sloping soils of the uplands. Their plow layer is sandier and more easily worked than that of the medium-textured soils of the Matapeake and Sassafras series. They are no more than moderately eroded.

These soils are well suited to most crops commonly grown in the county if properly managed. They are especially well suited to tobacco, and the crop is usually of high to very high quality. Proper management includes maintaining a plant cover as much of the time as possible, growing a clean-tilled crop no more than 1 year in 3, and farming in strips on the contour. Diversion terraces that have safe outlets are needed on long slopes, and natural drainageways should be kept sodded.

CAPABILITY UNIT IIe–6

Ochlockonee fine sandy loam, local alluvium, 2 to 5 percent slopes, is the only soil in this capability unit. This is a deep, well-drained, gently sloping soil that is moderately coarse textured throughout. It occurs in upland depressions and at the foot of slopes. The soil is moderately permeable and has moderate available moisture capacity. The hazard of erosion is moderate.

This soil is suited to many crops and produces tobacco of high quality. Some areas are not suited to orchards, because of poor air drainage. Proper management includes 3-year rotations and farming on the contour where feasible. All drainageways should be sodded. In places erosion should be controlled by diverting runoff from higher lying adjacent soils.

CAPABILITY UNIT IIe–13

This unit consists of soils of the Beltsville and Keyport series. These are moderately well drained, medium-textured, sloping soils of the uplands that have a very slowly permeable subsoil. The Beltsville soils have a fragipan, and the Keyport soils have a highly clayey, sticky subsoil. They are no more than moderately eroded.

These soils may produce good yields of tobacco, but quality tends to be low. They are not well suited to crops that may be damaged by frost heaving in winter. These soils are at times too wet for crops to grow well, and at times they are too dry. Rapid runoff makes control of erosion the most serious management problem. Good management includes not only practices to help control erosion, but also practices to remove excess water, especially early in spring. Drainage is especially important early in spring, when wetness may necessitate delay in planting. Drainage is most commonly by ditches, although tile lines are used. A good supply of plant nutrients must be maintained, and lime is necessary.

CAPABILITY UNIT IIe–16

This unit consists of soils of the Butlertown and Mattapex series. These are moderately well drained, medium-textured, gently sloping soils of the uplands that have a

moderately permeable to moderately slowly permeable subsoil. They are no more than moderately eroded.

If properly managed, these soils are suited to most crops commonly grown in the county. Tobacco yields are good, but quality tends to be low. The most serious management problem is control of erosion. These soils are easier to drain and manage than the soils of the Beltsville and Keyport series.

CAPABILITY UNIT IIe–28

Howell fine sandy loam, 2 to 6 percent slopes, moderately eroded, is the only soil in this capability unit. This is a deep, well-drained, moderately coarse textured, gently sloping soil that has a moderately slowly permeable to slowly permeable subsoil. It is no more than moderately eroded. The plow layer is sandy and easy to work. The subsoil is clayey and runoff is rapid, and the hazard of erosion is greater than normal for a soil on such gentle slopes. Deep plowing brings some of the clayey, sticky material from the subsoil to the surface.

This soil is suited to all crops commonly grown in the county. Tobacco yields are good, and quality is usually high. Rotations of 3 to 4 years, contour stripcropping, and the use of diversions and sodded waterways are practices that help to control erosion.

CAPABILITY UNIT IIe–29

Howell silt loam, 2 to 6 percent slopes, moderately eroded, is the only soil in this capability unit. This is a deep, well-drained, medium-textured, gently sloping soil of the uplands. It is no more than moderately eroded. The plow layer is much siltier and not so easy to work as that of Howell fine sandy loam. The subsoil is much finer textured and is moderately slowly to slowly permeable. The available moisture capacity is high.

This soil produces good yields if properly managed, but the quality of tobacco tends to be lower than on sandier soils. Rapid runoff makes the hazard of erosion greater than on most soils that have such gentle slopes. Contour stripcropping, diversion terraces, and sodded waterways are especially needed to help check erosion. Rotations should be at least 3 years, and preferably 4 years. The surface should be kept under protective vegetation as much of the time as feasible.

CAPABILITY UNIT IIe–36

This unit consists of soils of the Mattapex and Woodstown series. These are moderately well drained, moderately coarse textured, gently sloping soils of the uplands. They have a moderately permeable to moderately slowly permeable subsoil. These soils have a plow layer that is sandier and easier to work than that of soils of the Butlertown and Mattapex series in unit IIe–16, and they are generally easier to drain. They are no more than moderately eroded.

These soils are suited to most crops if properly managed. Tobacco is usually of only medium quality. Some perennial crops may be damaged by frost heaving in winter. Planting may be delayed in some years because the soils are wet early in spring and are slow to warm up. Either tile lines or ditches may be used where drainage is needed. Erosion control is generally a more serious problem than drainage.

CAPABILITY UNIT IIw–1

This unit consists of soils of the Butlertown and Mattapex series. These are moderately well drained, medium-textured, nearly level soils of the uplands that have a moderately slowly permeable subsoil. They have little or no hazard of erosion.

These soils are suited to most crops if drainage is provided. They can be readily drained by using either tile lines or open ditches. If properly managed, they are reasonably well suited to tobacco, but quality tends to be low. Some perennial crops may be damaged by frost heaving in winter. Planting may be delayed because the soils are wet early in spring and are slow to warm up.

CAPABILITY UNIT IIw–5

This unit consists of soils of the Mattapex and Woodstown series. These are moderately well drained, moderately coarse textured, nearly level soils of the uplands that have a moderately permeable to moderately slowly permeable subsoil. These soils have sandier plow layers than the medium-textured soils of the Butlertown and Mattapex series, and they are usually easier to work and drain. They have little or no hazard of erosion.

These soils are suited to most crops if drainage is provided. Tile lines function well, but ditches may also be used. Tobacco yields are generally good, but quality is usually only medium. Some perennial crops may be damaged by frost heaving in winter. Planting may be delayed because the soils are wet early in spring and are slow to warm up.

CAPABILITY UNIT IIw–7

Iuka fine sandy loam, local alluvium, 2 to 5 percent slopes, is the only soil in this capability unit. This is a moderately well drained, gently sloping soil that is moderately coarse textured throughout. It occurs in upland depressions and at the foot of slopes. The available moisture capacity is moderate.

This soil produces fairly good yields of most crops, but tobacco is usually of only medium quality. It is limited primarily by a seasonally high water table and impeded drainage. Tile lines can effectively be used to improve internal drainage. Measures for controlling erosion include farming on graded strips, using sodded waterways to dispose of runoff, and, in particular, providing ditches to intercept runoff and seepage from adjacent higher lying soils.

CAPABILITY UNIT IIw–8

Keyport silt loam, 0 to 2 percent slopes, is the only soil in this capability unit. This is a moderately well drained, medium-textured soil of the uplands. It has a very slowly permeable subsoil and is wet early in spring and slow to warm up. Drainage is difficult because of the slow movement of moisture through the subsoil.

This soil is suited to corn, soybeans, pasture, and other crops if properly managed. Tobacco yields are fairly good, but quality is generally low. Perennial crops may be damaged by frost heaving. Where feasible, crops that can be planted late in the season should be grown. For drainage, properly spaced ditches function better than tile in the tight subsoil. The soil should be worked only within a narrow range of moisture content. The use of

heavy machinery tends to compact and puddle the surface layer if there is much moisture present.

CAPABILITY UNIT IIs–4

This unit consists of soils of the Rumford and Evesboro series. The Rumford soils are deep, somewhat excessively drained, gently sloping soils of the uplands. They have a thick, very sandy surface layer underlain by a somewhat finer textured, moderately permeable subsoil. In places they occur in a mixed pattern with the more excessively drained soils of the Evesboro series, which are sandy throughout.

The soils warm up early in spring and can be used for early truck crops. Tobacco of high quality is produced, but yields are at times much lower than on more fertile soils that hold more moisture. The most important conservation measures needed are those that conserve moisture and plant nutrients. Supplemental irrigation is needed in dry seasons, and a large amount of fertilizer is needed for most crops. These soils are limited primarily by seasonal droughtiness, but some areas that are moderately eroded need erosion control measures. Runoff can be controlled by tilling on the contour in alternate strips of cultivated and close-growing crops. A vegetative cover, and in some places windbreaks, can be used to retard wind erosion.

CAPABILITY UNIT IIIe–4

Matapeake silt loam, 5 to 10 percent slopes, moderately eroded, is the only soil in this capability unit. This is a deep, well-drained, medium-textured, moderately sloping soil of the uplands.

The hazard of erosion is severe unless proper soil and water conservation practices are applied. A rotation at least 4 years long is advisable, and a close-growing crop should be on the soils most of the time. Tillage should be kept to a minimum, and crops should be grown in contour strips. Diversion terraces and waterways for carrying off excess water should be well sodded. It is also advisable to plant orchards on the contour. The soil around the trees should be kept in green-manure crops, a cover crop, or sod most of the time. Although this is probably the most fertile and productive soil of class III, the quality of the tobacco produced on it tends to be rather low.

CAPABILITY UNIT IIIe–5

This unit consists of soils of the Marr, Sassafras, and Westphalia series. These are deep, well-drained, moderately coarse textured, moderately eroded, moderately sloping soils of the uplands. They have a sandier, less silty surface layer than Matapeake silt loam.

These soils are severely limited for crops unless soil and water conservation practices are intensively applied and carefully maintained. Tobacco is generally of high or very high quality. Further erosion can be controlled and moisture preserved by stripcropping on the contour and using diversion terraces and sodded waterways. Disturbing the soil should be kept to a minimum. Tilled crops should be grown no more often than 1 year in 4, and the soil should be kept under protective vegetation the rest of the time. Supplemental irrigation is helpful in dry periods.

CAPABILITY UNIT IIIe–28

Howell fine sandy loam, 6 to 12 percent slopes, moderately eroded, is the only soil in this capability unit. This is a deep, well-drained, moderately coarse textured, moderately eroded soil of the uplands. It is similar to the moderately coarse textured soils of the Marr, Sassafras, and Westphalia series but has a much finer textured subsoil that is moderately slowly permeable to slowly permeable. Runoff is rapid, and the hazard of erosion is greater than on those soils because the subsoil is tighter and more slowly permeable.

This soil produces fairly high yields of crops if properly managed. Tobacco is usually of very good quality. Rotations should be 4 or 5 years long, and all other conservation practices should be intensively and carefully applied. It is especially important to dispose of excess surface water through sodded waterways that are constantly maintained.

CAPABILITY UNIT IIIe–33

This unit consists of soils of the Rumford and Evesboro series. The Rumford soils are deep, somewhat excessively drained, moderately sloping, and moderately eroded. They occur on uplands. They have a thick, very sandy surface layer and a somewhat finer textured, moderately permeable subsoil. In places they occur in a mixed pattern with the more excessively drained soils of the Evesboro series, which are sandy throughout. The soils of this unit resemble the gently sloping soils of the Rumford and Evesboro series but have a greater hazard of erosion.

These soils are especially well suited to early truck crops, and they usually produce tobacco of very high quality. They are seasonally droughty and need intensive conservation measures and supplemental irrigation in dry seasons. The most serious management problem is the hazard of wind and water erosion. Rotations should be at least 4 years long. Farming should be in narrow strips on the contour. The surface should be kept under protective vegetation as much of the time as possible.

CAPABILITY UNIT IIIw–6

This unit consists of soils of the Fallsington series. These are poorly drained, moderately coarse textured, level to gently sloping soils of the uplands. They have a moderately permeable subsoil. Available moisture capacity and fertility are moderate. The water table is at or near the surface in winter and spring and seldom falls much below 3 feet.

With proper management, including drainage, these soils are suited to corn, soybeans, and some hay and grazing. They are not suited to tobacco. Drainage is not difficult where outlets are adequate, and tile lines function very well. Ditches should not penetrate into the loose, sandy substratum. Runoff from higher adjacent areas should be diverted. Erosion control is needed in some of the more sloping areas.

CAPABILITY UNIT IIIw–7

This unit consists of soils of the Othello series. These are poorly drained, medium-textured, level to gently sloping soils of the uplands. They have a moderately permeable subsoil. Available moisture capacity is high,

but the soils are fairly difficult to work except at the right moisture content. The water table is at or near the surface in spring and seldom falls much below 3 feet.

If these soils are drained, they are suited to corn, soybeans, hay, and pasture, but they are not suited to tobacco. The more nearly level areas can be safely kept in row crops for several years if cover crops are grown and careful management is practiced. Drainage is not difficult where outlets are adequate. Ditches should not penetrate into the sandy underlying material. Runoff from higher adjacent areas should be diverted, and erosion control is needed in some of the more sloping areas.

CAPABILITY UNIT IIIw–9

Elkton silt loam is the only soil in this unit. This is a poorly drained, medium-textured, nearly level soil of the uplands. This soil has a fine-textured, very slowly permeable subsoil.

Corn, soybeans, and some hay or pasture are grown on this soil, but it is not suited to tobacco. The water table is at or near the surface in winter and sometimes late in spring. Drainage is more difficult than on other poorly drained soils of the county. Surface drainage can be improved by grading the areas between ditches or by planting crops in elevated or graded rows. Tile does not function well in the tight subsoil, and ditches must be closely spaced. Erosion is not normally a problem, but runoff from higher adjacent areas should be diverted.

CAPABILITY UNIT IVe–3

This unit consists of soils of the Howell series on the stronger slopes and of the Howell, Matapeake, and Sassafras series on moderate slopes. These are deep, well-drained, moderately fine textured to medium-textured, strongly sloping and moderately sloping soils of the uplands. They are moderately to severely eroded. In severely eroded areas, the plow layer consists mostly of what was originally the subsoil. Gullies are common in severely eroded areas.

These soils are marginal for tilled crops, which should not be grown more often than 1 year in 5. Farming should be in narrow strips on the contour wherever possible. Safer uses for these soils are permanent hay, pasture, or contoured orchards with permanent ground cover. The quality of tobacco grown on these soils ranges from low to high, depending on the texture of the plow layer. Generally, only Howell fine sandy loam produces tobacco of high quality. Erosion control measures must be intensively applied and maintained.

CAPABILITY UNIT IVe–5

This unit consists of soils of the Evesboro, Marr, Rumford, Sassafras, and Westphalia series. These are deep, well-drained, moderately coarse textured, strongly sloping and moderately sloping soils. The surface layer is sandy and easy to work, and the soils warm up fairly early in spring. Soils of the Marr, Sassafras, and Westphalia series are severely eroded. In places the Rumford soil occurs as a complex with the more droughty Evesboro soil.

Slope and erosion limit these soils for tilled crops. Safer uses are permanent hay, pasture, or contoured orchards with permanent ground cover. A tilled crop should be grown no more than 1 year in 5 and should be in narrow strips fitting the contour of the land where possible. Yields of most crops are low to moderate, but the quality of tobacco is high to very high. The available moisture capacity is moderate to fairly low, and moisture must be conserved. Irrigation is beneficial where economically feasible. Intensive erosion control measures are required.

CAPABILITY UNIT IVe–9

This unit consists of soils of the Beltsville and Butlertown series. These are moderately well drained, medium-textured, severely eroded, sloping soils of the uplands. They have a fragipan or hardpan in the subsoil. Water penetrates slowly, and runoff has eroded away the original surface layer. The present plow layer consists chiefly of subsoil material.

These soils are severely limited for tilled crops by erosion. Corn or other tilled crops should be planted no more often than 1 year in 5, and hay, pasture, or other close-growing vegetation should be grown the rest of the time. Yields of tobacco are fair to good, but quality is usually low. Control of erosion is a much more serious problem than improvement of internal drainage. Artificial drainage is not necessary, but excess water must be carefully diverted. Diversion terraces and sodded waterways are especially beneficial.

CAPABILITY UNIT IVs–1

Evesboro loamy sand, 0 to 6 percent slopes, is the only soil in this capability unit. This is a deep, excessively drained, rapidly permeable soil. Some areas of this soil occur as a complex with soils of the Rumford series and normally are used and managed in the same way as those soils.

This soil is limited by very low available moisture capacity, seasonal droughtiness, low content of plant nutrients, water erosion, and soil blowing. It is suited to corn, soybeans, and tobacco, and is especially well suited to truck crops. Tobacco produced on this soil is usually of very high quality. Proper management includes a close-growing crop in rotation, planting crops in strips crosswise to the direction of prevailing winds, and establishing windbreaks. Crop residue can be turned under to increase the supply of organic matter. A large amount of fertilizer is necessary, and irrigation is needed in dry years.

CAPABILITY UNIT VIe–2

This unit consists of severely eroded soils of the Howell, Marr, Matapeake, Mattapex, Sassafras, and Westphalia series. These are deep, dominantly well drained, steep soils, or soils that are strongly sloping and severely eroded.

These soils are not suited to regular cultivation, even in long rotations. Some of the areas are fairly well suited to hay if properly managed, and others are suited to orchards if planted on the contour. In either case, the surface should be kept under sod. The most intensive general use of these soils would otherwise be for improved grazing, but seasonal overgrazing or other damage to the sod that would result in severe erosion must be prevented. Other areas should be reforested if they are not in woodland, and all woodland should be carefully managed for maximum economic return or for watershed protection.

CAPABILITY UNIT VIw–1

This unit consists only of Mixed alluvial land. This is a nearly level, dominantly poorly drained land type on flood plains. It consists of mixed, very recently deposited alluvial material.

Where feasible, mainly in areas already cleared, water-tolerant grasses and legumes should be established for grazing. Grazing is limited by seasonal wetness, a high water table for a large part of the year, and flooding. Weed control is usually necessary. Areas in woodland should be managed for production of wood crops, and other areas should be planted to trees. The areas are also suitable for wildlife habitat, recreation areas, and construction of ponds or small lakes.

CAPABILITY UNIT VIIe–2

This unit consists only of Eroded land, steep. This land type is made up mainly of soils of the Howell, Marr, Matapeake, Mattapex, Rumford, Sassafras, and Westphalia series. These are deep, dominantly well drained, steep soils that are severely eroded. Some loose sands and a few wet spots are included.

No significant areas are suitable for cultivation, not even for hay crops. The safest use is for grazing. Overgrazing, however, damages the sod and results in severe erosion. Erosion damages not only the soils of this unit, but even more importantly, damages soils that receive the runoff and erosional debris.

Large areas of this land type are in second-growth and severely cutover woodland. These should be managed for the greatest economic return and for watershed protection. Many cleared areas and thin stands should be reforested. This unit has considerable potential value for some kinds of recreation.

CAPABILITY UNIT VIIw–1

This unit consists entirely of areas mapped as Swamp. These areas are covered with water most of the year and have a vegetative cover of swamp hardwoods and some cypress.

These areas are generally suited only to wetland forests, which can provide some woodland products, but planting and other phases of management are usually not feasible. These areas are not used for farming, becaused drainage is impractical. A few areas provide limited browsing for livestock during the drier periods. Swamp is suitable as habitat for some kinds of wildlife and for some kinds of recreation.

CAPABILITY UNIT VIIs–1

This unit consists of soils of the Evesboro series. These are excessively drained, sloping to steep soils that are extremely sandy and rapidly permeable.

These soils are severely limited by droughtiness and slope. They are not suitable for crops or pasture but provide limited grazing or shelter for livestock. The soils are not suited to many kinds of trees, but Virginia pine can be grown for pulpwood, and planted loblolly pine grows rather well. This unit also has potential for some kinds of wildlife and for some kinds of recreation.

CAPABILITY UNIT VIIIw–1

This unit consists entirely of Tidal marsh. These marshes are regularly flooded during high tide by waters that range from salty to brackish. They have no present use in farming but provide habitat for waterfowl and muskrats.

CAPABILITY UNIT VIIIs–1

This unit consists entirely of Escarpments. These areas are too steep to support vegetation and have no use in farming. Their chief use is recreational, in conjunction with adjacent beaches. They also have scenic value.

CAPABILITY UNIT VIIIs–2

This unit consists entirely of Coastal beaches that border the Chesapeake Bay and the Patuxent River. These beaches have no use in farming but are important for recreation. In some areas the loose sand has been stabilized to prevent blowing, drifting, and washing, which could damage the beaches and adjacent areas (fig. 4).

Figure 4.—**An area of Coastal beaches, of capability unit VIIIs–2, near Mears Creek. Beachgrass has been planted in rows to prevent damage to the beach and to trap blowing sand.**

CAPABILITY UNIT VIIIs–4

This unit consists entirely of Gravel and borrow pits. These are areas from which the soil has been removed. They have no present use in farming.

General Management Requirements

Some of the management practices needed to obtain a good growth of crops and, at the same time, to control erosion can be conveniently summarized for all the soils of the county. Among these practices are draining wet soils, irrigating soils in dry years, applying adequate soil amendments, practicing proper tillage, and managing crop residue.

