# St. Marys County, Maryland

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

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all who need the information, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1941–74. Soil names and descriptions were approved in 1975. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1975. 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 St. Marys Soil Conservation District.



# HOW TO USE THIS SOIL SURVEY

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

### Locating Soils

All the soils of St. Marys 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. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the page for the woodland group in which the soil has been placed.

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

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

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

*Community planners and others* can read about soil properties that affect the choice of sites for dwellings, industrial buildings, and for recreation areas in the sections "Town and country planning" and "Use of the soils for recreational 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 "Genesis, morphology, and classification of soils."

*Newcomers in St. Marys County* may be especially interested in the section "General soil map," where broad patterns of soils are described. They may also be interested in the information about the county given in the section "General nature of the county."

Cover: Characteristic nearly level landscape of Matapeake-Mattapex-Sassafras soil association in foreground and Othello-Mattapex association along the St. Marys River in background. The more wooded Beltsville-Caroline association occupies the higher elevations in the background. St. Marys City, the first capital of Maryland, is in the center. Courtesy of the St. Marys City Commission.

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Issued March 1978

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## Summary of tables

# SOIL SURVEY OF ST. MARYS COUNTY, MARYLAND

By Joseph W. Gibson, Soil Conservation Service

Soils surveyed by Moulton A. Bailey, E.Z.W. Compy, Joseph W. Gibson, Richard L. Hall, and Robert M. Kirby, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in cooperation with the Maryland Agricultural Experiment Station

ST. MARYS COUNTY is in the southernmost part of the Western Shore of Maryland (fig. 1). It is a peninsula surrounded by tidal water except along the northwestern boundary where it adjoins Charles County. It is bordered on the west by the Wicomico River, on the south by the Potomac River, on the east by the Chesapeake Bay, and on the northeast by the Patuxent River. The county occupies 234,878 acres, or about 367 square miles, and has approximately 300 miles of tidal shoreline. Leonardtown, the county seat, is on Breton Bay in the south-central part of the county.

## General nature of the county[1]

St. Marys County is entirely within the Atlantic Coastal Plain. The geological materials are thick unconsolidated beds of sand, silt, clay, and gravel laid down as marine deposits. Elevation ranges from 0 at sea level to more than 170 feet in the northwestern part of the county. Two main features characterize the county: a well disected upland plateau fringed by a low, flat plain.

The upland plateau occupies the greater area of the county and extends from the Charles County line through the central part of the county down to Ridge. To the east of Route 235 from the Patuxent Naval Air Test Center to the Charles County line is a very dissected area that has steep slopes and deep, V-shaped ravines. The lowland plain runs along the Wicomico and Potomac Rivers, and along the Chesapeake Bay and the Patuxent River.

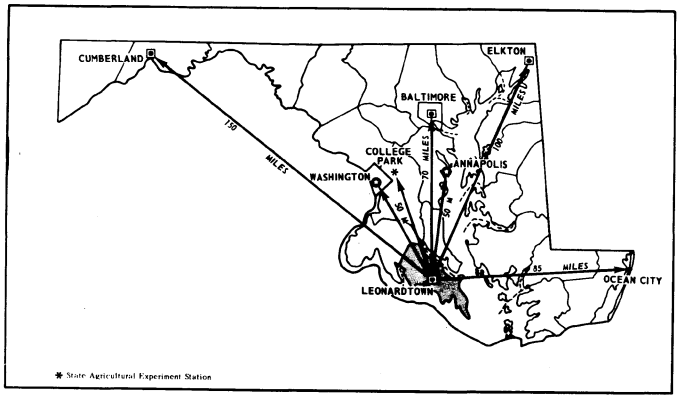


*Figure 1.*—Location of St. Marys County in Maryland.

State Routes 235 and 5 mark approximately the drainage divide in the county between the Potomac River and the Patuxent River-Chesapeake Bay drainage systems. Streams draining into the Potomac River are south and west of the divide and have relatively long courses of low gradient. The larger streams, such as the Wicomico and St. Marys River, are tidal for several miles from where they join the Potomac River. Streams such as Mill Creek and Horse Landing Creek, which flow northeast into the Patuxent River, are relatively short and occupy small valleys of steep gradient.

The county is essentially rural. It had a population of about 48,000 in 1970. The major industries in the county are tobacco farming with supplemental cash grain and livestock; commercial fishing, oystering, and crabbing; construction of homes, subdivisions, and residences for commuters; and small and large commercial businesses.

The Patuxent Naval Air Station with its satellite stations has provided employment for thousands of persons and resulted in growth of the county, particularly in Lexington Park and surrounding areas.

According to the 1969 Census of Agriculture, of the 234,878 acres total land area of the county, approximately 95,146 acres, or 41 percent, is farmland. Of this, approximately 46,067 acres are in crops. About 67 percent of the total land area, or 157,200 acres, is in woodland. The rest of the land area is in towns, military installations, highways, parking lots, schools, individual residences, commercial establishments, and marshy tidal areas.

Most of the soils in St. Marys County are acid and have naturally low fertility. About 44 percent of the county is made up of well drained soils; 32 percent is moderately well drained soils; and 19 percent is poorly drained soils. There are 4,027 acres of tidal marsh, and about 18,418 acres of soils on flood plains.

[1] Parts of this section were derived from "The Water Resources of St. Marys County," a State of Maryland publication (4).

About 80 percent of the land area of the county, including some areas now wooded, is suitable for cultivation. The rest of the land is so steep, so eroded, or so wet that it is best suited to woodland, wildlife habitat, or recreational uses. On about 55 percent of the land suitable for cultivation, there is a moderate to severe hazard of further erosion. About 28 percent of the land area needs some degree of artificial drainage before it can be used intensively for farming. About 8 percent is moderately to severely limited by sandiness and low available water capacity. About 4 percent of the soils have few, if any, limitations for farming and need no special management.