Drainage

Only about 9 percent of the acreage of Calvert County needs artificial drainage. In these areas crop yields are often poor, and some crops may fail completely unless a

drainage system is well established, maintained, and controlled. About another 6 percent of the county is not suitable for crops, but improved drainage would increase the quantity and quality of the forage. Many of the farms of the county are located entirely, or almost entirely, on soils that never need artificial drainage.

Soils that require no artificial drainage are those of the Evesboro, Howell, Marr, Matapeake, Ochlockonee, Rumford, Sassafras, and Westphalia series. These soils occupy about 82 percent of the county.

Soils that require moderate artificial drainage are those of the Beltsville, Butlertown, Iuka, Keyport, Mattapex, and Woodstown series. These soils make up about 7 percent of the county.

Soils that require intensive artificial drainage are those of the Elkton, Fallsington, and Othello series, as well as Mixed alluvial land. These soils occupy about 8 percent of the county.

The rest of the county consists of miscellaneous land types that are not suitable for farming, even if they are artificially drained. These areas occupy only about 3 percent of the county.

The kinds of drainage systems that are suitable for the soils of this county are explained in the "Drainage Guide for Maryland."[2]

Mixed alluvial land is the only mapping unit in the county that is generally subject to flooding by stream overflow. This hazard varies from site to site. For any particular site, the known history of flooding is the best guide to use limitations and to the degree of flood protection that may be required for a particular proposed use.

Irrigation

The amount and distribution of rainfall in Calvert County generally are adequate for crops, but there are extended dry periods when irrigation can be the means of sustaining crop growth, especially on those soils that have less capacity to hold moisture for crops. In Calvert County, where the soils are sloping to hilly, irrigation of the sprinkler type is the most satisfactory. Information concerning irrigation is given in the "Maryland Guide for Sprinkler Irrigation," which can be obtained from the Maryland Agricultural Extension Service or the Maryland Agricultural Experiment Station. Features that affect the suitability of individual soils for irrigation are given in table 6, "Engineering interpretations," in the subsection "Engineering Uses of the Soils."

Soil amendments

Most of the soils of this county are naturally low to moderate in plant nutrients. All of the soils are acid, and some are extremely acid. For these reasons, additions of lime and fertilizer are needed for all crops, and many soils require large amounts for full production. The amount of lime and the kind and amount of fertilizer needed can be determined by soil tests. Assistance in determining the specific requirement on each soil can be obtained from the county agricultural agent, who will arrange to have soil tested at the Soil Testing Laboratory of the University of Maryland.

Lime generally is needed about once every 3 years. On the sandier soils, such as those of the Evesboro and Rumford series, the amount of lime needed is 1 to 1½ tons per acre. On most other soils the amount needed is 2 to 3 tons per acre, but such wet, very acid soils as those of the Elkton, Fallsington, and Othello series may require 3 to 5 tons per acre. Different soils in the same field may require different amounts of lime. The use of too much lime should be avoided, especially on very sandy soils containing little clay and silt.

The soils in Calvert County that need the least lime are the sandy soils that generally need the most fertilizer for full crop production. These soils may benefit greatly by smaller but more frequent applications of fertilizer rather than by single large applications.

Tillage

On all soils in the county, tillage should be limited to that needed for the quick germination of seeds, the adequate growth of seedlings, and the maturing of a normal crop. Keeping tillage to a minimum is effective in reducing erosion and the breakdown of soil structure. This is particularly important in Calvert County where, at best, most of the soils have only very weak to moderate structure in the surface layers.

The continued use of heavy machinery compacts many kinds of soils and makes them difficult to work. This damage is most likely to occur on the Elkton, Othello, and other medium-textured soils that are poorly drained.

Residue management

All available crop residue should be left in the field. This is especially important on light and sandy soils and on heavy and clayey soils. These two extremes are represented in Calvert County by the loamy sands of the Evesboro and the Rumford series on the one hand, and by the Howell clay loams on the other.

Crop residue protects the soil against erosion, and it normally should be left on the surface until plowing is necessary. Where corn is grown continuously, for example, the leaving of stalks and leaves decreases soil loss by about 10 to 25 percent, depending upon the nature of the soil, the yield of the corn, and tillage practices. Even in long rotations, where close-growing crops protect the soil most of the time, crop residue decreases erosion losses by 3 to 5 percent. In Calvert County, even these soil savings are important on such readily eroded soils as those of the Howell series.

The foregoing applies to losses of soil by water erosion. In Calvert County there is also the hazard of soil blowing, particularly on the sandy soils of the Rumford and Evesboro series. Residue left on the surface prevents most soil blowing, however, and traps much of the sand that may be blown from less protected areas. Even residue only partly turned under is a definite help in checking soil loss by blowing, since the particles in such partially covered residue serve as miniature but effective windbreaks.

When this residue is finally turned under, it adds organic matter to the soil. This improves soil structure, increases the moisture capacity of the plow layer, pro-

[2] UNITED STATES DEPARTMENT OF AGRICULTURE (In cooperation with Md. Agr. Expt. Station). DRAINAGE GUIDE FOR MARYLAND. (Mimeographed.) 1960.

motes aeration of the soil and infiltration of water into it, and, as a side benefit, decreases erosive runoff.

Estimated Yields

Table 2 shows the estimated average yields per acre of specific crops that can be grown on most of the soils of the county under improved management. Yields are not listed for Coastal beaches, Escarpments, Gravel and borrow pits, Made land, Swamp, and Tidal marsh, because crops and pasture are not grown on these areas.

To obtain the yields listed in table 2, all or nearly all of the following practices are needed:

1. Contour tillage, stripcropping, terracing, minimum tillage, and similar practices are used wherever needed 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 for the capability of the soil. They generally consist of a tilled crop to help control weeds, a deep-rooted crop to help improve soil structure and to improve permeability on certain tight soils, a legume for 1 year or more to help maintain or improve fertility, and a close-growing crop for 1 year or more to help improve soil structure and tilth, to supply organic matter, and to help control erosion.
3. Manure, crop residue, and green-manure crops are turned under to supply nitrogen and other plant nutrients. This also improves tilth and aids in controlling soil losses.
4. Fertilizer and lime are applied according to needs indicated by soil tests; the county agent may 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 proper time and in the proper way.
7. The best adapted varieties are planted at populations recommended to achieve the desired yield goal; some varieties of some crops may require special management for best production.
8. Weeds, diseases, and insects are controlled without disturbing the soil more than necessary.

The yields shown in table 2 are not presumed to be the highest yields obtainable, but they set a goal that is practical for most farmers to reach if they use good management. Yields on any soil can be expected to vary because of differences in management, in the weather, in the crop varieties grown, and in the numbers and kinds of insects and diseases. Yields under good management, however, should not vary more than about 10 percent from those given in table 2.

More information about management practices needed to obtain good yields can be found in the subsections, "Capability Grouping" and "General Management Requirements."

TABLE 2.—*Estimated average yields per acre of principal crops under intensive management*

[Absence of yield figure indicates crop is not suited to the soil or is not commonly grown on it]

Soil	Corn	Soybeans	Clover hay	Tall-grass pasture	Tobacco
	Bu.	*Bu.*	*Tons*	*Cow-acre-days*[1]	*Lb.*
Beltsville silt loam, 2 to 5 percent slopes, moderately eroded	95	35	3.0	170	1,100–1,500
Beltsville silt loam, 5 to 10 percent slopes, severely eroded	70		2.5	145	1,100–1,500
Butlertown silt loam, 0 to 2 percent slopes	130	45	3.5	255	1,500+
Butlertown silt loam, 2 to 5 percent slopes, moderately eroded	130	45	3.5	255	1,500+
Butlertown silt loam, 5 to 10 percent slopes, severely eroded	110		3.0	230	1,500+
Elkton silt loam	105	40	3.5	200	
Eroded land, steep				170	
Evesboro loamy sand, 0 to 6 percent slopes	60	25	2.0	145	700–1,100
Evesboro loamy sand, 6 to 12 percent slopes					
Evesboro loamy sand, 12 to 35 percent slopes					
Fallsington sandy loam, 0 to 2 percent slopes	120	35	3.0	170	
Fallsington sandy loam, 2 to 5 percent slopes	120	35	3.0	170	
Howell clay loam, 6 to 12 percent slopes, severely eroded	100		3.0	255	700–1,100
Howell clay loam, 12 to 20 percent slopes, severely eroded				230	
Howell fine sandy loam, 2 to 6 percent slopes, moderately eroded	130	45	3.5	315	1,100–1,500
Howell fine sandy loam, 6 to 12 percent slopes, moderately eroded	120	40	3.5	285	1,100–1,500
Howell fine sandy loam, 12 to 20 percent slopes, moderately eroded	100		3.0	255	1,100–1,500
Howell silt loam, 2 to 6 percent slopes, moderately eroded	130	45	3.5	315	1,500+
Iuka fine sandy loam, local alluvium, 2 to 5 percent slopes	115	40	3.0	200	1,100–1,500
Keyport silt loam, 0 to 2 percent slopes	110	40	3.0	170	1,100–1,500

See footnote at end of table.

TABLE 2.—*Estimated average yields per acre of principal crops under intensive management*—Continued

Soil	Corn	Soybeans	Clover hay	Tall-grass pasture	Tobacco
	Bu.	*Bu.*	*Tons*	*Cow-acre-days* [1]	*Lb.*
Keyport silt loam, 2 to 5 percent slopes, moderately eroded	110	40	3.0	170	1,100–1,500
Marr fine sandy loam, 0 to 2 percent slopes	130	45	3.5	315	1,100–1,500
Marr fine sandy loam, 2 to 6 percent slopes, moderately eroded	130	45	3.5	315	1,100–1,500
Marr fine sandy loam, 6 to 12 percent slopes, moderately eroded	120	40	3.5	285	1,100–1,500
Marr fine sandy loam, 6 to 12 percent slopes, severely eroded	100	----	3.0	255	1,100–1,500
Marr fine sandy loam, 12 to 20 percent slopes, severely eroded	----	----	----	230	----
Matapeake fine sandy loam, 0 to 2 percent slopes	140	45	3.5	315	1,100–1,500
Matapeake fine sandy loam, 2 to 5 percent slopes, moderately eroded	140	45	3.5	315	1,100–1,500
Matapeake silt loam, 0 to 2 percent slopes	140	45	3.5	315	1,500+
Matapeake silt loam, 2 to 5 percent slopes, moderately eroded	140	45	3.5	315	1,500+
Matapeake silt loam, 5 to 10 percent slopes, moderately eroded	130	40	3.5	285	1,500+
Matapeake silt loam, 5 to 10 percent slopes, severely eroded	110	----	3.0	255	1,500+
Matapeake silt loam, 10 to 15 percent slopes, severely eroded	----	----	----	230	----
Mattapex fine sandy loam, 0 to 2 percent slopes	135	45	3.5	255	1,100–1,500
Mattapex fine sandy loam, 2 to 5 percent slopes, moderately eroded	135	45	3.5	255	1,100–1,500
Mattapex silt loam, 0 to 2 percent slopes	135	45	3.5	255	1,500+
Mattapex silt loam, 2 to 5 percent slopes, moderately eroded	135	45	3.5	255	1,500+
Mattapex silt loam, 5 to 15 percent slopes, severely eroded	----	----	----	170	----
Mixed alluvial land	----	----	2.0	160	----
Ochlockonee fine sandy loam, local alluvium, 2 to 5 percent slopes	130	45	3.5	315	1,100–1,500
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	3.5	285	700–1,100
Rumford loamy sand, 5 to 10 percent slopes, moderately eroded	100	35	3.0	255	700–1,100
Rumford loamy sand, 10 to 15 percent slopes, moderately eroded	80	----	3.0	230	700–1,100
Rumford-Evesboro gravelly loamy sands, 2 to 6 percent slopes:					
Rumford gravelly loamy sand, 2 to 6 percent slopes	110	40	3.5	285	700–1,100
Evesboro gravelly loamy sand, 2 to 6 percent slopes	60	25	2.0	145	700–1,100
Rumford-Evesboro gravelly loamy sands, 6 to 12 percent slopes:					
Rumford gravelly loamy sand, 6 to 12 percent slopes	100	35	3.0	255	700–1,100
Evesboro gravelly loamy sand, 6 to 12 percent slopes	----	----	----	----	----
Rumford-Evesboro gravelly loamy sands, 12 to 20 percent slopes:					
Rumford gravelly loamy sand, 12 to 20 percent slopes	80	----	3.0	230	700–1,100
Evesboro gravelly loamy sand, 12 to 20 percent slopes	----	----	----	----	----
Sassafras fine sandy loam, 0 to 2 percent slopes	130	45	3.5	315	1,100–1,500
Sassafras fine sandy loam, 2 to 5 percent slopes, moderately eroded	130	45	3.5	315	1,100–1,500
Sassafras fine sandy loam, 5 to 10 percent slopes, moderately eroded	120	40	3.5	285	1,100–1,500
Sassafras fine sandy loam, 5 to 10 percent slopes, severely eroded	100	----	3.0	255	1,100–1,500
Sassafras fine sandy loam, 10 to 15 percent slopes, moderately eroded	100	----	3.0	255	1,100–1,500
Sassafras fine sandy loam, 10 to 15 percent slopes, severely eroded	----	----	----	230	----
Sassafras loam, 0 to 2 percent slopes	130	45	3.5	315	1,500+
Sassafras loam, 2 to 5 percent slopes, moderately eroded	130	45	3.5	315	1,500+
Sassafras loam, 5 to 10 percent slopes, severely eroded	100	----	3.0	255	1,500+
Sassafras loamy fine sand, 0 to 2 percent slopes	130	45	3.5	315	1,100–1,500
Sassafras loamy fine sand, 2 to 5 percent slopes, moderately eroded	130	45	3.5	315	1,100–1,500
Sassafras loamy fine sand, 5 to 10 percent slopes, moderately eroded	120	40	3.5	285	1,100–1,500
Sassafras-Westphalia gravelly fine sandy loams, 2 to 6 percent slopes, moderately eroded	130	45	3.5	300	1,100–1,500
Sassafras-Westphalia gravelly fine sandy loams, 6 to 12 percent slopes, severely eroded	100	----	3.0	245	1,100–1,500
Sassafras and Westphalia soils, steep	----	----	----	215	----
Westphalia fine sandy loam, 2 to 6 percent slopes, moderately eroded	130	45	3.5	285	1,100–1,500
Westphalia fine sandy loam, 6 to 12 percent slopes, moderately eroded	115	40	3.0	255	1,100–1,500
Westphalia fine sandy loam, 6 to 12 percent slopes, severely eroded	95	----	3.0	230	1,100–1,500
Westphalia fine sandy loam, 12 to 20 percent slopes, moderately eroded	95	----	3.0	230	1,100–1,500
Westphalia fine sandy loam, 12 to 20 percent slopes, severely eroded	----	----	----	200	----
Woodstown fine sandy loam, 0 to 2 percent slopes	130	40	3.5	255	1,100–1,500
Woodstown fine sandy loam, 2 to 5 percent slopes	130	40	3.5	255	1,100–1,500

[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 cow-acre-days.

Woodland

According to the U. S. Census of Agriculture, about 23 percent of Calvert County was farm woodland in 1964. Practically no virgin forest remains, but hardwoods probably were dominant, and in many wooded areas they are still dominant.

Oaks are the main hardwoods on better drained soils, and oaks make up a large part of the hardwoods on soils with impeded to poor drainage. Other hardwoods common to the county are sweetgum, blackgum, holly, swamp maple, hickory, beech, locust, and many kinds of scrub oaks. Much of the timber harvested has been oak or yellow-poplar (fig. 5). Large areas now wooded were once cultivated, and most areas never cultivated have been severely cut over.

Virginia pine has invaded much of the woodland that has been cut over or is no longer cultivated, particularly on the sandier, better drained soils. Loblolly pine, perhaps more important as timber, has taken over many abandoned fields and invaded others. Much of this loblolly pine is mature enough to be harvested or is nearly mature. Of minor importance are shortleaf pine, pitch pine, and pond pine.

Figure 5.—**Young stand of thinned yellow-poplar on Mixed alluvial land near Saint Leonard.**

Loblolly pine is more valuable for timber and pulpwood than Virginia pine. It can be used for reestablishing cover in many places because it grows well on many kinds of soils, it reseeds naturally where conditions are favorable, and it is easily established in pure stands by planting seedlings. In some places, particularly on drier, sandier soils, Virginia pine establishes itself more readily by seeding than loblolly pine. It can also be established by planting. White pine grows better than Virginia pine if it is planted so that it cannot be overtopped.

Woodland suitability groups

The soils of Calvert County have been placed in woodland suitability groups to assist owners in planning the use of their soils for wood crops. Each group is made up of soils that are suited to the same kinds of trees, that need similar management when existing vegetation is similar, and that have about the same potential productivity. The names of the soil series represented in each group are mentioned in describing that group, but this does not imply that all the soils of a series are in a given group. Refer to the "Guide to Mapping Units" at the back of this survey to find the group in which each individual soil, or mapping unit, has been placed.

Each woodland group is identified by a three-part symbol, such as 1o1, 2w2, or 3o3. The three parts of a symbol indicate, respectively, suitability class, subclass, and group. The first part of the symbol, always a number, indicates woodland suitability class or relative potential productivity of the soils. In this county, four such classes are recognized. Soils in the first class are potentially the most productive, and those in following classes are progressively less productive down to class 4.

Potential productivity is based on field determination of average site index for indicator species. Site index is the height, in feet, that the dominant trees of a given species, on a specified kind of soil, reach in a natural stand within a stated number of years. For the merchantable hardwoods and softwoods in this county, the site index is the height reached in 50 years.

In Calvert County, site indexes have been determined only for loblolly pine, but they have been determined for other species on the same kinds of soils in other parts of Maryland and in Delaware, New Jersey, and Virginia. Because more of this kind of information is available for loblolly pine than for other species, the placement of soils in classes, subclasses, and woodland suitability groups is based primarily on site index and other factors affecting the productivity and management of loblolly pine.

The second part of the symbol identifying a woodland group is a lower case letter. This letter indicates an important soil property that imposes a moderate or severe hazard or limitation in managing soils of the woodland group. A letter *c* shows that the main limitation is the kind or amount of clay in the upper part of the soils in the group; *d* shows that rooting depth is restricted be-

cause the soils are shallow to a hardpan, to hard rock, or to some other restrictive material; *f* shows that the main limitation is large amounts of fragments in the soil that measure greater than 2 millimeters but less than 10 inches in size; *o* shows that the soils have few limitations that restrict their use for trees; *r* shows that the main limitation is steep slopes; *s* shows that the soils are sandy and dry, have little or no difference in texture between surface layer and subsoil (or B horizon), have low available moisture capacity, and generally have a low supply of plant nutrients; *t* means that the soils are excessively alkaline, excessively acid, or contain sodium salts or other toxic substances in amounts that limit or impede the growth; *w* shows that water in or on the soil, either seasonally or year round, is the chief limitation; and *x* shows that stones or rocks in and on the soil are the chief limiting factor.

The last part of the symbol, another number, merely differentiates one woodland suitability group from others that have identical first and second parts in their identifying symbol. For example, the last Arabic number in the symbol 2w2 differentiates the woodland suitability group bearing that last number from all other groups having *2w* as the first two parts of their identifying symbol.

In the following pages, the woodland suitability groups of Calvert County are described. Important in these descriptions are the ratings *slight*, *moderate*, and *severe*, which are assigned to indicate relative hazard or limitation for factors that most affect woodland management. These factors are windthrow hazard, erosion hazard, equipment limitations, seedling mortality, and plant competition.

A rating of *slight* means that no special problems are recognized, and that use of the soils for trees would not be affected, except as indicated by that special hazard. A rating of *moderate* means that the use of the soils for trees would be affected by the stated hazard, but not to the extent of precluding use, and that ordinary management practices give adequate control. A rating of *severe* means that the stated hazard makes management of the soils for trees impractical, or that difficult or expensive practices are required for control.

Seedling mortality refers to the expected loss of naturally occurring or planted seedlings.

Plant competition refers both to the degree of competition from less desirable plants in the existing stand and to the rate at which undesirable species invade when an opening is made in the canopy. In Calvert County competition is ordinarily more severe for loblolly pine, and for hardwoods generally.

Limitations on the use of equipment depend on soil characteristics or topographic features that restrict or prohibit the use of equipment commonly used in tending a crop of trees or in harvesting the trees.

Hazard of windthrow depends on soil characteristics that control the development of tree roots.

Hazard of erosion refers to erodibility when the soils are not fully protected by a woodland cover. The soils are not well protected during the seedling stages of tree growth, for example, or after more or less clean harvesting of woodland crops.

Following are descriptions of the woodland suitability groups of Calvert County. Further information on management of woodlands can be obtained free from the assistant district forester for the county. He can be reached through the office of the county agent or through the Calvert Soil Conservation District.

WOODLAND SUITABILITY GROUP 1o1

This woodland group consists of well drained and moderately well drained soils of the Ochlockonee and Iuka series. These are soils of the uplands that formed in depressions and in accumulations of sandy materials at the bases of some slopes. Soils of this group occupy about 0.4 percent of the county.

The soils of this group have a site index of 95 or more for loblolly pine. The index for yellow-poplar and sweetgum is about the same as for loblolly pine, particularly on the moderately well drained Iuka soils. On soils that have a site index of 95, the expected yield per acre from well-stocked, unmanaged stands of 50-year-old loblolly pine is about 20,000 board feet of merchantable timber or about 77 cords of pulpwood. For the next 10 years, the expected yearly increase is about 550 board feet of timber, or about three-fourths cord of pulpwood.

Seedling mortality is slight. Plant competition is severe for conifers and moderate for hardwoods. Limitation to use of heavy equipment is slight, and there is only slight hazard of erosion or windthrow. In this county, these soils are considered the most productive of wood crops, particularly loblolly pine.

Loblolly pine, yellow-poplar, and sweetgum should have first priority for planting, but stands of red maple, sycamore, or oaks of potential commercial value should be managed until they are ready for harvesting. Scotch pine, Austrian pine, and white pine are suitable for Christmas trees.

WOODLAND SUITABILITY GROUP 2o1

This woodland group consists of soils of the Butlertown and Woodstown series that, although only moderately well drained, are not so wet that woodland management is much affected. These soils resemble those of woodland suitability group 1o1 in their limitations and hazards but are less productive. They occupy about 1.9 percent of the county.

The soils of this group have a site index of 85 or more for loblolly pine. The site index is ordinarily a little greater than 85 for yellow-poplar and sweetgum, but somewhat less than 85 for oaks. On soils that have a site index of 85, the expected yield per acre from a well-stocked, unmanaged stand of 50-year-old loblolly pine is about 14,000 board feet of merchantable timber or about 65 cords of pulpwood. For the next 10 to 20 years, the expected yearly increase is about 500 board feet of timber or about half a cord of pulpwood.

Loblolly pine, yellow-poplar, and sweetgum should have first priority for planting, but white pine can also be planted. Good stands of oaks or of red maple of potential commercial value should be managed until they are ready for harvesting. Scotch pine, Austrian pine, and white pine are suitable for the commercial production of Christmas trees.

WOODLAND SUITABILITY GROUP 2w1

This woodland group consists entirely of poorly drained soils of the Fallsington series that occur on flats and gentle slopes. These soils occupy less than 0.3 percent of the county.

Soils of this group have a site index of 85 or more for loblolly pine and an index somewhat lower for most hardwoods. On soils that have a site index of 85, the expected yield per acre from a well-stocked, unmanaged stand of 50-year-old loblolly pine is about 14,000 board feet of merchantable timber or about 65 cords of pulpwood. For the next 10 to 20 years the expected yearly increase is about 500 board feet of timber or about half a cord of pulpwood.

Seedling mortality is severe because of long periods of excessive wetness. Plant competition is severe for both conifers and hardwoods. Use of heavy equipment is severely limited because the water table is at or near the surface for long periods, particularly in winter and in early spring. Erosion and windthrow, however, are only slight hazards.

Loblolly pine should have first priority for planting, but white pine, sweetgum, and yellow-poplar may also be planted. Any stands of oaks or of red maple of potential commercial value should be managed until they are ready for harvesting. Scotch pine, white pine, and Austrian pine are suitable for the commercial production of Christmas trees after these soils have been artificially drained.

WOODLAND SUITABILITY GROUP 2w2

This woodland group consists entirely of Mixed alluvial land. This land occurs on flood plains that are flooded one or more times per year. It occupies about 5.8 percent of the county.

This kind of land has a site index of 85 or more for loblolly pine and an index somewhat higher for yellow-poplar and adapted oaks. The expected yield per acre from a well-stocked, unmanaged stand of 50-year-old loblolly pine is about 14,000 board feet of merchantable timber or about 65 cords of pulpwood. For the next 10 to 20 years, the expected yearly increase is about 500 board feet of timber or about half a cord of pulpwood.

Use of heavy equipment is severely limited by the high water table and by periodic flooding. Plant competition and seedling mortality are severe. The hazard of windthrow is slight, and there is little hazard of erosion except for some scouring during flood periods.

Loblolly pine should have first priority in planting, but yellow-poplar and sweetgum can also be planted in most areas. On this land are many stands of hardwoods that should be managed until they are ready for harvesting. This is especially true of yellow-poplar that grows on natural levees and wherever surface drainage is adequate. Many areas of yellow-poplar reproduce themselves abundantly. Scotch pine and white pine are suitable for the commercial production of Christmas trees.

WOODLAND SUITABILITY GROUP 2c1

This woodland group consists entirely of soils of the Howell series. These are deep, well-drained soils of the uplands that have fine-textured, clayey subsoils. These soils occupy about 2.1 percent of the county.

Few if any natural stands of loblolly pine exist, but planted stands should grow as well as sweetgum or yellow-poplar. Estimated site indexes are 75 to 85 for oaks and Virginia pine and 85 to 95 for yellow-poplar and sweetgum. Loblolly pine should yield 14,000 board feet at 50 years of age or about 65 cords of pulpwood. Expected yearly growth in the next 10 to 20 years should approximate 500 board feet of timber or half a cord of pulpwood.

Use of heavy equipment is moderately limited by a clayey subsoil that does not bear heavy loads well when wet. This subsoil is near the surface in all Howell soils and may be at the surface where they are severely eroded. The hazard of erosion is slight but ranges to moderate on slopes between about 6 and 12 percent. Seedling mortality is slight. Plant competition is severe for conifers and moderate for hardwoods.

Loblolly pine, white pine, yellow-poplar, and sweetgum are all suitable for planting. In places there are good stands of upland oaks or Virginia pine that should be managed until they are ready for harvesting. Scotch pine, Austrian pine, and white pine are suitable for the commercial production of Christmas trees.

WOODLAND SUITABILITY GROUP 2c2

This woodland group consists entirely of soils of the Howell series that have slopes greater than about 12 percent. These soils occupy about 0.65 percent of the county.

Few natural stands of loblolly pine exist on these soils, but planted stands should do as well as sweetgum or yellow-poplar. Estimated site indexes are 75 to 85 for oaks and Virginia pine and 85 to 95 for yellow-poplar and sweetgum. Loblolly pine should yield 14,000 board feet at 50 years of age or about 65 cords of pulpwood. Expected yearly growth in the next 10 to 20 years should approximate 500 board feet of timber or half a cord of pulpwood.

The hazard of erosion is severe on these soils. Use of heavy equipment is limited by the clayey subsoil and the steepness of the slopes. Seedling mortality is slight. Plant competition is severe for conifers and moderate for hardwoods.

Loblolly pine, white pine, yellow-poplar, and sweetgum are all suitable for planting. In places there are good stands of upland oaks or Virginia pine that should be managed until ready for harvesting. Scotch pine, Austrian pine, and white pine are suitable for the commercial production of Christmas trees.

WOODLAND SUITABILITY GROUP 3o1

This woodland group consists entirely of soils of the Matapeake series. These are deep, well-drained soils that have slopes no greater than about 15 percent. They occupy about 4.9 percent of the county.

The soils of this group have an estimated site index of 75 to 85 for loblolly pine. The site index is a little greater for yellow-poplar and somewhat less for oaks and Virginia pine. A well-stocked, unmanaged stand of loblolly pine that is 50 years old and has an average height of 80 feet should yield about 11,500 board feet of merchantable timber or about 60 cords of pulpwood. For

the next 10 to 20 years, the expected yearly increase per acre is about 400 board feet of timber or about half a cord of pulpwood. Other tree crops also do well on these soils.

Equipment limitations, seedling mortality, and the hazards of erosion and of windthrow are slight. Competition is moderate for conifers and slight for hardwoods.

Loblolly pine, white pine, yellow-poplar, and sweetgum are well suited to planting. Any good stands of Virginia pine, blackgum, or oaks of potential commercial value should be managed until they are ready for harvesting. Scotch pine, Austrian pine, and white pine are suitable for the commercial production of Christmas trees.

WOODLAND SUITABILITY GROUP 3o2

This woodland group consists entirely of soils of the Mattapex series. These soils are only moderately well drained, but their wetness does not greatly affect woodland management. They occupy about 3.6 percent of the county.

Site index for loblolly pine is estimated at 75 to 85. A well-stocked, unmanaged stand should yield 11,500 board feet or 60 cords of pulpwood at an age of 50 years. For the next 10 to 20 years, a yearly increase of 400 board feet or half a cord could be expected.

Seedling mortality is slight. Competition ranges from moderate to severe for conifers and from slight to moderate for hardwoods. Hazard of either windthrow or erosion is slight.

Loblolly pine should have first priority for planting, but white pine, yellow-poplar, and sweetgum also can be planted. Any oaks of potential commercial value should be managed until they are ready for harvesting. Virginia pine generally is not well adapted. Scotch pine is the most suitable species for the commercial production of Christmas trees.

WOODLAND SUITABILITY GROUP 3o3

This woodland group consists of soils of the Marr, Rumford, Sassafras, and Westphalia series. These soils occur in the uplands. They are deep, well-drained, sandy soils that have slopes no greater than 12 to 15 percent. In this group are also some soil areas where Evesboro soils are complexly mixed with Rumford soils. Individual areas of the very sandy Evesboro soils should be managed as if they were in woodland suitability group 3s1. Soils of this woodland group occupy about 25.5 percent of the county.

Estimated site index for loblolly pine is 75 to 85 at age of 50 years; is a little greater for yellow-poplar; and is somewhat less for oaks and Virginia pine. A well-stocked, unmanaged stand of loblolly pine at 50 years has an average height of 80 feet and yields about 11,500 board feet of merchantable timber or 60 cords of pulpwood.

Practically no hazards or limitations affect the woodland management of these soils. Plant competition in this group is moderate for conifers and slight for hardwoods.

Loblolly pine, white pine, and Virginia pine are about equally well suited for planting. Yellow-poplar and sweetgum are suited for planting, except possibly on the Rumford soils of the group. Any stands of oaks or white ash of potential commercial value should be managed until they are ready for harvesting. Scotch pine, Austrian pine, white pine, and Virginia pine are suitable for the commercial production of Christmas trees.

WOODLAND SUITABILITY GROUP 3w1

This woodland group consists entirely of moderately well drained soils of the Keyport series that have a fine-textured subsoil. These soils occupy about 0.6 percent of the county.

Soils of this group have a site index of 75 to 85 for loblolly pine. The site index is a little greater for yellow-poplar and somewhat less for oaks and Virginia pine. A well-stocked, unmanaged stand of loblolly pine that is 50 years old has an average height of 80 feet and should yield about 11,500 board feet of merchantable timber or about 60 cords of pulpwood.

Limitation to use of heavy equipment is moderate. The water table is moderately high for long periods, and the subsoil when saturated will not adequately support heavy equipment unless mats are used. Seedling mortality is slight. Competition is moderate for conifers and slight for hardwoods. Hazard of windthrow or erosion is slight.

Loblolly pine, white pine, and sweetgum are suitable for planting. Any natural stands of upland oaks or Virginia pine should be managed until ready for harvesting. Scotch pine is the most suitable species for the commercial production of Christmas trees.

WOODLAND SUITABILITY GROUP 3w2

This woodland group consists entirely of moderately well drained soils of the Beltsville series. These soils occupy about 0.4 percent of the county.

Site index for loblolly pine is estimated at 75 to 85. A well-stocked, unmanaged stand should yield 11,500 board feet or 60 cords of pulpwood at age of 50 years.

Limitation to use of heavy equipment is moderate because the soils have a seasonal perched water table over a tough fragipan. Seedling mortality is also moderate because the soils tend to be seasonally wet or dry. Competition is moderate for conifers and slight for hardwoods. Hazard of erosion or windthrow is only slight in wooded areas.

Virginia pine has priority for planting, but white pine and loblolly pine also can be planted. Soils of this group ordinarily do not produce good hardwoods, but stands of oaks of potential commercial value should be managed until ready for harvesting. Scotch pine is usually most suitable for the commercial production of Christmas trees, but white pine and Austrian pine also can be grown for this purpose.

WOODLAND SUITABILITY GROUP 3w3

This woodland group consists of poorly drained soils of the Elkton and Othello series. These soils occupy about 1.7 percent of the county.

Soils of this group have a site index of 75 to 85 for loblolly pine. The site index is a little greater for yellow-poplar and somewhat less for oaks and Virginia pine. A well-stocked, unmanaged stand of loblolly pine at age of 50 years yields about 11,500 feet of merchantable timber or 60 cords of pulpwood.

Limitation to use of heavy equipment is severe. Heavy equipment cannot operate effectively without the use of an extensive system of mats because the water table is high for long periods during the year. Seedling mortality is also severe, and competition is severe for both conifers and hardwoods. There is practically no hazard of windthrow or erosion.

Loblolly pine should have first priority for planting, but sweetgum and white pine may also be planted. Any good stands of other trees, particularly of red maple and the white-oak group, should be managed until they are ready for harvesting. Scotch pine and white pine are suitable for the commercial production of Christmas trees.

WOODLAND SUITABILITY GROUP 3s1

This woodland group consists of deep, sandy, excessively drained soils of the Evesboro series. These soils have slopes ranging up to 12 percent. They occupy about 1.3 percent of the county.

Soils of this group have a site index of about 85 for loblolly pine. An average well-stocked, unmanaged stand of loblolly pine that is 50 years old yields about 11,500 board feet of merchantable timber or about 60 cords of pulpwood.

Limitation to use of heavy equipment is moderate because both the surface soil and the subsoil are loose and provide poor traction. Seedling mortality is moderate because of seasonal droughtiness. Competition is moderate for pines and slight for hardwoods. Hazard of erosion or windthrow under woodland conditions is slight.

Loblolly pine and Virginia pine are suitable for planting. Since these soils tend to be droughty, they are not generally well suited to hardwoods, but stands of oaks of potential commercial value should be favored in native woodlands. Scotch pine, white pine, and Virginia pine are suitable for the commercial production of Christmas trees.

WOODLAND SUITABILITY GROUP 3s2

This woodland group consists of soils of the Evesboro series that have slopes of about 12 to 35 percent. The soils resemble those in woodland group 3s1 but have steeper slopes. These soils occupy about 0.7 percent of the county.

Soils of this group have a site index of about 85 for loblolly pine. An average well-stocked, unmanaged stand of loblolly pine that is 50 years old yields about 11,500 board feet of merchantable timber or about 60 cords of pulpwood.

Limitation to use of heavy equipment is severe because soils of this group are loose, sandy, and steep. Seedling mortality is moderate, competition for conifers is moderate, and competition for hardwoods is slight. Hazard of windthrow is almost absent, and there is little if any hazard of erosion when these soils are used as woodland.

WOODLAND SUITABILITY GROUP 3r1

This woodland group consists of well-drained soils that have slopes steep enough to affect woodland management practices. These include soils of the Marr series on slopes greater than about 12 percent; soils of the Westphalia series on slopes greater than about 6 percent; of complexes of Rumford-Evesboro soils on slopes greater than about 12 percent; and of Sassafras and Westphalia soils on slopes greater than about 15 percent. Soils of this group are to a large extent used as woodland, and particularly the undifferentiated areas of Sassafras and Westphalia soils on slopes greater than about 15 percent.

Limitation to use of heavy equipment is generally moderate but ranges to severe on areas of the sandy Evesboro and Westphalia soils on slopes greater than about 15 percent. Seedling mortality is slight to moderate in the sandier areas. Competition is slight for hardwoods and moderate for conifers. Hazard of erosion is moderate but ranges to severe on the easily eroded Westphalia soils on slopes greater than about 15 percent.

Loblolly pine or white pine generally should have priority for planting. Virginia pine is well suited to the Rumford, Evesboro, and Westphalia soils of this group, and yellow-poplar and sweetgum are well suited for planting on the Marr and Sassafras soils of the group. There are good stands of other hardwoods, particularly oaks, that should be managed until they are ready for harvesting. The site index for loblolly pine is about 80. A well-stocked, unmanaged stand of loblolly pine that is 50 years old should yield about 11,500 board feet of merchantable timber or about 60 cords of pulpwood. For the next 10 to 20 years, the expected yearly increase per acre is about 400 board feet of timber or about half a cord of pulpwood.

WOODLAND SUITABILITY GROUP 4r1

This woodland group consists entirely of Eroded land, steep, which has slopes ranging from 15 percent to 35 percent or more. This land occupies about 19.9 percent of the county.

Loblolly pine should have a site index of 65 to 70 at 50 years of age, and Virginia pine an index of 55 to 60. In fully stocked stands, this should produce up to 6,000 board feet of saw timber or about 50 cords of pulpwood per acre. Loblolly pine and Virginia pine are probably the only trees suitable for planting on this kind of land. There are some small stands of pines or hardwoods that should be managed until they are ready for harvesting.

Limitation to use of heavy equipment is severe in most areas but only moderate in some. Seedling mortality ranges from moderate to severe, depending upon the conditions where the seedling is planted. Plant competition is generally slight. The hazard of windthrow varies with the rooting conditions for each tree. The hazard of continued erosion is severe.

This land has lost most of its productivity because of erosion. Some of it is wooded, but large areas are idle or in brush. The establishment of an adequate woodland cover would put this land to one of its most suitable uses. It would also retard runoff and erosion, and the resulting damage to waterways and to other land in the county.

Wildlife

Natural habitat for most wildlife has been drastically altered in Calvert County, but 95 percent of the land area is potentially fair or better as habitat for deer, squirrels, turkeys, and other woodland wildlife. Only about 4 per-

cent of the land area is fair or better as habitat for such wetland wildlife as raccoons, woodcocks, muskrats, and waterfowl. About 40 percent of the land area is potentially fair or better as habitat for such open-land wildlife as rabbits, some deer, and quail and other upland birds.

Table 3 lists the soils of the county and rates their suitability for eight elements of wildlife habitat and for three classes, or kinds, of wildlife. In that table the soils are given a rating of *good*, or above average; *fair*, or average; *poor*, or below average; or *unsuited*.

The following paragraphs explain in a little more detail the elements of wildlife habitat for which the soils are rated in table 3. Suitability for each of the three categories of wildlife, as shown in table 3, is based on the suitability of the soils for the habitat elements essential to the birds and animals of the category.

Grain and seed crops.—These include corn, sorghum, millet, soybeans, buckwheat, cowpeas, wheat, oats, barley, rye, and other grainlike seeds eaten by wildlife.

Grasses and legumes.—These include lespedeza, alfalfa, various clovers, tall fescue, bromegrass, bluegrass, and timothy. All of these are commonly planted forage crops that also provide food and cover for wildlife.

Wild herbaceous upland plants.—In this group are panicgrass and other native grasses, partridgepea, beggarstick, lespedeza, and other native herbs that wildlife use for food or cover.

Hardwood woody plants.—Included are sumac, dogwood, persimmon, sassafras, hazelnut, multiflora rose, autumn-olive, wild cherry, various oaks and hickories, huckleberry, highbush cranberry, blackhaw, and various hollies. These plants produce vigorous growth and heavy crops of fruit or seed (fig. 6), and are established naturally or are planted.

Coniferous woody plants.—These are Virginia pine, shortleaf pine, red pine, Scotch pine, Norway spruce, redcedar, and Atlantic white cedar. The rating is not based on the size of mature plants, but on whether young plants grow rapidly and develop dense foliage. The soils are rated according to their suitability for coniferous trees and shrubs that are native or are planted.

Wetland food and cover plants.—These include barnyard grass, bulrush, cattail, waterwillow, smartweed, duckweed, arrow-arum, and various sedges. The soils are rated according to their suitability for wetland plants that provide food and cover for waterfowl and furbearing animals.

***Figure 6.*—Autumn-olive, excellent food for game and other wildlife, growing on Butlertown silt loam, 0 to 2 percent slopes, near Port Republic.**

TABLE 3.—*Suitability of soils for elements of*

[Gravel and borrow pits (Gp) and Made

Soil series and map symbols	Elements of wildlife habitat			
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants
Beltsville:				
BlB2	Fair	Good	Good	Good
BlC3	Poor	Fair	Good	Good
Butlertown:				
BtA	Good	Good	Good	Good
BtB2	Fair	Good	Good	Good
BtC3	Poor	Fair	Good	Good
Coastal beaches: Co	Unsuited	Poor	Poor	Unsuited
Elkton: Ek	Poor	Fair	Fair	Good
Eroded land, steep: ErE	Unsuited	Unsuited	Good	Good
Escarpments: Es	Unsuited	Unsuited	Unsuited	Unsuited
Evesboro:				
EvB, EvC	Poor	Poor	Poor	Poor
EvE	Unsuited	Poor	Poor	Poor
Fallsington:				
FsA	Poor	Fair	Fair	Good
FsB	Poor	Fair	Fair	Good
Howell:				
HoB2, HoC2, HwB2	Fair	Good	Good	Good
HoD2, HyC3	Poor	Fair	Good	Good
HyD3	Unsuited	Fair	Good	Good
Iuka: ImB	Fair	Good	Good	Good
Keyport:				
KpA	Fair	Good	Good	Good
KpB2	Fair	Good	Good	Good
Marr:				
MlA	Good	Good	Good	Good
MlB2, MlC2	Fair	Good	Good	Good
MlC3	Poor	Fair	Good	Good
MlD3	Unsuited	Poor	Good	Good
Matapeake:				
MmA, MnA	Good	Good	Good	Good
MmB2, MnB2, MnC2	Fair	Good	Good	Good
MnC3	Poor	Fair	Good	Good
MnD3	Unsuited	Poor	Good	Good
Mattapex:				
MtA, MuA	Fair	Good	Good	Good
MtB2, MuB2	Fair	Good	Good	Good
MuD3	Unsuited	Poor	Good	Good
Mixed alluvial land: My	Poor	Fair	Fair	Good
Ochlockonee: OcB	Fair	Good	Good	Good
Othello:				
OtA	Poor	Fair	Fair	Good
OtB	Poor	Fair	Fair	Good

wildlife habitat and for kinds of wildlife

land (Ma) are not rated in this table]

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	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Poor	Poor	Poor	Poor	Good	Good	Poor.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Unsuited	Unsuited	Unsuited	Unsuited	Unsuited	Unsuited	Unsuited.
Fair	Good	Good	Good	Fair	Good	Good.
Poor	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Unsuited	Unsuited	Unsuited	Unsuited	Unsuited	Unsuited	Unsuited.
Good	Unsuited	Unsuited	Unsuited	Poor	Poor	Unsuited.
Good	Unsuited	Unsuited	Unsuited	Unsuited	Poor	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	Fair	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Poor	Poor	Poor	Good	Good	Poor.
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.
Poor	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Poor	Poor	Poor	Poor	Good	Good	Poor.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Fair	Fair	Poor	Fair	Fair	Good	Fair.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Fair	Good	Good	Good	Fair	Good	Good.
Fair	Fair	Poor	Poor	Fair	Good	Poor.

TABLE 3.—*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
Rumford:				
RdB, RdC2, ReB, ReC	Fair	Fair	Fair	Fair
RdD2, ReD	Poor	Poor	Fair	Fair
For Evesboro part of units ReB and ReC, see Evesboro EvB, ErC; for Evesboro part of unit ReD, see Evesboro EvE.				
Sassafras:				
SaA, ShA, SlA	Good	Good	Good	Good
SaB2, SaC2, ShB2, ShC2, SlB2	Fair	Good	Good	Good
ShC3, ShD2, SlC3	Poor	Fair	Good	Good
ShD3	Unsuited	Poor	Good	Good
Sassafras-Westphalia:				
SpB2	Fair	Good	Good	Good
SpC3	Poor	Fair	Good	Good
Sassafras and Westphalia: SrE	Unsuited	Poor	Good	Good
Swamp: Sx	Unsuited	Poor	Unsuited	Fair
Tidal marsh: Tm	Unsuited	Unsuited	Unsuited	Unsuited
Westphalia:				
WaB2, WaC2	Fair	Good	Good	Good
WaC3, WaD2	Poor	Fair	Good	Good
WaD3	Unsuited	Poor	Good	Good
Woodstown:				
WoA	Fair	Good	Good	Good
WoB	Fair	Good	Good	Good

Shallow water developments.—These are impoundments in which the water level is kept at or no more than 2 feet above the natural ground level. (fig. 7).

Excavated ponds.—The suitability of a soil as a site for an excavated pond depends on the supply of ground water for the pond. Ponds must not depend upon runoff from surrounding areas, though water from that source may help to keep the pond at the desired level.

Farm ponds are not included in this section, but they can be important in producing fish. For fish, a part of the water should be at least 6 feet deep. The subsection "Engineering Uses of the Soils" gives features of each soil in the county that affect its selection as a site for a pond (see table 6, page 50).

Engineering Uses of the Soils [3]

This subsection is a guide to the engineering properties of the soils. The information it contains was obtained partly by examining soils in the field and evaluating their characteristics, but mainly by testing soil samples. These samples were taken at various locations in Maryland and in adjacent states, and the results of the tests on the samples were correlated to determine that the properties of a given kind of soil are similar no matter where that particular kind of soil occurs.

[3] THEODORE IFFT, assistant State conservation engineer, SCS, assisted in preparing this subsection.

By using information in this section and the soil map, engineering interpretations useful for many purposes can be made. Engineers can use the data to—

1. Make soil and land use studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Assist in the design of 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 land conditions that will aid in selecting locations for highways, airports, pipelines, and cables, and in planning detailed investigations of the selected locations.
4. Locate probable sources of sand, gravel, and other construction materials.
5. Correlate performance of engineering structures with kinds of soils and thus develop information that will be useful in designing and maintaining the structures.
6. Evaluate the suitability of soil mapping units for cross-country movement of vehicles and construction equipment.
7. Supplement information obtained from other published maps and reports and from aerial photographs.

wildlife habitat and for 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	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	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Unsuited	Good	Good	Fair	Unsuited	Poor	Good.
Unsuited	Good	Fair	Unsuited	Unsuited	Unsuited	Fair.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	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.

***Figure 7.*—Water impounded to an average depth of 1 foot for water fowl on Elkton silt loam, one of the few soils in the county rated good for this purpose.**

8. Develop other preliminary estimates for design or construction purposes pertinent to the particular area.

The interpretations are made mainly in tables 4, 5, and 6. It should be emphasized that these interpretations do not eliminate need for sampling and testing at the site of specific engineering works involving heavy loads and excavations deeper than the depths of layers here reported. Nevertheless, the soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected. For example, the information in this subsection shows that the soils of the Butlertown series are not suitable as sources of sand or gravel. It 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, however, just how suitable any particular area of the Sassafras soils is for these purposes. Tests at the site will be required to obtain such detailed information.

Engineering test data

In table 4 are test results on samples from five of the more important soil series in Calvert County. These determinations, and others like them, are in part the basis for estimates in tables 5 and 6.

Engineering properties of the soils

Table 5 shows estimated engineering properties of the soils of Calvert County. The information in this table applies to soils no more than slightly eroded. The thickness of soil layers and the other properties given are those for a typical profile of the soil series. Some variation in thickness and other properties can be expected. The many severely eroded soils have their subsoil and substratum nearer the surface.

Definitions for some of the engineering properties shown in table 5 are given in the following paragraphs.

The AASHO system (*1*) is used to classify soils according to those properties that affect use in highway construction. In this system, a soil is placed in one of seven basic groups ranging from A–1 through A–7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A–1 are gravelly soils of high bearing strength, or the best soils for subgrade (foundation) and, at the other extreme, clay soils that have low strength when wet. The best soils for subgrade are therefore classified as A–1, the next best A–2, and so on to class A–7, the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are divided as follows: A–1–a, A–1–b; A–2–4, A–2–5, A–2–6, A–2–7; and A–7–5, A–7–6. If soil material is near a classification boundary, it is given a symbol showing both classes; for example, A–2 or A–4. Within each group, the relative engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 for the poorest. The estimated classification for all soils mapped in the survey area is given in table 5; the AASHO classification for tested soils, with index numbers in parentheses, is shown in table 4.

In the Unified system (*8*) soils are classified according to particle size distribution, plasticity, liquid limit, and organic-matter content. Soils are grouped in 15 classes. There are eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, CH or MH.

Soil permeability is the rate at which water moves downward through an undisturbed, saturated soil under ideal conditions, where there is no hydraulic pressure from above and no water table or other restriction on the water as it passes through the soil.

Available water capacity is the water content of the soil at field capacity minus the water content at the wilting point. It is expressed as inches of available water per inch of soil.

Reaction, or the degree of acidity, is expressed by pH values for soil horizons.

Optimum moisture is the moisture content at which the maximum dry density of a soil can be obtained by compaction. Maximum dry density is the amount of dry soil that can be compacted into any unit of volume; it is expressed in table 5 as pounds of dry soil per cubic foot. 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. It is estimated primarily on the basis of the kind and amount of clay in a horizon. No soil of Calvert County has a high shrink-swell potential, and only some horizons of a few soils have a moderate shrink-swell potential. Most soils of the county have a low shrink-swell potential.

Corrosivity is the probable corroding effect on underground installations made of untreated steel and concrete.

Engineering interpretations

Table 6 rates the soils of Calvert County according to their susceptibility to frost action and their suitability as sources of topsoil, sand, gravel, and road fill. It also gives characteristics that affect the suitability of each soil for different kinds of engineering work. The interpretations are based on information given in tables 4 and 5 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. Elkton silt loam, for example, is suitable as a site for a reservoir but generally is not suitable as a source of sand. On the other hand, the Evesboro soils, and part of the Rumford-Evesboro soils, are ordinarily fair sources of sand and in places are fair to good sources of gravel, but they generally are not suitable for reservoir sites, because they are subject to excessive seepage.

Table 6 shows favorable and unfavorable properties of a soil that may require consideration before a site is selected and a structure is planned. For example, a subsoil of fine silty clay loam or silty clay has properties that make it poor as an embankment or dam. Such a subsoil, however, is very slowly permeable and therefore may be suitable as a core placed in a dam to reduce seepage. The fine texture and slow permeability of such a subsoil limit suitability for irrigation and make it difficult to provide adequate drainage.

The choice of route for laying a pipeline is determined primarily by the natural stability of the soils it must cross and by the height and seasonal fluctuation of the water table. If the water table is high, it is difficult to lay sewer, water, or gas lines, and ditchbanks are likely to collapse. In some soils, ditchbanks lack good stability even where the water table is not high.

Location for a road or highway is affected primarily by the seasonal height of the water table; by the stability of the soil materials, which is largely dependent on soil texture; and by the expected severity of frost action. The topography is an external factor that also affects road location.

The choice of a soil for a pond or reservoir depends largely on the amount of seepage that can be expected, particularly through the bottom of the reservoir. Seepage can differ in the same location, depending on whether the reservoir floor consists of subsoil material or substratum material. A constant and reliable source of water is desirable for any reservoir and is especially necessary if seepage or other losses are rapid. Dugout ponds are dependent upon position of the water table during the year. Pond levels drop during dry weather at sites having a seasonal high water table.

Probable maximum density of soil material, along with its stability and erodibility, strongly affect the choice of a soil for building dikes, levees, dams, and other embankments. The maximum density to which soil material can be compacted in a dam or other embankment affects the strength of the dam and the permeability of the structure. Generally, soils that can be compacted to the greatest maximum density, in pounds of dry soil per cubic foot, have the least seepage loss and the greatest strength and stability.

A soil having greatest maximum density when compacted by ordinary methods is one that contains well-graded sands of various sizes and sufficient fine material to fill the voids between the sand grains. A well-graded soil material is one that has particles well distributed over a wide range in size or diameter. A good example in Calvert County is the 19-inch to 41-inch major horizon of the typical profile in the Sassafras soil series. This is a well-graded sandy clay loam, and its density and bearing properties easily can be increased by compaction.

The ease or difficulty with which a soil can be drained artificially is determined mainly by (1) the permeability of the least permeable layer, which normally is the subsoil, (2) the height and fluctuation of the water table, and (3) the erodibility of the bottoms and banks of ditches and canals.

Features that affect design of a sprinkler irrigation system are the rate that applied water infiltrates into the soil, the capacity of the soil to retain moisture, and the degree of natural drainage. Soils that have impeded or poor drainage should be thoroughly drained before the irrigation system is installed. Flood or ditch irrigation is not practiced in Maryland.

The stability and the erodibility of the soil are of special concern in planning and designing terraces and diversions. These features, as well as the available moisture capacity and the natural fertility of the surface soil, strongly influence the design of waterways through fiields and the kinds of grasses or other vegetation used for sodding the waterways.

Use of the Soils in Community Development

Calvert County is chiefly rural, but its population is growing, and residential areas are expanding. This growth increases the demand for information about soil properties that affect nonfarm and recreational uses. The purpose of this subsection is to furnish some of this information.

Table 7 gives the limitations of each soil in the county for selected nonfarm uses. All these limitations are expressed by the ratings *slight*, *moderate*, or *severe*. A rating of slight means that the soil properties are mostly favorable for the intended use, and that those not so favorable are not limiting to any significant degree. A rating of moderate shows that a moderate problem is recognized but can be tolerated, overcome, or corrected. A rating of severe for a particular use does not necessarily prohibit that use. It indicates, however, that such use would be expensive and in some instances impractical. In table 7, a rating of moderate or severe is followed by a summary of the soil properties causing the rating.

A rating for any specified use is based on the degree to which the most unfavorable limitation exists. For example, if a high water table and resultant poor drainage severely limit use of a soil for the disposal of sewage effluent from septic tanks, the limitation is severe, even though the soil may be well suited to that use in other respects.

Following are the properties that limit the soils of Calvert County for each use specified in table 7:

Filter fields for sewage disposal.—Permeability of the soil, depth to a seasonal high water table, natural drainage, hazard of flooding, depth to an impervious layer, and slopes; and for some soils, hazard of water pollution.

Sewage lagoons.—Permeability of the soil and its substratum, slope, hazard of flooding, and organic-matter content. It is assumed that all natural surface soil layers are removed wherever sewage lagoons are constructed.

Homes with basements (three stories or less).—Depth to water table, natural drainage, slope, hazard of flooding, and soil stability and bearing properties. Limitations are less severe for homes without basements, especially those caused by the water table or impeded drainage. The suitability of a soil for industrial or commercial buildings and for homes of more than two stories should be investigated at the site.

Roads, streets, and parking lots.—Depth to water table, natural drainage, slope, soil stability and bearing properties, hazard of flooding, and frost heaving. (see also table 6).

Cemeteries.—Depth to water table, natural drainage, depth to hard layers, soil permeability, plasticity and stability of the subsoil and substratum, texture of the surface soil, and hazard of flooding.

Home gardens (small areas where cultural practices are intensively applied to vegetables, flowers, and ornamentals).—Texture of the surface layer, permeability of the subsoil, moisture capacity, fertility, depth to water table, natural drainage, slope, and degree of erosion.

TABLE 4.—*Engineering*

[Tests made by Soil Consultants, Inc., in accordance with standard

Soil name and location	Report number	Depth	Mechanical analysis[1]	
			Percentage passing sieve—	
			⅜ in.	No. 4 (4.7 mm.)
		Inches		
Butlertown silt loam:				
Hungerford farm on Little Cove Point Road. (Modal).	4–1	0–8		
	4–4	20–31		
	4–6	40–48		
Cove Point Road, 1.5 miles E. of Route 4. (Thin solum).	6–3	4–10		
	6–5	16–25		
	6–6	25–36		
Parker Wharf Road, 0.75 mile S. of Route 511. (More sandy than modal).	5–1	0–8		
	5–4	16–29		
	5–6	36–44		100
Howell fine sandy loam:				
Route 4, 200 yards S. of Route 260. (Modal).	7–1	0–8		
	7–3	14–25		
	7–6	39–60		
S. side of Grays Road. (Thin solum).	8–1	0–6	100	99
	8–2	6–22		
	8–4	25–36		
Matapeake silt loam:				
0.3 mile W. of Old Cedar Hill school on N. side of road. (Less silty in subsoil than modal).	1–1	0–8		
	1–4	19–31		
	1–6	41–50		
2.5 miles S. of Prince Frederick on W. side of Route 2. (Modal).	2–1	0–6		
	2–5	24–32		
	2–6	32–39		
1 mile S. of Saint Leonard on E. side of Route 2. (More sandy than modal).	3–2	8–32		
	3–3	32–39		
	3–5	45–53		
Mattapex silt loam:				
3 miles SSW. of Lusby. (Less silty in subsoil than modal).	10–1	0–9		
	10–3	13–24		
	10–5	29–38		
1 mile W. of Barstow. (Heavy subsoil).	12–1	0–7		
	12–3	10–17		
	12–4	17–22		
3 miles SW. of Lusby. (Modal).	11–1	0–8		
	11–3	14–25		
	11–5	33–48		
Sassafras loamy fine sand:				
0.25 mile N. of Saint Leonard Creek on Route 4. (Modal).	13–1	0–9		
	13–4	31–41		
	13–5	41–46	[4] 99	99
Route 4, 1 mile N. of Huntingtown. (Thick subsoil).	14–1	0–9		100
	14–3	24–37		
	14–4	37–60		
1.5 miles W. of Huntingtown. (Sandy subsoil).	15–1	0–10	[4] 99	98
	15–3	16–26	[4] 99	98
	15–5	30–42		

[1] Mechanical analyses according to AASHO Designation T 88–57. Results by this procedure frequently 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 of the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical

test data for soils

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

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

analysis data used in this table are not suitable for use in naming USDA textural classes of soil.

[2] The Soil Conservation Service and the Bureau of Public Roads have agreed that all soils having plasticity indexes within 2 points of the A-line will be given borderline classification.

[3] NP=nonplastic.

[4] For this horizon, 100 percent of the sample passed the ¾-inch sieve.

TABLE 5.—*Estimated engineering*

[Eroded land, steep (ErE), Escarpments (Es), Gravel and borrow pits (Gp), Made land (Ma), Mixed alluvial land (My), Swamp (Sx), them is lacking. See the section describing

Soil series and map symbols	Depth to seasonal high water table	Depth from surface of typical profile	Dominant USDA texture	Classification		Percentage passing sieve—	
				Unified	AASHO	No. 4	No. 10
	Feet	*Inches*					
Beltsville: B1B2, B1C3	[2] 1½–2½	0–7	Silt loam	ML, CL	A–4	95–100	95–100
		7–23	Silty clay loam	CL, ML	A–4, A–6	95–100	95–100
		23–50	Silt loam (fragipan)	ML	A–4, A–6	95–100	95–100
Butlertown: BtA, BtB2, BtC3	[2] 2–4	0–31	Silt loam	ML, ML–CL	A–4, A–6	95–100	95–100
		31–40	Silt loam (fragipan)	ML, ML–CL	A–4, A–6	95–100	95–100
		40–60	Loam	ML, CL, SC	A–4, A–6	95–100	95–100
Coastal beaches: Co	1–10+	0–48	Sand	SP	A–3	95–100	95–100
Elkton: Ek	0–1	0–17	Silt loam	ML, CL	A–4, A–6	95–100	95–100
		17–60	Silty clay to heavy silty clay loam.	CL	A–6, A–7	95–100	95–100
		60–72	Sandy clay loam	SC, CL	A–2, A–6, A–7	90–100	85–100
Evesboro: EvB, EvC, EvE	10+	0–60	Loamy sand to sand	SP, SP–SM, SM	A–2, A–3	85–100	80–100
Fallsington: FsA, FsB	0–1	0–9	Sandy loam	SM, SM–SC	A–2, A–4	95–100	95–100
		9–30	Sandy clay loam	SM, SC, ML	A–2, A–4, A–6	95–100	95–100
		30–48	Loamy sand	SP, SP–SM	A–2, A–3	95–100	95–100
Howell: HoB2, HoC2, HoD2, HwB2, HyC3, HyD3.	3+	0–8	Fine sandy loam	SM, ML, CL	A–2, A–4, A–6	95–100	95–100
		8–25	Clay loam and fine sandy clay loam	ML, MH, CL, CH	A–6, A–7	95–100	95–100
		25–60	Silty clay and clay	ML, MH, CL, CH, SM–SC	A–2, A–6, A–7	95–100	95–100
Iuka: ImB	1–2	0–27	Fine sandy loam	SM, ML	A–2, A–4	95–100	95–100
		27–48	Sand and gravel	SP–SM, SM, GM	A–2, A–4	30–100	25–100
Keyport: KpA, KpB2	1½–2½	0–14	Silt loam	ML, ML–CL	A–4	95–100	95–100
		14–43	Silty clay and clay	MH, CL, CH	A–6, A–7	95–100	95–100
		43–56	Sandy clay loam	SM, SC	A–2, A–4, A–6	90–100	80–100
Marr: MIA, MIB2, MIC2, MIC3, MID3.	5+	0–17	Fine sandy loam	SM, ML	A–4	95–100	95–100
		17–35	Sandy clay loam	SC, CL	A–2, A–4, A–6	95–100	95–100
		35–60	Loamy fine sand or fine sand.	SP–SM, SM	A–2, A–3	90–100	80–100

See footnotes at end of table.

properties of the soils [1]

and Tidal marsh (Tm) are not included in this table because they are variable in characteristics or because sufficient information about the soils for further information]

Percentage passing sieve—Continued		Permeability	Available water capacity	Reaction (unlimed)	Moisture-density data		Shrink-swell potential	Corrosivity	
No. 40	No. 200				Optimum moisture	Maximum dry density		Uncoated steel	Concrete
		Inches per hour	*Inches per inch of soil*	*pH value*	*Percent*	*Pounds per cubic foot*			
95–100	75–90	0. 63–2. 0	0. 18–0. 24	4. 0–5. 0			Low	Moderate	High.
95–100	75–90	0. 20–. 63	0. 18–0. 24	4. 0–5. 0	14–18	101–110	Low to moderate	Moderate	High.
90–100	65–80	<. 20	0. 08–0. 18	4. 0–5. 0	10–15	111–125	Low	Moderate	High.
95–100	70–100	0. 63–2. 0	0. 18–0. 24	4. 5–5. 5	14–18	101–110	Low	Moderate	High.
95–100	80–100	0. 20–. 63	0. 18–0. 24	4. 5–5. 5	14–18	101–110	Low to moderate	Moderate	High.
80–100	45–100	0. 63–2. 0	0. 12–0. 24	4. 5–5. 5	10–18	101–120	Low	Moderate	High.
40–90	0–5	6. 3+	<0. 06	5. 0–8. 0	9–15	91–110	Very low	High	High.
90–100	60–90	0. 20–6. 3	0. 18–0. 22	4. 0–5. 0			Low to moderate	High	High.
90–100	70–100	<. 20	0. 16–0. 20	4. 0–5. 0	16–24	101–110	Moderate	High	High.
60–100	30–80	0. 20–. 63	0. 12–0. 20	4. 0–5. 0	10–20	101–125	Low to moderate	High	High.
40–90	5–20	6. 3+	<0. 06	4. 0–5. 0	10–14	101–115	Very low	Low	High.
70–95	30–45	2. 0–6. 3	0. 12–0. 18	4. 0–5. 0			Low	High	High.
65–100	20–65	0. 63–2. 0	0. 18–0. 24	4. 0–5. 0	10–14	111–125	Low	High	High.
50–90	5–20	2. 0–6. 3	0. 06–0. 10	4. 0–5. 0	10–14	101–125	Low	High	High.
85–100	30–90	0. 20–2. 0	0. 18–0. 29	4. 0–5. 5			Low to moderate	Moderate	High.
90–100	65–95	0. 20–0. 63	0. 18–0. 27	4. 0–5. 0	12–18	101–115	Moderate	High	High.
90–100	35–95	0. 20–2. 0	0. 18–0. 24	4. 0–5. 0	10–20	91–115	Moderate	High	High.
70–95	25–65	0. 20–2. 0	0. 12–0. 24	4. 0–5. 0	12–18	101–115	Low	Moderate	High.
20–70	10–45	2. 0–6. 3	0. 06–0. 18	4. 0–5. 0	10–18	111–130	Low	Moderate	High.
90–100	65–100	0. 20–. 63	0. 18–0. 24	4. 0–5. 0			Low to moderate	High	High.
95–100	80–100	<. 20	0. 18–0. 24	4. 0–5. 0	14–27	91–110	Moderate	High	High.
60–100	20–45	0. 20–2. 0	0. 12–0. 16	4. 0–5. 0	10–15	111–115	Low to moderate	High	High.
90–100	35–80	2. 0–6. 3	0. 14–0. 20	4. 0–5. 5			Low	Low	High.
90–100	30–90	0. 63–2. 0	0. 16–0. 24	4. 0–5. 5	10–15	111–125	Low	Low	High.
75–100	5–20	2. 0–6. 3	0. 06–0. 12	4. 0–5. 5	10–14	101–110	Low	Low	High.

TABLE 5.—*Estimated engineering*

Soil series and map symbols	Depth to seasonal high water table	Depth from surface of typical profile	Dominant USDA texture	Classification		Percentage passing sieve—	
				Unified	AASHO	No. 4	No. 10
	Feet	*Inches*					
Matapeake: MmA, MmB2, MnA, MnB2, MnC2, MnC3, MnD3.	5+	0–12	Silt loam	SM, ML, ML–CL	A–4, A–6	95–100	95–100
		12–35	Silt loam and loam	ML–CL, CL	A–4, A–6, A–7	95–100	95–100
		35–46	Sandy loam	SM, SM–SC	A2	90–100	85–100
		46–60	Loamy sand	SP–SM, SM–SC	A2	90–100	85–100
Mattapex: MtA, MtB2, MuA, MuB2, MuD3.	1½–2½	0–13	Silt loam	SM, ML, ML–CL	A–4, A–6	95–100	95–100
		13–24	Silty clay loam	ML–CL, CL	A–6, A–7	95–100	95–100
		24–38	Fine sandy loam and sandy clay loam.	SM–SC, SC, ML–CL	A–2, A–4, A–6	90–100	90–100
		38–50	Loamy sand	SP–SM, SM	A–2	90–100	90–100
Ochlockonee: OcB	4+	0–32	Fine sandy loam	SM	A–2, A–4	90–100	90–100
		32–42	Sand	SP, SP–SM	A–2, A–3	90–100	90–100
Othello: OtA, OtB	0–1	0–10	Silt loam	ML–CL	A–4	95–100	95–100
		10–24	Silty clay loam	ML, CL	A–4, A–6	95–100	90–100
		24–29	Sandy clay loam	SC, CL	A–2, A–4, A–6	90–100	90–100
		29–48	Loamy sand	SP–SM, SM	A–2	90–100	80–100
Rumford: RdB, RdC2, RdD2, ReB, ReC, ReD. For Evesboro component of ReB, ReC, and ReD, see Evesboro series.	5+	0–17	Loamy sand	SM	A–2	80–100	70–100
		17–28	Sandy loam	SM, SC	A–2, A–4	80–100	75–100
		28–48	Sand	SP, SP–SM	A–3	70–100	65–100
Sassafras: SaA, SaB2, SaC2, ShA, ShB2, ShC2, ShC3, ShD2, ShD3, SlA, SlB2, SlC3, SpB2, SpC3, SrE. For Westphalia component of SpB2, SpC3, and SrE, see Westphalia series.	5+	0–19	Loamy fine sand, fine sandy loam, or loam.	SM, ML	A–2, A–4	80–100	70–100
		19–41	Sandy clay loam	SM, SC, CL	A–2, A–4, A–6	80–100	75–100
		41–60	Loamy fine sand	SP, SP–SM, SM, SC	A–2, A–3, A–4	70–100	65–100
Westphalia: WaB2, WaC2, WaC3, WaD2, WaD3.	5+	0–8	Fine sandy loam	SM	A–2, A–4	80–100	70–100
		8–21	Fine sandy loam	SM, SC, CL	A–2, A–4, A–6	80–100	75–100
		21–48	Fine sand	SP–SM, SM	A–2, A–3	75–100	70–100
Woodstown: WoA, WoB	1½–2½	0–14	Fine sandy loam	SM, ML	A–2, A–4	95–100	95–100
		14–33	Sandy clay loam	SM, SC, CL	A–4, A–6	95–100	95–100
		33–48	Sand	SP, SP–SM	A–2, A–3	95–100	95–100

[1] Depth to bedrock is not shown in this table because the soils formed in deep Coastal Plain sediments.

properties of the soils [1]—Continued

Percentage passing sieve—Continued		Permeability	Available water capacity	Reaction (unlimed)	Moisture-density data		Shrink-swell potential	Corrosivity	
No. 40	No. 200				Optimum moisture	Maximum dry density		Uncoated steel	Concrete
		Inches per hour	*Inches per inch of soil*	*pH value*	*Percent*	*Pounds per cubic foot*			
90–100	40–90	0. 63–2. 0	0. 18–0. 27	4. 5–5. 5			Low	Low	Moderate.
90–100	60–90	0. 20–2. 00	0. 18–0. 24	4. 5–5. 0	12–18	101–110	Low to moderate	Moderate	Moderate.
80–100	20–35	0. 63–2. 0	0. 12–0. 18	4. 5–5. 0	10–14	111–120	Low	Low	High.
70–100	10–20	0. 63–6. 3	0. 06–0. 12	4. 5–5. 0	10–16	101–120	Low	Low	High.
85–100	40–80	0. 63–2. 0	0. 18–0. 27	4. 5–5. 5			Low	Moderate	Moderate.
90–100	75–95	0. 20–. 63	0. 18–0. 27	4. 5–5. 5	12–18	101–110	Low to moderate	High	High.
70–100	30–80	0. 20–2. 0	0. 12–0. 24	4. 5–5. 5	9–15	111–125	Low	High	High.
60–100	10–20	0. 63–6. 3	0. 06–0. 12	4. 5–5. 5	10–16	101–120	Low	High	High.
70–100	25–45	0. 63–2. 0	0. 12–0. 18	4. 5–5. 0	12–18	101–115	Low	Low	High.
20–70	5–15	6. 3+	0. 06–0. 10	4. 0–5. 0	8–12	101–110	Low	Low	High.
80–100	60–100	0. 20–2. 0	0. 18–0. 27	4. 0–5. 0			Low	High	High.
85–100	70–100	0. 20–. 63	0. 18–0. 24	4. 0–5. 0	12–18	111–120	Low to moderate	High	High.
60–90	30–60	0. 20–. 63	0. 18–0. 24	4. 0–5. 0	10–14	111–125	Low	High	High.
50–80	10–20	0. 63–6. 3	0. 06–0. 12	4. 0–5. 0	10–16	101–120	Low	High	High.
50–85	15–30	2. 0–6. 3	0. 06–0. 12	4. 0–5. 0			Low	Low	High.
50–90	25–40	0. 63–2. 0	0. 12–0. 18	4. 0–5. 0	7–14	111–125	Low	Low	High.
40–80	0–10	6. 3+	<. 06	4. 0–5. 0	8–14	91–110	Low	Low	High.
50–85	15–60	2. 0–6. 3	0. 12–0. 24	4. 0–5. 5			Low	Low	High.
65–90	25–60	. 63–2. 0	0. 18–0. 24	4. 0–5. 5	7–18	111–125	Low	Low	High.
40–80	5–45	2. 0–6. 3	0. 06–0. 10	4. 0–5. 0	9–15	101–125	Low	Low	High.
50–100	20–50	2. 0–6. 3	0. 12–0. 18	4. 0–5. 0			Low	Low	High.
65–100	25–70	0. 63–2. 0	0. 18–0. 24	4. 5–5. 5	10–15	105–120	Low	Low	High.
60–100	10–25	2. 0–6. 3	0. 06–0. 10	4. 5–5. 5	10–17	101–115	Low	Low	High.
75–95	30–65	0. 63–2. 0	0. 12–0. 18	4. 0–5. 0			Low	Low	High.
75–100	35–65	0. 63–2. 0	0. 18–0. 24	4. 0–5. 0	7–18	111–125	Low	Moderate	High.
40–70	5–15	2. 0–6. 3	0. 06–0. 08	4. 0–5. 0	9–15	101–120	Low	Moderate	High.

[2] Perched water table.

TABLE 6.—*Engineering*

[Not included in this table are Eroded land, steep (ErE) Escarpments

Soil series and map symbols	Suitability as source of—				Susceptibility to frost action	Soil features affecting—
	Topsoil [1]	Sand	Gravel	Road fill		Road and highway location [2]
Beltsville: BlB2, BlC3	Fair	Not suitable	Not suitable	Poor	Severe	Water table; fair stability; severe frost action.
Butlertown: BtA, BtB2, BtC3	Good	Not suitable	Not suitable	Poor to fair	Severe	Water table; fair stability; severe frost action.
Coastal beaches: Co	Not suitable	Good	Not suitable	Poor	Low	Water table; tidal hazard; loose; poor stability.
Elkton: Ek	Poor	Not suitable	Not suitable	Poor	Severe	Water table; poor stability; severe frost action.
Evesboro: EvB, EvC, EvE	Poor	Fair	Locally fair	Poor alone; good if soil binder is added.	Slight	Fair stability; slight frost action.
Fallsington: FsA, FsB	Fair	Locally fair	Not suitable	Fair to good	Severe	Water table; fair to good stability; severe frost action.
Howell: HoB2, HoC2, HoD2, HwB2, HyC3, HyD3.	Good, unless severely eroded.	Not suitable	Not suitable	Poor	Moderate	Poor to fair stability; moderate frost action.
Iuka: ImB	Fair	Locally fair	Not suitable	Fair	Moderate	Water table; fair stability; moderate frost action.
Keyport: KpA, KpB2	Fair	Not suitable	Not suitable	Poor	Severe	Water table; poor to fair stability; severe frost action.
Marr: MlA, MlB2, MlC2, MlC3, MlD3.	Good, unless severely eroded.	Not suitable	Not suitable	Good	Moderate	Good stability; moderate frost action.

See footnotes at end of table.

interpretations

(Es), Gravel and borrow pits (Gp), Made land (Ma), and Swamp (Sx)]

Soil features affecting—Continued						
Dikes, levees, dams, and embankments [3]	Pond and reservoir sites	Agricultural drainage	Irrigation	Terraces and diversions	Waterways [4]	Pipelines [5]
Fair stability; highly erodible; medium to high maximum density.	Low seepage	Slowly permeable; highly erodible.	Moderate available moisture capacity; slow infiltration; impeded drainage.	Highly erodible; fair stability.	Moderate available moisture capacity; moderate fertility; erodible.	1 to 2 feet to perched water table; fair stability.
Fair stability; highly erodible; high to medium maximum density.	Low to moderate seepage.	Moderately slowly permeable; highly erodible.	High available moisture capacity; medium infiltration; impeded drainage.	Highly erodible; fair stability.	High available moisture capacity; moderate fertility; erodible.	2 to 4 feet to high water table; fair stability.
Poor stability; easily eroded by winds; medium maximum density; highly porous.	Not applicable	Drainage not needed.	Extremely low available moisture capacity; extremely rapid infiltration.	Not applicable	Not applicable	Fluctuating saline water table; loose; poor stability.
Poor stability; highly erodible; low to high maximum density.	Low seepage	Slowly permeable; highly erodible.	High available moisture capacity; slow infiltration; poor drainage.	Highly erodible; poor stability.	High available moisture capacity; low fertility; erodible.	0 to 1 foot to high water table; poor stability.
Fair stability; easily eroded by winds; medium maximum density; porous.	High to excessive seepage.	Drainage not needed.	Very low available moisture capacity; rapid infiltration.	Easily eroded by winds; fair stability.	Very low available moisture capacity; low fertility; erodible.	10 feet or more to water table; fair stability.
Fair stability; highly erodible; high to medium maximum density.	Moderate seepage.	Moderately permeable; moderately erodible.	Moderate to high available moisture capacity; medium infiltration; poor drainage.	Moderately erodible; fair to good stability.	Moderate to high available moisture capacity; low fertility; erodible.	0 to 1 foot to high water table; fair to good stability.
Poor to fair stability; highly erodible; low to high maximum density.	Low seepage	Drainage not needed.	High available moisture capacity; slow infiltration.	Highly erodible; poor to fair stability.	High available moisture capacity; moderate fertility; erodible.	5 feet or more to water table; poor to fair stability.
Fair stability; moderately erodible; medium maximum density.	Moderate to high seepage.	Moderately permeable; moderately erodible.	Moderate to high available moisture capacity; medium infiltration; impeded drainage.	Moderately erodible; fair stability.	Moderate to high available moisture capacity; low fertility; erodible.	1 to 2 feet to high water table; fair stability.
Poor to fair stability; highly erodible; low to high maximum density.	Low seepage	Slowly permeable; highly erodible.	High available moisture capacity; slow infiltration; impeded drainage.	Highly erodible; poor to fair stability.	High available moisture capacity; low fertility; erodible.	1½ to 2½ feet to high water table; poor to fair stability.
Fair stability; moderately erodible; high to medium maximum density.	Moderate to high seepage.	Drainage not needed.	High available moisture capacity; medium infiltration.	Moderately erodible; good stability.	High available moisture capacity; moderate fertility; erodible.	5 feet or more to water table; good stability.

TABLE 6.—*Engineering*

Soil series and map symbols	Suitability as source of—				Susceptibility to frost action	Soil features affecting—
	Topsoil [1]	Sand	Gravel	Road fill		Road and highway location [2]
Matapeake: MmA, MmB2, MnA, MnB2, MnC2, MnC3, MnD3.	Good	Locally fair	Not suitable	Fair above 3 feet; good below.	Moderate	Fair stability; moderate frost action.
Mattapex: MtA, MtB2, MuA, MuB2, MuD3.	Good	Locally fair below 3 to 5 feet.	Not suitable	Fair above 3 feet; good below.	Severe	Fair stability; severe frost action.
Mixed alluvial land: My	Poor to fair	Mostly not suitable.	Mostly not suitable.	Poor to good	Severe	Variable for all features.
Ochlockonee: OcB	Fair	Locally fair	Locally fair	Fair	Moderate	Fair stability; moderate frost action.
Othello: OtA, OtB	Fair	Not suitable	Not suitable	Poor to fair	Severe	Water table; poor stability; severe frost action.
Rumford: RdB, RdC2, RdD2, ReB, ReC, ReD. For properties of Evesboro soils in mapping units ReB, ReC, and ReD, refer to Evesboro series.	Fair	Poor (good below 3 feet).	Locally fair	Fair to good	Slight	Fair stability; high to medium maximum density.
Sassafras: SaA, SaB2, SaC2, ShA, ShB2, ShC2, ShC3, ShD2, ShD3, SlA, SlB2, SlC3, SpB2, SpC3, SrE. For properties of Westphalia soils in mapping units SpB2, SpC3, and SrE, refer to Westphalia series.	Fair to good	Locally fair	Locally fair	Good	Slight to moderate.	Good stability; moderately erodible; high to medium maximum density.
Tidal marsh: Tm	Not suitable	Not suitable	Not suitable	Not suitable	Very severe	Very poor stability; tidal flooding.
Westphalia: WaB2, WaC2, WaC3, WaD2, WaD3.	Fair	Fair	Locally fair	Fair to good	Slight	Fair stability; highly erodible; high to medium maximum density.
Woodstown: WoA, WoB	Good	Locally fair	Not suitable	Fair to good	Severe	Good stability; moderately erodible.

[1] Rating is for the A horizon, or to a depth of 10 inches, whatever is less; severely eroded soils are generally not suitable.
[2] Important effects of slope and changes in slope are not included.

interpretations—Continued

Soil features affecting—Continued						
Dikes, levees, dams, and embankments [3]	Pond and reservoir sites	Agricultural drainage	Irrigation	Terraces and diversions	Waterways [4]	Pipelines [5]
Fair stability; moderately erodible; high to medium maximum density.	Moderate to high seepage.	Drainage not needed.	High available moisture capacity; medium infiltration.	Moderately erodible; fair stability.	High moisture capacity; moderate fertility; erodible.	5 feet or more to water table; fair stability.
Fair stability; highly erodible; high to medium maximum density.	Moderate to high seepage.	Moderately slowly permeable; highly erodible.	High available moisture capacity; medium infiltration; impeded drainage.	Highly erodible; fair stability.	High available moisture capacity; moderate fertility; erodible.	1½ to 2½ feet to high water table; fair stability.
Water table; moderate to severe frost action.	Variable seepage; constant water source.	Variable for all features.	Variable for all features.	Variable for all features.	Variable for all features.	0 to 4 feet to high water table; poor to good stability.
Fair stability; moderately erodible; medium maximum density.	Moderate to high seepage.	Drainage not needed.	Moderate available moisture capacity; medium infiltration.	Moderately erodible; fair stability.	Moderate available moisture capacity; moderate fertility; erodible.	4 feet or more to water table; fair stability.
Poor stability; highly erodible; medium to high maximum density.	Low seepage in subsoil; higher in substratum.	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.	0 to 1 foot to high water table; poor stability.
Fair stability; slight frost action.	Moderate to excessive seepage.	Drainage not needed.	Low available moisture capacity; rapid infiltration.	Fair stability----	Low available moisture capacity; low fertility; erodible.	5 feet or more to water table; fair stability.
Good stability; slight to moderate frost action.	Moderate to high seepage.	Drainage not needed.	Moderate available moisture capacity; medium to rapid infiltration.	Moderately erodible; good stability.	Moderate available moisture capacity; moderate fertility; erodible.	5 feet or more to water table; good stability.
Very poor stability; tidal flooding.	Not applicable--	Not applicable--	Not applicable----	Not applicable--	Not applicable----	Very poor stability; tidal flooding.
Fair stability; slight frost action.	Moderate to excessive seepage.	Drainage not needed.	Moderate available moisture capacity; medium to rapid infiltration.	Highly erodible; fair stability.	Moderate available moisture capacity; low fertility; erodible.	5 feet or more to water table; fair stability.
Water table; good stability; severe frost action.	Moderate to high seepage.	Moderately permeable; moderately erodible.	High available moisture capacity; medium infiltration; impeded drainage.	Moderately erodible; good stability.	High available moisture capacity; moderate fertility; erodible.	1½ to 2½ feet to high water table; good stability.

[3] Where two ratings are given for maximum density, the first applies to the subsoil and the second to the substratum.
[4] Applies primarily to the surface layer, to normal plow depth.
[5] See also the columns under Corrosivity in table 5.

TABLE 7.—*Soil limitations*

[Not included in this table are Escarpments

Soil series and map symbols	Sewage disposal		Homes with basements (3 stories or less)
	Filter fields	Lagoons	
Beltsville:			
BlB2	Severe: slow permeability; seasonal perched water table.	Moderate: 2 to 5 percent slopes.	Moderate: seasonal perched water table.
BlC3	Severe: slow permeability; seasonal perched water table.	Severe: 5 to 10 percent slopes.	Moderate: seasonal perched water table.
Butlertown:			
BtA	Severe: moderately slow permeability; seasonal perched water table.	Slight	Moderate: seasonal perched water table.
BtB2	Severe: moderately slow permeability; seasonal perched water table.	Moderate: 2 to 5 percent slopes.	Moderate: seasonal perched water table.
BtC3	Severe: moderately slow permeability; seasonal perched water table.	Severe: 5 to 10 percent slopes.	Moderate: seasonal perched water table.
Coastal beaches:			
Co	Severe: fluctuating water table; tidal flooding.	Severe: very rapid permeability; tidal flooding.[1]	Severe: fluctuating water table; tidal flooding; poor stability.
Elkton:			
Ek	Severe: high water table; slow permeability.	Slight	Severe: high water table
Eroded land, steep:			
ErE	Severe: 15 to 40 percent slopes	Severe: 15 to 40 percent slopes.	Severe: 15 to 40 percent slopes.
Evesboro:			
EvB	Slight [1]	Severe: rapid permeability [1]	Slight
EvC	Slight [1]	Severe: rapid permeability; 6 to 12 percent slopes. [1]	Slight
EvE	Moderate to severe: 12 to 35 percent slopes.[1]	Severe: rapid permeability; 12 to 35 percent slopes.[1]	Moderate on 12 to 15 percent slopes; severe on 15 to 35 percent slopes.
Fallsington:			
FsA	Severe: high water table	Moderate: moderate permeability.	Severe: high water table
FsB	Severe: high water table	Moderate: moderate permeability; 2 to 5 percent slopes.	Severe: high water table
Howell:			
HoB2	Severe: moderately slow permeability.	Moderate: 2 to 6 percent slopes.	Slight
HoC2	Severe: moderately slow permeability.	Severe: 6 to 12 percent slopes.	Slight
HoD2	Severe: moderately slow permeability.	Severe: 12 to 20 percent slopes.	Moderate, 12 to 15 percent slopes; severe, 15 to 20 percent slopes.

See footnotes at end of table.

for specified nonfarm uses

(Es), Gravel and borrow pits (Gp), and Made land (Ma)]

Roads and highways	Streets and parking lots	Cemeteries	Home gardens
Moderate: seasonal perched water table.	Moderate: seasonal perched water table; 2 to 5 percent slopes.	Severe: slow permeability	Moderate: impeded natural drainage; 2 to 5 percent slopes.
Moderate: seasonal perched water table; 5 to 10 percent slopes.	Severe: 5 to 10 percent slopes	Severe: slow permeability	Severe: 5 to 10 percent slopes; severely eroded.
Moderate: seasonal perched water table.	Moderate: seasonal perched water table.	Moderate: moderately slow permeability; seasonal perched water table.	Moderate: impeded natural drainage.
Moderate: seasonal perched water table.	Moderate: seasonal perched water table; 2 to 5 percent slopes.	Moderate: moderately slow permeability; seasonal perched water table.	Moderate: impeded natural drainage; 2 to 5 percent slopes.
Moderate: seasonal perched water table; 5 to 10 percent slopes.	Severe: 5 to 10 percent slopes.	Moderate: moderately slow permeability; seasonal perched water table; severely eroded.	Severe: 5 to 10 percent slopes; severely eroded.
Severe: fluctuating water table; tidal flooding; poor stability.	Severe: fluctuating water table; tidal flooding; poor stability.	Severe: fluctuating water table; tidal flooding; extreme sandiness.	Severe: extreme droughtiness and low fertility; salinity; blowing sand.
Severe: high water table	Severe: high water table	Severe: high water table; slow permeability.	Severe: poor natural drainage.
Severe: 15 to 40 percent slopes.	Severe: 15 to 40 percent slopes.	Severe: 15 to 40 percent slopes; severely eroded.	Severe: 15 to 40 percent slopes; severely eroded.
Slight	Slight to moderate: 0 to 6 percent slopes.	Severe: loose loamy sand	Severe: very low available moisture capacity and fertility.
Moderate: 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.	Severe: loose loamy sand	Severe: very low available moisture capacity and fertility; 6 to 12 percent slopes.
Severe: 12 to 35 percent slopes.	Severe: 12 to 35 percent slopes.	Severe: loose loamy sand; 12 to 35 percent slopes.	Severe: very low available moisture capacity and fertility; 12 to 35 percent slopes.
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	Moderate: 2 to 6 percent slopes.	Severe: moderately slow permeability.	Moderate: 2 to 6 percent slopes.
Moderate: 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.	Severe: moderately slow permeability.	Severe: 6 to 12 percent slopes.
Moderate: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Severe: moderately slow permeability.	Severe: 12 to 20 percent slopes.

TABLE 7.—*Soil limitations for*

Soil series and map symbols	Sewage disposal		Homes with basements (3 stories or less)
	Filter fields	Lagoons	
Howell—Continued			
HwB2	Severe: moderately slow permeability.	Moderate: 2 to 6 percent slopes.	Slight
HyC3	Severe: moderately slow permeability.	Severe: 6 to 12 percent slopes.	Slight
HyD3	Severe: moderately slow permeability.	Severe: 12 to 20 percent slopes.	Moderate, 12 to 15 percent slopes; severe, 15 to 20 percent slopes.
Iuka:			
ImB	Severe: high water table; variable permeability.	Moderate to severe: variable permeability; 2 to 5 percent slopes.	Severe: high water table
Keyport:			
KpA	Severe: slow permeability	Slight	Moderate: moderately high water table.
KpB2	Severe: slow permeability	Moderate: 2 to 5 percent slopes.	Moderate: moderately high water table.
Marr:			
MlA	Slight	Slight	Slight
MlB2	Slight	Moderate: 2 to 6 percent slopes.	Slight
MlC2	Moderate: 6 to 12 percent slopes	Severe: 6 to 12 percent slopes.	Slight
MlC3	Moderate: 6 to 12 percent slopes	Severe: 6 to 12 percent slopes.	Slight
MlD3	Severe: 12 to 20 percent slopes	Severe: 12 to 20 percent slopes.	Moderate, 12 to 15 percent slopes; severe, 15 to 20 percent slopes.
Matapeake:			
MmA	Moderate: moderate to moderately slow permeability in the upper 3 feet.	Slight	Slight
MmB2	Moderate: moderate to moderately slow permeability in the upper 3 feet.	Moderate: 2 to 5 percent slopes.	Slight
MnA	Moderate: moderate to moderately slow permeability in the upper 3 feet.	Slight	Slight
MnB2	Moderate: moderate to moderately slow permeability in the upper 3 feet.	Moderate: 2 to 5 percent slopes.	Slight
MnC2	Moderate: moderate to moderately slow permeability in the upper 3 feet.	Severe: 5 to 10 percent slopes.	Slight

See footnotes at end of table.

specified nonfarm uses—Continued

Roads and highways	Streets and parking lots	Cemeteries	Home gardens
Slight	Moderate: 2 to 6 percent slopes.	Severe: moderately slow permeability.	Moderate: 2 to 6 percent slopes.
Moderate: 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.	Severe: moderately slow permeability.	Severe: 6 to 12 percent slopes; severely eroded.
Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Severe: slow permeability; 12 to 20 percent slopes; severely eroded.	Severe: 12 to 20 percent slopes; severely eroded.
Moderate: high water table	Moderate: high water table	Severe: high water table	Moderate: impeded natural drainage; 2 to 5 percent slopes.
Moderate: moderately high water table.	Moderate: moderately high water table.	Severe: slow permeability	Moderate: impeded natural drainage.
Moderate: moderately high water table.	Moderate: moderately high water table; 2 to 5 percent slopes.	Severe: slow permeability	Moderate: impeded natural drainage; 2 to 5 percent slopes.
Slight	Slight	Slight	Slight.
Slight	Moderate: 2 to 6 percent slopes.	Slight	Moderate: 2 to 6 percent slopes.
Moderate: 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.	Moderate: 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.
Moderate: 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes, severely eroded.	Severe: 6 to 12 percent slopes; severely eroded.
Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes; severely eroded.
Slight	Slight	Slight	Slight.
Slight	Moderate: 2 to 5 percent slopes.	Slight	Moderate: 2 to 5 percent slopes.
Slight	Slight	Slight	Slight.
Slight	Moderate: 2 to 5 percent slopes.	Slight	Moderate: 2 to 5 percent slopes.
Moderate: 5 to 10 percent slopes.	Severe: 5 to 10 percent slopes.	Slight	Severe: 5 to 10 percent slopes.

TABLE 7.—*Soil limitations for*

Soil series and map symbols	Sewage disposal		Homes with basements (3 stories or less)
	Filter fields	Lagoons	
Matapeake—Continued			
MnC3	Moderate: moderate to moderately slow permeability in the upper 3 feet.	Severe: 5 to 10 percent slopes.	Slight
MnD3	Moderate: moderate to moderately slow permeability in the upper 3 feet; 10 to 15 percent slopes.	Severe: 10 to 15 percent slopes.	Moderate: 10 to 15 percent slopes.
Mattapex:			
MtA	Severe: moderately slow permeability.	Slight	Moderate: moderately high water table.
MtB2	Severe: moderately slow permeability.	Moderate: 2 to 5 percent slopes.	Moderate: moderately high water table.
MuA	Severe: moderately slow permeability.	Slight	Moderate: moderately high water table.
MuB2	Severe: moderately slow permeability.	Moderate: 2 to 5 percent slopes.	Moderate: moderately high water table.
MuD3	Severe: moderately slow permeability.	Severe: 5 to 15 percent slopes.	Moderate: moderately high water table; 5 to 15 percent slopes.
Mixed alluvial land:			
My	Severe: flood hazard [1]	Severe: flood hazard [1]	Severe: flood hazard
Ochlockonee:			
OcB	Slight	Moderate: moderate permeability; 2 to 5 percent slopes.	Slight
Othello:			
OtA	Severe: high water table; moderately slow permeability.	Slight	Severe: high water table
OtB	Severe: high water table; moderately slow permeability.	Moderate: 2 to 5 percent slopes.	Severe: high water table
Rumford:			
RdB	Slight	Moderate: moderate permeability; 2 to 5 percent slopes.	Slight
RdC2	Slight	Severe: 5 to 10 percent slopes	Slight
RdD2	Moderate: 10 to 15 percent slopes	Severe: 10 to 15 percent slopes	Moderate: 10 to 15 percent slopes.
Rumford-Evesboro:			
ReB Rumford	Slight	Moderate: moderate permeability; 2 to 6 percent slopes.	Slight
ReB Evesboro	Slight [1]	Severe: rapid permeability [1]	Slight

See footnotes at end of table.

specified nonfarm uses—Continued

Roads and highways	Streets and parking lots	Cemeteries	Home gardens
Moderate: 5 to 10 percent slopes.	Severe: 5 to 10 percent slopes.	Moderate: 5 to 10 percent slopes; severely eroded.	Severe: 5 to 10 percent slopes; severely eroded.
Moderate: 10 to 15 percent slopes.	Severe: 10 to 15 percent slopes.	Severe: 10 to 15 percent slopes; severely eroded.	Severe: 10 to 15 percent slopes; severely eroded.
Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: moderately high water table; moderately slow permeability.	Moderate: impeded natural drainage.
Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: moderately high water table; moderately slow permeability.	Moderate: impeded natural drainage; 2 to 5 percent slopes.
Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: moderately high water table; moderately slow permeability.	Moderate: impeded natural drainage.
Moderate: moderately high water table.	Moderate: moderately high water table.	Moderate: moderately high water table; moderately slow permeability.	Moderate: impeded natural drainage; 2 to 5 percent slopes.
Moderate: moderately high water table; 5 to 15 percent slopes.	Severe: 5 to 15 percent slopes.	Moderate to severe: 5 to 15 percent slopes; severely eroded.	Severe: 5 to 15 percent slopes; severely eroded.
Severe: flood hazard	Severe: flood hazard	Severe: flood hazard	Severe: flood hazard.
Slight	Moderate: 2 to 5 percent slopes.	Slight	Moderate: 2 to 5 percent slopes.
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	Moderate: 2 to 5 percent slopes.	Moderate: loamy sand surface layer.	Moderate: moderate available moisture capacity.
Moderate: 5 to 10 percent slopes.	Severe: 5 to 10 percent slopes	Moderate: loamy sand surface layer.	Severe: 5 to 10 percent slopes.
Moderate: 10 to 15 percent slopes.	Severe: 10 to 15 percent slopes	Moderate: loamy sand surface layer; 10 to 15 percent slopes.	Severe: 10 to 15 percent slopes.
Slight	Moderate: 2 to 6 percent slopes	Moderate: loamy sand surface layer.	Moderate: moderate available moisture capacity.
Slight	Moderate: 2 to 6 percent slopes	Severe: loose loamy sand	Severe: very low available moisture capacity and fertility.

TABLE 7.—*Soil limitations for*

Soil series and map symbols	Sewage disposal		Homes with basements (3 stories or less)
	Filter fields	Lagoons	
Rumford-Evesboro—Con.			
ReC Rumford	Slight	Severe: 6 to 12 percent slopes	Slight
ReC Evesboro	Slight [1]	Severe: rapid permeability; 6 to 12 percent slopes. [1]	Slight
ReD Rumford	Moderate to severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes	Moderate, 12 to 15 percent slopes; severe, 15 to 20 percent slopes.
ReD Evesboro	Moderate to severe: 12 to 20 percent slopes.[1]	Severe: rapid permeability; 12 to 20 percent slopes.[1]	Moderate, 12 to 15 percent slopes; severe, 15 to 20 percent slopes.
Sassafras:			
SaA	Slight	Moderate: moderate permeability.	Slight
SaB2	Slight	Moderate: moderate permeability; 2 to 5 percent slopes.	Slight
SaC2	Slight	Severe: 5 to 10 percent slopes	Slight
ShA	Slight	Moderate: moderate permeability.	Slight
ShB2	Slight	Moderate: moderate permeability; 2 to 5 percent slopes.	Slight
ShC2	Slight	Severe: 5 to 10 percent slopes	Slight
ShC3	Slight	Severe: 5 to 10 percent slopes	Slight
ShD2	Moderate: 10 to 15 percent slopes.	Severe: 10 to 15 percent slopes	Moderate: 10 to 15 percent slopes.
ShD3	Moderate: 10 to 15 percent slopes.	Severe: 10 to 15 percent slopes	Moderate: 10 to 15 percent slopes.
SlA	Slight	Moderate: moderate permeability.	Slight
SlB2	Slight	Moderate: moderate permeability; 2 to 5 percent slopes.	Slight
SlC3	Slight	Severe: 5 to 10 percent slopes	Slight

See footnotes at end of table.

specified nonfarm uses—Continued

Roads and highways	Streets and parking lots	Cemeteries	Home gardens
Moderate: 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.	Moderate: loamy sand surface layer.	Severe: 6 to 12 percent slopes.
Moderate: 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.	Severe: loose loamy sand	Severe: very low available moisture capacity and fertility; 6 to 12 percent slopes.
Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.
Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Severe: loose loamy sand; 12 to 20 percent slopes.	Severe: Very low available moisture capacity and fertility; 12 to 20 percent slopes.
Slight	Slight	Moderate: loamy fine sand surface layer.	Slight.
Slight	Moderate: 2 to 5 percent slopes.	Moderate: loamy fine sand surface layer.	Moderate: 2 to 5 percent slopes.
Moderate: 5 to 10 percent slopes.	Severe: 5 to 10 percent slopes.	Moderate: loamy fine sand surface layer.	Severe: 5 to 10 percent slopes.
Slight	Slight	Slight	Slight.
Slight	Moderate: 2 to 5 percent slopes.	Slight	Moderate: 2 to 5 percent slopes.
Moderate: 5 to 10 percent slopes.	Severe: 5 to 10 percent slopes.	Slight	Severe: 5 to 10 percent slopes.
Moderate: 5 to 10 percent slopes.	Severe: 5 to 10 percent slopes.	Moderate: 5 to 10 percent slopes; severely eroded.	Severe: 5 to 10 percent slopes; severely eroded.
Moderate: 10 to 15 percent slopes.	Severe: 10 to 15 percent slopes.	Moderate: 10 to 15 percent slopes.	Severe: 10 to 15 percent slopes.
Moderate: 10 to 15 percent slopes.	Severe: 10 to 15 percent slopes.	Severe: 10 to 15 percent slopes; severely eroded.	Severe: 10 to 15 percent slopes; severely eroded.
Slight	Slight	Slight	Slight.
Slight	Moderate: 2 to 5 percent slopes.	Slight	Moderate: 2 to 5 percent slopes.
Moderate: 5 to 10 percent slopes.	Severe: 5 to 10 percent slopes.	Moderate: 5 to 10 percent slopes; severely eroded.	Severe: 5 to 10 percent slopes; severely eroded.

TABLE 7.—*Soil limitations for*

Soil series and map symbols	Sewage disposal		Homes with basements (3 stories or less)
	Filter fields	Lagoons	
Sassafras-Westphalia:			
SpB2 Sassafras	Slight	Moderate: moderate permeability; 2 to 6 percent slopes.	Slight
SpB2 Westphalia	Slight	Severe: too rapidly permeable	Slight
SpC3 Sassafras	Slight	Severe: 5 to 10 percent slopes	Slight
SpC3 Westphalia	Slight	Severe: too rapidly permeable; 6 to 12 percent slopes.	Slight
SrE	Severe: 15 to 35 percent slopes	Severe: 15 to 35 percent slopes.[2]	Severe: 15 to 35 percent slopes.
Swamp: Sx	Severe: high water table [1]	Severe: high water table [1]	Severe: high water table
Tidal marsh: Tm	Severe: tidal flooding [1]	Severe: tidal flooding [1]	Severe: tidal flooding
Westphalia: WaB2	Slight	Severe: too rapidly permeable.	Slight
WaC2	Slight	Severe: too rapidly permeable; 6 to 12 percent slopes.	Slight
WaC3	Slight	Severe: too rapidly permeable; 6 to 12 percent slopes.	Slight
WaD2	Moderate to severe: 12 to 20 percent slopes.	Severe: too rapidly permeable; 12 to 20 percent slopes.	Moderate; 12 to 15 percent slopes; severe, 15 to 20 percent slopes.
WaD3	Moderate to severe: 12 to 20 percent slopes.	Severe: too rapidly permeable; 12 to 20 percent slopes.	Moderate; 12 to 15 percent slopes; severe, 15 to 20 percent slopes.
Woodstown: WoA	Moderate: moderately high water table.	Moderate: moderate permeability.	Moderate: moderately high water table.
WoB	Moderate: moderately high water table.	Moderate: moderate permeability; 2 to 5 percent slopes.	Moderate: moderately high water table.

[1] Possible pollution hazard to nearby wells, springs, streams, ponds, or other bodies of water.

specified nonfarm uses—Continued

Roads and highways	Streets and parking lots	Cemeteries	Home gardens
Slight	Slight	Slight	Moderate: 2 to 6 percent slopes.
Slight	Slight	Slight	Moderate: 2 to 6 percent slopes.
Moderate: 6 to 12 percent slopes.	Slight	Moderate: 6 to 12 percent slopes; severely eroded.	Severe: 6 to 12 percent slopes; severely eroded.
Moderate: 6 to 12 percent slopes.	Slight	Moderate: 6 to 12 percent slopes; severely eroded.	Severe: 6 to 12 percent slopes; severely eroded.
Severe: 15 to 35 percent slopes	Severe: 15 to 35 percent slopes.	Severe: 15 to 35 percent slopes.	Severe: 15 to 35 percent slopes.
Severe: high water table	Severe: high water table [1]	Severe: high water table	Severe: high water table.
Severe: tidal flooding	Severe: tidal flooding [1]	Severe: tidal flooding	Severe: tidal flooding.
Slight	Moderate: 2 to 6 percent slopes.	Slight	Moderate: 2 to 6 percent slopes.
Moderate: 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.	Slight	Severe: 6 to 12 percent slopes.
Moderate: 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.	Moderate: 6 to 12 percent slopes; severely eroded.	Severe: 6 to 12 percent slopes; severely eroded.
Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.
Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes; severely eroded.	Severe: 12 to 20 percent slopes; severely eroded.
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; 2 to 5 percent slopes.	Moderate: moderately high water table.	Moderate: impeded natural drainage; 2 to 5 percent slopes.

[2] Limitation for sewage lagoons is automatically severe on the Westphalia soils of this unit because of rapid permeability.

Another group of uses closely related to community development are those for outdoor recreation. Table 8 rates the soils of the county according to their limitations for various outdoor recreational facilities that depend a great deal on soil properties. Among these facilities are campsites, including tent and trailer sites, where foot and vehicular traffic are heavy and there is contiguous parking; athletic fields (baseball diamonds, football fields, volleyball courts) and other intensive play areas; parks, picnic areas, and play areas where foot traffic is usually not heavy; lawns, golf fairways, and landscaping and related uses; and paths and trails for hiking, studying nature, or enjoying the scenery.

The major properties that limit the use of soils for recreational activities are wetness; natural drainage; depth to the water table; hazard of flooding; texture and stability of the surface layer; slope; erosion; and permeability, which affects the ease or difficulty of improving drainage. A soil feature may cause a soil to be rated *severe* for one recreational use but *slight* for another recreational use. A soil that is well suited to farming is also generally suitable for building sites and other nonfarm uses.

TABLE 8.—*Soil limitations for specified recreational uses*

[Not included in this table are Escarpments (Es), Gravel and borrow pits (Gp), and Made land (Ma)]

Soil series and map symbols	Campsites (tents and trailers)	Athletic fields and intensive play areas	Parks and extensive play and picnic areas	Lawns, fairways, and landscaping	Paths and trails
Beltsville:					
BlB2	Severe: slow permeability.	Severe: slow permeability.	Slight	Slight	Slight.
BlC3	Severe: slow permeability; 5 to 10 percent slopes.	Severe: slow permeability; 5 to 10 percent slopes.	Slight	Moderate: 5 to 10 percent slopes, severely eroded.	Slight.
Butlertown:					
BtA	Moderate: moderately slow permeability; seasonal perched water table.	Moderate: moderately slow permeability; seasonal perched water table.	Slight	Slight	Slight.
BtB2	Moderate: moderately slow permeability; seasonal perched water table.	Moderate: moderately slow permeability; seasonal perched water table; 2 to 5 percent slopes.	Slight	Slight	Slight.
BtC3	Moderate: moderately slow permeability; seasonal perched water table; 5 to 10 percent slopes.	Severe: 5 to 10 percent slopes.	Slight	Moderate: 5 to 10 percent slopes, severely eroded.	Slight.
Coastal beaches:					
Co	Severe: fluctuating water table; tidal flooding; extreme sandiness.	Severe: fluctuating water table; tidal flooding; extreme sandiness.	Severe: tidal flooding; extreme sandiness.	Severe: tidal flooding; extreme sandiness.	Severe: extreme sandiness.
Elkton:					
Ek	Severe: high water table: slow permeability.	Severe: high water table; slow permeability.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Eroded land, steep:					
ErE	Severe: 15 to 40 percent slopes.	Severe: 15 to 40 percent slopes.	Severe: 15 to 40 percent slopes.	Severe: 15 to 40 percent slopes; severely eroded.	Moderate to severe on slopes greater than 25 percent.
Evesboro:					
EvB	Moderate: loose loamy sand.	Moderate: loose loamy sand; 0 to 6 percent slopes.	Moderate: loose loamy sand.	Severe: loose loamy sand.	Moderate: loose loamy sand.
EvC	Moderate for tents; severe for trailers: loose loamy sand; 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes; loose loamy sand.	Moderate: loose loamy sand; 6 to 12 percent slopes.	Severe: loose loamy sand.	Moderate: loose loamy sand.

TABLE 8.—*Soil limitations for specified recreational uses*—Continued

Soil series and map symbols	Campsites (tents and trailers)	Athletic fields and intensive play areas	Parks and extensive play and picnic areas	Lawns, fairways, and landscaping	Paths and trails
Evesboro—Continued					
EvE	Severe: 12 to 35 percent slopes.	Severe: 12 to 35 percent slopes.	Severe: 12 to 35 percent slopes.	Severe: loose loamy sand; 12 to 35 percent slopes.	Moderate on 12 to 25 percent slopes; severe on slopes of more than 25 percent; loose loamy sand.
Fallsington:					
FsA, FsB	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Howell:					
HoB2	Moderate: moderately slow permeability.	Moderate: moderately slow permeability.	Slight	Slight	Slight.
HoC2	Moderate: moderately slow permeability; 6 to 12 percent slopes.	Severe: moderately slow permeability; 6 to 12 percent slopes.	Moderate: 6 to 12 percent slopes.	Slight	Slight.
HoD2	Severe: moderately slow permeability; 12 to 20 percent slopes.	Severe: moderately slow permeability; 12 to 20 percent slopes.	Moderate to severe: 12 to 20 percent slopes.	Moderate to severe: 12 to 20 percent slopes.	Moderate: 12 to 20 percent slopes.
HwB2	Moderate: moderately slow permeability.	Moderate: moderately slow permeability; 6 to 12 percent slopes.	Slight	Slight	Slight.
HyC3	Moderate: moderately slow permeability; 6 to 12 percent slopes.	Severe: moderately slow permeability; 6 to 12 percent slopes.	Moderate: clay loam surface layer; 6 to 12 percent slopes.	Moderate: clay loam surface layer; 6 to 12 percent slopes; severely eroded.	Moderate: clay loam surface layer.
HyD3	Severe: moderately slow permeability; 12 to 20 percent slopes.	Severe: moderately slow permeability; 12 to 20 percent slopes.	Moderate to severe: clay loam surface layer; 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes; severely eroded.	Moderate: clay loam surface layer; 12 to 20 percent slopes.
Iuka:					
ImB	Severe: high water table.	Severe: high water table.	Moderate: high water table.	Moderate: high water table.	Moderate: high water table.
Keyport:					
KpA, KpB2	Severe: slow permeability.	Severe: slow permeability.	Slight	Slight	Slight.
Marr:					
MlA	Slight	Slight	Slight	Slight	Slight.
MlB2	Slight	Moderate: 2 to 6 percent slopes.	Slight	Slight	Slight.
MlC2	Moderate: 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.	Moderate: 6 to 12 percent slopes.	Slight	Slight.
MlC3	Moderate: 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.	Moderate: 6 to 12 percent slopes.	Moderate: 6 to 12 percent slopes; severely eroded.	Slight.
MlD3	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Moderate to severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes; severely eroded.	Moderate: 12 to 20 percent slopes.

TABLE 8.—*Soil limitations for specified recreational uses*—Continued

Soil series and map symbols	Campsites (tents and trailers)	Athletic fields and intensive play areas	Parks and extensive play and picnic areas	Lawns, fairways, and landscaping	Paths and trails
Matapeake:					
MmA	Slight	Slight	Slight	Slight	Slight.
MmB2	Slight: 2 to 5 percent slopes.	Moderate: 2 to 5 percent slopes.	Slight	Slight	Slight.
MnA	Slight	Slight	Slight	Slight	Slight.
MnB2	Slight: 2 to 5 percent slopes.	Moderate: 2 to 5 percent slopes.	Slight	Slight	Slight.
MnC2	Moderate: 5 to 10 percent slopes.	Severe: 5 to 10 percent slopes.	Slight	Slight	Slight.
MnC3	Moderate: 5 to 10 percent slopes.	Severe: 5 to 10 percent slopes.	Slight	Moderate: 5 to 10 percent slopes; severely eroded.	Slight.
MnD3	Moderate: 10 to 15 percent slopes.	Severe: 10 to 15 percent slopes.	Moderate: 10 to 15 percent slopes.	Severe: 10 to 15 percent slopes; severely eroded.	Slight.
Mattapex:					
MtA	Moderate: moderately high water table; moderately slow permeability.	Moderate: moderately high water table; moderately slow permeability.	Slight	Slight	Slight.
MtB2	Moderate: moderately high water table; moderately slow permeability.	Moderate: moderately high water table; moderately slow permeability; 2 to 5 percent slopes.	Slight	Slight	Slight.
MuA	Moderate: moderately high water table; moderately slow permeability.	Moderate: moderately high water table; moderately slow permeability.	Slight	Slight	Slight.
MuB2	Moderate: moderately high water table; moderately slow permeability.	Moderate: moderately high water table; moderately slow permeability; 2 to 5 percent slopes.	Slight	Slight	Slight.
MuD3	Moderate: moderately high water table; moderately slow permeability; 5 to 15 percent slopes.	Severe: 5 to 15 percent slopes.	Slight on 5 to 10 percent slopes; moderate on slopes of more than 10 percent.	Moderate to severe on slopes of more than 10 percent; severely eroded.	Slight.
Mixed alluvial land:					
My	Severe: flood hazard.[1]	Severe: flood hazard.[2]	Severe: flood hazard.[2]	Severe: flood hazard.[2]	Severe: flood hazard.
Ochlockonee:					
OcB	Slight	Moderate: 2 to 5 percent slopes.	Slight	Slight	Slight.
Othello:					
OtA, OtB	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.

See footnotes at end of table.

TABLE 8.—*Soil limitations for specified recreational uses*—Continued

Soil series and map symbols	Campsites (tents and trailers)	Athletic fields and intensive play areas	Parks and extensive play and picnic areas	Lawns, fairways, and landscaping	Paths and trails
Rumford:					
RdB	Slight	Moderate: 2 to 5 percent slopes.	Slight	Moderate: loamy sand surface layer.	Moderate: loamy sand surface layer.
RdC2	Moderate: 5 to 10 percent slopes.	Severe: 5 to 10 percent slopes.	Slight	Moderate: loamy sand surface layer.	Moderate: loamy sand surface layer.
RdD2	Moderate: 10 to 15 percent slopes.	Severe: 10 to 15 percent slopes.	Moderate: 10 to 15 percent slopes.	Moderate: loamy sand surface layer; 10 to 15 percent slopes.	Moderate: loamy sand surface layer.
Rumford-Evesboro:					
ReB Rumford	Slight	Moderate: 2 to 6 percent slopes.	Slight	Moderate: loamy sand surface layer.	Moderate: loamy sand surface layer
ReB Evesboro	Moderate: loose loamy sand.	Moderate: loose loamy sand; 2 to 6 percent slopes.	Moderate: loose loamy sand.	Severe: loose loamy sand.	Moderate: loose loamy sand.
ReC Rumford	Moderate: 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.	Moderate: 6 to 12 percent slopes.	Moderate: loamy sand surface layer.	Moderate: loamy sand surface layer.
ReC Evesboro	Moderate for tents; severe for trailers: loose loamy sand; 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes; loose loamy sand.	Moderate: loose loamy sand; 6 to 12 percent slopes.	Severe: loose loamy sand.	Moderate: loose loamy sand.
ReD Rumford	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Moderate to severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Moderate: loamy sand surface layer; 12 to 20 percent slopes.
ReD Evesboro	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Moderate to severe: loose loamy sand; 12 to 20 percent slopes.	Severe: loose loamy sand; 12 to 20 percent slopes.	Moderate: loose loamy sand; 12 to 20 percent slopes.
Sassafras:					
SaA	Slight	Slight	Slight	Moderate: loamy fine sand surface layer.	Slight.
SaB2	Slight	Moderate: 2 to 5 percent slopes.	Slight	Moderate: loamy fine sand surface layer.	Slight.
SaC2	Moderate: 5 to 10 percent slopes.	Severe: 5 to 10 percent slopes.	Slight	Moderate: loamy fine sand surface layer.	Slight.
ShA	Slight	Slight	Slight	Slight	Slight.
ShB2	Slight	Moderate: 2 to 5 percent slopes.	Slight	Slight	Slight.
ShC2	Moderate: 5 to 10 percent slopes.	Severe: 5 to 10 percent slopes.	Slight	Slight	Slight.
ShC3	Moderate: 5 to 10 percent slopes.	Severe: 5 to 10 percent slopes.	Slight	Moderate: 5 to 10 percent slopes; severely eroded.	Slight.

TABLE 8.—*Soil limitations for specified recreational uses*—Continued

Soil series and map symbols	Campsites (tents and trailers)	Athletic fields and intensive play areas	Parks and extensive play and picnic areas	Lawns, fairways, and landscaping	Paths and trails
ShD2	Moderate: 10 to 15 percent slopes.	Severe: 10 to 15 percent slopes.	Moderate: 10 to 15 percent slopes.	Moderate: 10 to 15 percent slopes.	Slight.
ShD3	Moderate: 10 to 15 percent slopes.	Severe: 10 to 15 percent slopes.	Moderate: 10 to 15 percent slopes.	Severe: 10 to 15 percent slopes; severely eroded.	Slight.
SlA	Slight	Slight	Slight	Slight	Slight.
SlB2	Slight	Moderate: 2 to 5 percent slopes.	Slight	Slight	Slight.
SlC3	Moderate: 5 to 10 percent slopes.	Severe: 5 to 10 percent slopes.	Slight	Moderate: 5 to 10 percent slopes; severely eroded.	Slight.
Sassafras-Westphalia: SpB2	Slight	Moderate: 2 to 6 percent slopes.	Slight	Slight	Slight.
SpC3	Moderate: 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.	Moderate: 6 to 12 percent slopes.	Moderate: 6 to 12 percent slopes; severely eroded.	Slight.
Sassafras and Westphalia: SrE	Severe: 15 to 35 percent slopes.	Severe: 15 to 35 percent slopes.	Severe: 15 to 35 percent slopes.	Severe: 15 to 35 percent slopes.	Moderate on 15 to 25 percent slopes; severe on slopes of 25 percent or more.
Swamp: Sx	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Tidal marsh: Tm	Severe: tidal flooding.	Severe: tidal flooding.	Severe: tidal flooding.	Severe: tidal flooding.	Severe: tidal flooding.
Westphalia: WaB2	Slight	Moderate: 2 to 6 percent slopes.	Slight	Slight	Slight.
WaC2	Moderate: 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.	Slight	Slight	Slight.
WaC3	Moderate: 6 to 12 percent slopes.	Severe: 6 to 12 percent slopes.	Moderate: 6 to 12 percent slopes.	Moderate: 6 to 12 percent slopes; severely eroded.	Slight.
WaD2	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Moderate to severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Moderate: 12 to 20 percent slopes.
WaD3	Severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes.	Moderate to severe: 12 to 20 percent slopes.	Severe: 12 to 20 percent slopes; severely eroded.	Moderate: 12 to 20 percent slopes.
Woodstown: WoA	Moderate: moderately high water table.	Moderate: moderately high water table.	Slight	Slight	Slight.
WoB	Moderate: moderately high water table.	Moderate: moderately high water table; 2 to 5 percent slopes.	Slight	Slight	Slight.

[1] Based on a frequency of flooding of more than once in 5 years during periods of heavy use.

[2] Based on a frequency of flooding of more than once in 2 years during periods of heavy use.

Service buildings and sewage disposal are important in some forms of recreation, particularly those associated with tenting areas and trailer camps. Soil features that limit soils for service buildings (such as washrooms, bathhouses, and picnic shelters), as well as for year-round cottages, are about the same as those that affect use for homesites (table 7). Wetness is less limiting, however, if the service building or cottage has no basement. Limitation on soils for sewage effluent disposal by septic tank is also given in table 7.

Only the level to gently sloping soils of the Evesboro, Howell, Marr, Matapeake, Ochlockonee, Rumford, Sassafras, and Westphalia series have no more than slight limitation for homesites with basements. Of these, only Evesboro, Marr, Ochlockonee, Rumford, Sassafras, and Westphalia soils have only slight limitation for sewage disposal by septic tank.

Soils of the county that have only slight limitation for athletic fields and other nearly level play areas are those of the Marr, Matapeake, and Sassafras series, on slopes no greater than 2 percent. These soils occupy no more than 2 percent of the county. Many other soils, however, are only moderately limited for intensive play areas. These soils are seasonally wet, have slopes up to 5 or 6 percent, are too coarse in texture to provide a good surface for play, or are slow to dry after rain (see table 8).

More than 30 percent of the county is only slightly limited for parks or for extensive play and picnic areas. While level land is preferred, it is not necessary where foot traffic is light.

About 44 percent of the land of Calvert County consists of the steep sides of ravines and the adjoining narrow bottom lands. These areas are not well suited to farming or for use as building sites, but they are useful for recreation.

Many recreational and community uses of land result in the soil being exposed, and a similar situation exists along many bay and river shores. The Calvert Soil Conservation District can suggest sod plants, ground cover, shrubs, vines, and trees that can be used to stabilize and protect the various soils in the county under such circumstances.

Formation, Morphology, and Classification of the Soils

In this section the factors of soil formation are discussed as they relate to the formation of soils in Calvert 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 and order of the 1938 classification.

Factors of Soil Formation

Soils are the products of soil-forming processes acting upon materials altered or deposited by geologic forces. The five major factors in the formation of soils are climate, plant and animal life, parent material, relief, and time. Climate and plant and animal life, particularly vegetation, are the active forces in soil formation. Their effect on the parent material is modified by relief and by the length of time the parent material has been in place. The relative importance of each factor varies from place to place. In some places one factor is dominant and fixes most of the properties of the soil. Normally, however, the interaction of all five factors determines the kind of soil that develops in any given place.

Climate

Climate is important in the formation of soils because it influences the weathering of minerals. Weathering is more rapid under a warm, humid climate than it is under a cold or dry climate. Precipitation and the length of the growing season influence the type and abundance of vegetation. Precipitation also affects the translocation and leaching of some products of weathering. Hard rains and frequent showers can cause excessive erosion of surface soil.

Calvert County has a continental climate modified by the influence of the Chesapeake Bay and, to a lesser degree, the Patuxent River.

Plant and animal life

The life cycles of plants, animals, insects, and microorganisms are important in the cycle of decay and regeneration of plants, and the growth of plants, in turn, influences the formation of soils.

Some plants, for example, use large amounts of calcium and other available bases, and many plants absorb mineral elements from the soil and store them in their roots, stems, and leaves. When these plants or parts of them decay, the minerals reenter the soils and again are used by plants. If undisturbed, this cycle continues through the years.

As plant roots penetrate soil materials to varying depths, they break up coarse fragments in the soil. Organic acids produced by plants react on the basic minerals in the geologic materials. Elements from minerals that go into solution or suspension may be absorbed by plants, leached from the soils, or translocated within the soil. Root activity generally increases the porosity of soil material. This permits moisture and oxygen to penetrate more readily to lower depths.

The native vegetation of Calvert County consisted chiefly of hardwoods, but included a few conifers. With the introduction of farming into the county, forests were cleared and crops, particularly tobacco, were intensively cultivated. This has drastically altered the characteristics of most of the soils of the county.

Intensive cultivation has greatly accelerated erosion of soil from the uplands, and in places the original A horizon and subsoil have been completely washed away. Much of this material has been deposited on areas mapped as Mixed alluvial land, and a large part of the clay and silt have undoubtedly been carried into the Chesapeake Bay and the Patuxent River.

Parent material

The soils of Calvert County formed primarily in marine and alluvial deposits. The kind of soils that de-

veloped depended mainly on the coarseness of the sediments deposited and on the natural drainage.

The well drained Howell soils, the moderately well drained Keyport soils, and the poorly drained Elkton soils formed in dominantly clayey sediments. The well drained Matapeake soils, the moderately well drained Beltsville, Butlertown, and Mattapex soils, and the poorly drained Othello soils formed in sediments dominated by silts. The well drained Marr and Sassafras soils, the moderately well drained Woodstown soils, and the poorly drained Fallsington soils developed in sandy sediments containing a considerable amount of silt, clay, or both. The somewhat excessively drained Rumford soils and the well drained Westphalia soils formed in sandy sediments containing some clay but little silt. The excessively drained Evesboro soils formed in deposits of almost pure sand. Soils of similar drainage that formed in similar materials have internal differences that are pointed out in the section "Descriptions of the Soils" and in this section under the heading "Classification of the Soils."

Genetic soil profiles have started to form in the more recently deposited sediments only in certain favorable locations. The well drained Ochlockonee soils and the moderately well drained Iuka soils formed in some of these sediments. Most recent sediments, however, have not developed soil profiles and are mapped as Coastal beaches, Mixed alluvial land, Swamp, or Tidal marsh.

Relief

Calvert County is entirely within the Atlantic Coastal Plain. About 32 percent of this county has gentle slopes of 5 to 6 percent or less, another 16 percent has intermediate slopes of 10 to 12 percent, and more than 12 percent has slopes of 15 to 20 percent. The rest of the county, about 40 percent, has steeper slopes ranging up to 35 to 40 percent. Minor areas in ravines and on bayside cliffs are much steeper than 40 percent.

The county slopes gently from north to south, but it slopes sharply from the many small-watershed lines to ravines and onto the Chesapeake Bay and Patuxent River shorelines. Local differences in elevation in most places are only a few feet, but in some they are up to 100 feet or more. Most of the county ranges from 100 to 170 feet or more in elevation. Some minor areas, primarily along the Patuxent River, are less than 20 feet in elevation.

Differences in elevation explain why most of the soils of the county are moderately well drained to well drained. The problem of drainage is increased in the less extensive, more nearly level area because water moves more slowly through the soils.

Time

The soils in Calvert County range from mature to immature. A mature soil has well-defined, genetically related horizons and is in equilibrium with its environment. A soil is immature if the soil-forming processes are still active and unhindered.

Soils that form in the same kind of materials but in areas of different relief do not necessarily develop in the same length of time. On many steep slopes, for example, formation of horizons may be slow because the soil material is removed by erosion too rapidly.

Soils that form in materials that are highly resistant to weathering mature more slowly than soils that form in more easily weathered material. Genetic horizons may never develop in such resistant materials as quartz sand.

Deposition as well as erosion alters the effects of time. On flood plains the development of genetically related horizons may be slowed or prevented if alluvium is deposited frequently. This is the situation on practically all of the flood plains of Calvert County.

Interrelationships of Soil Series

In table 9 the soils of the county are grouped to show relationships in position, parent material, and drainage. Most of the soils are in uplands, but a few are in depressions or on foot slopes.

Morphology of Soils

In most soils of the county, morphology is expressed by distinct to prominent horizons. Horizonation is weak to very weak, however, in immature soils on foot slopes and in the soils that consist mainly of quartz sand.

The differentiation of horizons in the soils is the result of one or more of the following processes: (1) accumulation of organic matter, (2) leaching of carbonates and salts more soluble than calcium carbonate, (3) chemical weathering of the primary minerals of the geologic material into silicate clay minerals, (4) translocation of the silicate clay minerals, and probably of some silt-sized particles, from one horizon to another; and (5) chemical changes (oxidation, reduction, and hydration) and transfer of iron.

In most of the soils of the county, several of these processes have interacted in varying degrees. For example, the interaction of the first, second, third, and fourth processes is reflected in the distinctly expressed horizons of the Howell, Marr, and Sassafras series, and all five processes have been active in the development of the moderately well drained Keyport and Woodstown soils. Only the first process has had any appreciable effect on the soils of the Ochlockonee series. In all soils, however, the second process, the leaching of carbonates and salts, must have taken place in the soil materials before they were deposited, and possibly some of the other processes may have been active before such deposition.

Some organic matter has accumulated in all the soils to form an A1 horizon, but in many places this horizon has been eroded away or has been mixed with underlying horizons through cultivation. The content of organic matter varies from soil to soil. The Evesboro and Rumford soils have weak A1 horizons that contain little organic matter, while the Fallsington soils, for example, have rather prominent A1 horizons that are considerably higher in organic matter.

All of the soils of Calvert County have formed in unconsolidated sediments, and all of them have been completely leached of carbonates and salts and are naturally acid. Most of them are strongly acid to extremely acid.

Some clay minerals were present in the parent materials of most of the soils of Calvert County. Other clay minerals formed through chemical weathering and mechanical

TABLE 9.—*Soils arranged to show relationships in position, parent material, and drainage*

Parent material	Excessively drained	Somewhat excessively drained	Well drained	Moderately well drained	Poorly drained
SOILS OF UPLANDS AND TERRACES					
Quartz sand containing very little fines	Evesboro				
Sand containing moderate clay and silt			Sassafras	Woodstown	Fallington.
Sand containing limited clay and silt		Rumford			
Silt mantle over older sediments			Matapeake	Beltsville, Butlertown, Mattapex	Othello.
Clay or silty clay				Keyport	Elkton.
Silty clay			Howell	Keyport	Elkton.
Fine sand with moderate clay			Marr		
Fine sand with limited clay			Westphalia		
SOILS OF FOOT SLOPES AND DEPRESSIONS					
Local alluvium from uplands			Ochlockonee	Iuka	
SOILS OF FLOOD PLAINS					
General alluvium from uplands					Mixed alluvial land.[1]

[1] Not a soil series, but a miscellaneous land type included for comparison; drainage is variable, but the land is mostly poorl drained.

disintegration during the genesis of the soils. Although no laboratory studies have been made of the clay minerals of Calvert County soils, it is estimated, on the basis of other studies, that a mixture of silicate clay minerals is present in most of these soils. The clay minerals most likely to be present in the mixtures include kaolinite, mica (illite), and silicate clays composed of interstratified and intergradient 2:1 and 2:2 layers.

Translocation, plus some development in place, of silicate clay minerals has contributed strongly to the formation of certain horizons in the soils. The silicate clays that formed in the A horizons have been partly transferred into the B horizons by percolation and partly immobilized there. This process contributed to the formation of a B2t horizon texturally finer than the A horizon. The process may also be active to a limited degree in soils that do not have distinct B2t horizons. Silicate clays may also develop within a B2t horizon and be partly or completely immobilized as they are formed. For example, translocation of silicate clays has occurred in the Sassafras and Marr soils, and translocation and in-place development of silicate clays have taken place in the Keyport soils.

Accumulations of clay minerals and especially of silt in the lower subsoil may result in the formation of a compact layer commonly known as a fragipan. This fragipan is a part of the B horizon in most soils and is designated by the symbol Bx. If it extends into the underlying C horizon, it is designated by the symbol Cx. Because a fragipan generally is slowly permeable by water, a temporary perched water table can form above it in wet seasons, while deeper horizons of the soil remain relatively dry. The Beltsville soils of Calvert County have a strongly developed and expressed fragipan. The fragipan in the Butlertown series is less strongly developed and expressed.

Gleying, or the process of chemical reduction and transfer of iron, occurs in soils with impeded drainage. The naturally wet soils of the county have some degree of gleying in one or more of their horizons. The Elkton, Fallsington, and Othello soils are examples of soils that have been strongly affected by gleying because of their naturally high water tables.

Iron that has been reduced in areas where the soil is poorly aerated becomes mobile and may be removed from the soil. Part of the mobile iron moves within the horizon where it originated or to another horizon. Part of this iron may be segregated and reoxidized to form the reddish-yellow, yellowish-red, yellowish-brown, or strong-brown mottles that are common in some horizons of soils that have impeded drainage.

When clay forms from primary minerals, some iron generally is freed as a hydrated oxide. Depending on the degree of hydration, these oxides are more or less reddish. Even a small amount of the oxides may cause the soil to have a somewhat reddish color. No intensely red soils occur in Calvert County, but the strong-brown to somewhat reddish colors in subsoils of the Rumford, Sassafras, Matapeake, Howell, and Marr series are caused primarily by iron oxides.

A profile that is representative for each soil series in the county is described in the section, "Descriptions of the Soils."

Classification of the 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 relationships to one another and to the whole environment, and to develop principles that help us 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 used in managing farms, fields, and woodlands; in developing suburbs and other communities; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison of 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 (*2*) and later revised (*5*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965. The current system is under continual study. Therefore, readers interested in the development of the current system should search the latest literature available (*4, 7*).

In table 10 the soil series of Calvert County are placed in some categories of the current system and in the great soil groups and orders of the older system. Placement of some soil series in the current system of classification may change as more precise information becomes available.

The current system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen, however, so that the soils of similar genesis, or mode of origin, are grouped together. The classes that make up the current system are briefly defined in the following paragraphs.

Order.—Ten soil orders are recognized. Each order is named with a word of three or four syllables ending in sol (Ent-i-sol). The ten orders are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate the soil orders are those that tend to give broad climatic groupings of soils. Two exceptions, Entisols and Histosols, occur in many different climates.

Table 10 shows the two soil orders in Calvert County—Entisols and Ultisols. Entisols are mineral soils that have been only slightly modified from the geologic material in which they formed. In Calvert County the principal modification is a weakly developed A1 horizon.

Ultisols are mineral soils that have a clay-enriched B horizon in which base saturation is low, generally less than 35 percent. They generally represent the ultimate in soil development where the processes have not been prevented or blocked by lack of weatherable minerals or by some unaccountable variation in the environment. In Calvert County these are the most common soils.

Suborder.—Each order is subdivided into suborders, primarily on the basis of those soil characteristics that seem to produce classes having the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders mainly reflect either the presence or absence of waterlogging or soil differences resulting from

TABLE 10—*Classification of soil series according to the current system and the revised 1938 system*

Series	Current system [1]			1938 system	
	Family [2]	Subgroup	Order	Great soil group	Order
Beltsville	Fine-loamy, mixed, mesic	Typic Fragiudults	Ultisols	Gray-Brown Podzolic soils	Zonal soils.
Butlertown	Fine-silty, mixed, mesic	Typic Fragiudults	Ultisols	Gray-Brown Podzolic soils	Zonal soils.
Elkton	Clayey, mixed, mesic	Typic Ochraquults	Ultisols	Low-Humic Gley soils	Intrazonal soils.
Evesboro	Mesic, coated	Typic Quartzipsamments	Entisols	Regosols	Azonal soils.
Fallsington	Fine-loamy, siliceous, mesic	Typic Ochraquults	Ultisols	Low-Humic Gley soils	Intrazonal soils.
Howell	Clayey, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils	Zonal soils.
Iuka	Coarse-loamy, siliceous, acid, thermic.	Aquic Udifluvents	Entisols	Alluvial soils	Azonal soils.
Keyport	Clayey, mixed, mesic	Aquic Hapludults	Ultisols	Red-Yellow Podzolic soils	Zonal soils.
Marr	Fine-loamy, siliceous, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils	Zonal soils.
Matapeake	Fine-silty, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils	Zonal soils.
Mattapex	Fine-silty, mixed, mesic	Aquic Hapludults	Ultisols	Gray-Brown Podzolic soils	Zonal soils.
Ochlockonee	Coarse-loamy, siliceous, acid, thermic.	Typic Udifluvents	Entisols	Alluvial soils	Azonal soils.
Othello	Fine-silty, mixed, mesic	Typic Ochraquults	Ultisols	Low-Humic Gley soils	Intrazonal soils.
Rumford	Coarse-loamy, siliceous, thermic.	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils	Zonal soils.
Sassafras	Fine-loamy, siliceous, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils	Zonal soils.
Westphalia	Coarse-loamy, siliceous, mesic.	Ochreptic Hapludults	Ultisols	Gray-Brown Podzolic soils	Zonal soils.
Woodstown	Fine-loamy, siliceous, mesic	Aquic Hapludults	Ultisols	Gray-Brown Podzolic soils	Zonal soils.

[1] Placement of some soil series in the current system of classification, particularly in families, may change as more precise information becomes available.

[2] Calvert County is in the rather indefinite border area between the mesic and thermic temperature zones.

the climate or vegetation. The suborder is not shown in table 10 for the current classification system.

Great Group.—Soil suborders are separated into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus has accumulated. The features used are the self-mulching properties of clays, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), and the like. The great group is not shown in table 10 for the current classification system. The name of the great group is the last word in the name of the subgroup.

Subgroup.—Great groups are subdivided into subgroups, one representing the central (typic) segment of the group, and others, called intergrades, that have properties of one great group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. An example is Typic Hapludult (a typical Hapludult).

Family.—Families are separated within a subgroup primarily on the basis of properties important to the growth of plants or to the behavior of soils where used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. A family name consists of a series of adjectives, and these are the class names for texture, mineralogy, and so on, that are used as family differentiae.

Series.—The series consists of a group of soils that formed from a particular kind of parent material and have genetic horizons that, except for texture of the surface soil, are similar in differentiating characteristics and in arrangement in the profile. Among these characteristics are color, structure, reaction, consistence, and mineralogical and chemical composition.

Climate [4]

Calvert County has a continental climate with well-defined seasons. The climate is considerably modified in those areas adjacent to the Chesapeake Bay and, to a lesser degree, those near the Patuxent River.

Temperature and precipitation data from the Owings Ferry Landing station are given in table 11. In the text, however, reference also will be made to the record of the Chesapeake Bay Laboratory at Solomons. That record shows the effect of water exposure, especially the effect on temperature.

The warmest period of the year is during the last half of July, when the maximum afternoon temperature averages 89°F. Temperatures of 90° or higher occur on an average of 31 days per year; at Solomons, the average is 26 days per year.

The coldest period of the year is during the last of January and the beginning of February, when the early morning minimum temperatures average 25°. At Owings Ferry Landing the daily minimum temperature is 32°F.

[4] By W. J. Moyer, State climatologist, Environmental Science Services Administration, Weather Bureau, U. S. Department of Commerce.

TABLE 11.—*Temperature and precipitation at Owings Ferry Landing station, 1931–60*

[Elevation, 160 feet]

Month	Temperature				Precipitation				
	Average daily		Two years in 10 will have at least 4 days with [1]—		Average	One year in 10 will have—		Days with snow cover	Average depth of snow on days with snow cover
	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	46. 1	27. 9	65	11	3. 48	1. 7	6. 1	4	3
February	47. 6	27. 6	66	14	2. 62	1. 3	4. 0	5	3
March	55. 3	33. 9	75	20	3. 49	1. 6	5. 8	2	3
April	66. 6	43. 7	84	31	3. 48	1. 9	6. 2	----------	----------
May	75. 9	53. 7	88	41	4. 10	. 9	6. 5	----------	----------
June	83. 4	62. 5	93	52	3. 26	1. 6	6. 0	----------	----------
July	87. 0	66. 7	96	57	4. 27	1. 9	7. 4	----------	----------
August	85. 0	65. 1	95	55	5. 31	2. 0	10. 7	----------	----------
September	79. 2	58. 6	91	44	4. 17	. 6	9. 4	----------	----------
October	69. 4	47. 7	85	34	3. 29	1. 2	5. 8	----------	----------
November	58. 7	37. 7	73	26	3. 23	. 9	5. 9	[2]	3
December	47. 7	28. 9	64	14	3. 05	1. 6	5. 6	3	3
Year	66. 8	46. 2	[3] 99	[4] 6	43. 75	33. 2	52. 5	14	3

[1] Record for the period 1939–60.
[2] Less than 0.5 day.
[3] Average annual highest temperature.
[4] Average annual lowest temperature.

or lower for 92 days each year, while at Solomons it is for only 62 days.

The annual precipitation averages about 44 inches at both Owings Ferry Landing and Solomons. The monthly distribution is fairly uniform during the year, and the maximum occurs during the months of July and August. Most precipitation in the colder part of the year is the result of low-pressure systems moving north or northeast along the coast, and in summer this precipitation occurs in showers and thunderstorms.

The average annual snowfall is 16.0 inches at Owings Ferry Landing and 12.6 inches at Solomons. The greatest total for one day at Owings Ferry Landing was 22 inches on January 24, 1940.

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

Table 12 gives the average dates of the last spring and first fall occurrences of minimum temperatures equal to or below specified threshold values for both Owings Ferry Landing and Solomons. The period between the last frost or 32°F. in spring and the first in fall, often defined as the growing season, averages 193 days at Owings Ferry Landing and 235 days at Solomons.

Prevailing winds are from the northwest, but during summer months they become more southerly. The average annual windspeed is 8 to 10 miles per hour; however, winds may reach 50 to 60 miles per hour or higher in severe thunderstorms, hurricanes, or general winter storms.

Thunderstorms occur on an average of 30 days per year, and about 70 percent of these occur from May through August. Tornadoes are rare and have in the past caused little damage; the average for a 10-year period (1953-1964) is two per year for the State of Maryland. Tropical storms or hurricanes affect the county about once a year, usually in the period from August through October. Most of these cause minor damage.

TABLE 12.—*Probability dates of last freezing temperatures in spring and first in fall, 1926–55*

[Data from Owings Ferry Landing and Solomons (Chesapeake Biological Laboratory)]

Probability	Dates for given probability and temperature					
	32° F. or lower		24° F. or lower		16° F. or lower	
	Owings Ferry Landing	Solomons	Owings Ferry Landing	Solomons	Owings Ferry Landing	Solomons
Spring:						
9 years in 10 later than	March 31	March 13	March 2	February 13	February 2	January 22
3 years in 4 later than	April 7	March 21	March 9	February 22	February 13	January 31
2 years in 3 later than	April 9	March 24	March 12	February 25	February 17	February 3
1 year in 2 later than	April 15	March 30	March 17	March 3	February 24	February 9
1 year in 3 later than	April 20	April 5	March 22	March 9	March 3	February 15
1 year in 4 later than	April 22	April 8	March 25	March 12	March 7	February 18
1 year in 10 later than	April 29	April 16	April 1	March 21	March 18	February 27
Fall:						
1 year in 10 earlier than	October 11	November 7	November 9	November 24	November 24	December 2
1 year in 4 earlier than	October 18	November 13	November 16	December 1	December 1	December 9
1 year in 3 earlier than	October 20	November 16	November 18	December 3	December 4	December 11
1 year in 2 earlier than	October 25	November 20	November 23	December 8	December 9	December 16
2 years in 3 earlier than	October 30	November 24	November 28	December 13	December 14	December 21
3 years in 4 earlier than	November 1	November 27	November 30	December 15	December 17	December 23
9 years in 10 earlier than	November 8	December 3	December 7	December 22	December 24	December 30

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Glossary

Acidity, soil. See Reaction, soil.

Aeration, soil. The exchange of air in soil with air from the atmosphere. A poorly aerated soil is high in carbon dioxide and low in oxygen.

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

Available moisture capacity. The capacity of a soil to hold water in a form available to plants. Amount of moisture held in soil between field capacity, or about one-third atmosphere of tension, and the wilting coefficient, or about 15 atmospheres of tension.

Base. Any of the positive, generally metallic elements that make up the nonacid plant nutrients. The most important of these in plant nutrition are calcium (Ca), potassium (K), magnesium (Mg)), and ammonium (NH_4).

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.

Color. Munsell notation. A system for designating color by degrees of three simple variables—hue, value, and chroma. For example, the color notation (10YR 6/4) stands for a color with hue of 10YR, a value of 6, and a chroma of 4. Hue is the dominant spectral color; value relates to the relative lightness or darkness of color; and chroma is the relative purity or strength of color and increases as grayness decreases.

Complex, soil. A mapping unit consisting of different kinds of soils that occur in such small individual areas or in such an intricate pattern that they cannot be shown separately on a publishable soil map.

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

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Contour farming. Plowing, cultivating, planting, and harvesting in rows that are at right angles to the natural direction of the slopes or that are parallel to terrace grade.

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. As a farm management operation, the removal of excess water from the soil. As a soil condition, the relative rapidity and extent of the removal of water from the soil under natural conditions.

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 sediments, that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The base of a slope, where there is a significant change in the grade or angle toward more nearly level land.

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic matter 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.

Glauconite. A granular, greenish mineral containing both iron and potassium. Locally called greensand.

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.

Green-manure crop. 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.

Leaching. The removal of soluble materials from soils or other materials by percolating water.

Loam. Soil having equal amounts of sand, silt, and clay.

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.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

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.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in making food and tissue. Nitrogen, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil, and carbon, hydrogen, and oxygen obtained largely from the air and water, are plant nutrients.

Parent material. The weathered rock or partly weathered soil material from which soil has formed.

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; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Relief. The elevations or inequalities of a land surface, considered collectively.

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 of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from 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 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 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.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topography. See Relief.

Topsoil. A presumed fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Upland (geologic). Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than the alluvial plain or stream terrace. Land above the lowlands along rivers.

Value. See Color, Munsell notation.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

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