The major farm crops grown in the county are tobacco, soybeans, corn, wheat, and hay. Tobacco has always been the leading cash crop and the most important farm crop. The most important soils for producing high quality tobacco are Westphalia, Sassafras, Rumford, and Evesboro soils.

Increased demand for land for other uses than farm, particularly housing developments, has caused a big decline in farmland, especially in the northern and eastern parts of the county.

The chief source of ground water supplies is from drilled wells. These are generally less than 500 feet deep, and they tap one or the other of two artesian water-bearing zones in the Eocene age formations. These aquifers are present throughout the County, are easily reached by drilling, and yield water generally of good quality. The extensive sheet-like deposits of Pleistocene age consist largely of permeable sand and gravel and yield moderate supplies of water, mostly to shallow dug wells. Most of these wells are in the higher central part of the county.

## Climate [2]

St. Marys County has a continental type climate with well defined seasons. The Chesapeake Bay, the Potomac River, and their tributaries exert a considerable modifying influence on the climate, especially in moderating extreme temperatures in nearby areas.

Temperature and precipitation data for the Leonardtown cooperative weather station, which is located at Radio Station WKIK, 3 miles northwest of Leonardtown, are given in table 1. Reference also is made to records of earlier stations located in Leonardtown or near Breton Bay. It should be noted that the temperature record of the currently operating station is unusually cold in contrast to earlier records; this may be more representative for the county as a whole.

The warmest period of the year is during the last

[2] By W. J. MOYER, former climatologist for Maryland and Delaware, National Weather Service.

TABLE 1.—*Temperature and precipitation*

[Data taken 3 miles northwest of Leonardtown, September 1959 through December 1973, except where indicated otherwise; elevation 110 feet]

| Month | Temperature | | | | Precipitation | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Average daily maximum | Average daily minimum | Two years in 10 will have at least 4 days with [1]— | | Average monthly precipitation | One year in 10 will have [2]— | | Days with snow cover of 1 inch or more | Average depth of snow on days with snow cover of 1 inch or more |
| | | | Maximum temperature equal to or higher than— | Minimum temperature equal to or lower than— | | Less than— | More than— | | |
| | °F | °F | °F | °F | *Inches* | *Inches* | *Inches* | *Number* | *Inches* |
| January | 45.3 | 24.1 | 63 | 5 | 2.95 | 1.2 | 3.9 | 5 | 4 |
| February | 46.7 | 25.2 | 62 | 9 | 3.38 | 1.3 | 4.5 | 5 | 3 |
| March | 56.7 | 32.6 | 76 | 20 | 3.38 | 1.9 | 5.9 | 2 | 4 |
| April | 67.9 | 41.3 | 83 | 28 | 3.18 | 1.1 | 4.9 | | |
| May | 77.0 | 50.5 | 89 | 35 | 3.45 | 0.8 | 6.2 | | |
| June | 85.2 | 59.4 | 94 | 47 | 3.60 | 1.6 | 6.1 | | |
| July | 88.0 | 63.4 | 96 | 53 | 4.75 | 1.7 | 8.6 | | |
| August | 86.9 | 62.5 | 93 | 51 | 3.43 | 1.3 | 9.7 | | |
| September | 81.7 | 56.2 | 93 | 41 | 3.12 | 0.5 | 6.6 | | |
| October | 70.9 | 45.4 | 83 | 29 | 2.92 | 1.1 | 5.2 | | |
| November | 59.8 | 36.2 | 74 | 23 | 3.43 | 0.9 | 5.8 | ([3]) | |
| December | 47.8 | 27.8 | 63 | 14 | 3.46 | 1.4 | 5.2 | 3 | 3 |
| Year | 67.8 | 43.7 | [4] 97 | [5] 0 | 41.05 | 31.1 | 52.7 | 15 | 3 |

[1] Record for the period 1961–70.

[2] Total record for Leonardtown stations between March 1911 and May 1974.

[3] Only one day during period but with a 5-inch total.

[4] Average annual highest temperature.

[5] Average annual lowest temperature.

half of July when the maximum afternoon temperature averages 89° F. Temperatures of 90° or higher occur on an average of 38 days per year. Records from the Leonardtown stations near the bay differ very little from these temperatures. The coldest period of the year is the end of January and the beginning of February when early morning minimum temperatures average about 23° F. Temperatures at the other Leonardtown stations have averaged 26° F. Temperatures of 32° F. or lower occur an average of 100 days per year except in areas near the bay, where they occur an average of only 86 days per year.

The annual precipitation averages 41.05 inches. The monthly distribution, based on a much longer period of record than is given in table 1, is fairly uniform during the year. The wettest month is generally June or July, and the driest is January or October. Heavy precipitation during the colder part of the year is the result of low-pressure systems moving north or northeast along the coast. In summer, precipitation occurs mostly in thunderstorms. Tropical storms or hurricanes may also bring unusually heavy one- or two-day totals. Rainfall from thunderstorms during the evening and early morning hours of July 22-23, 1969, totaled 12.44 inches, Maryland's second heaviest one-day total.

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

Table 2 gives the average dates of minimum temperatures equal to or below specified threshold values last in spring and first in fall for both Leonardtown and the earlier station located near Breton Bay. The difference between the two is worthy of note. The period between the last frost (32° F) in spring and the first in fall, often defined as the growing season, averages 169 days at the Leonardtown station and 202 days at the Breton Bay station. In most areas in the county the growing season is likely to range between 180 and 200 days.

Prevailing winds are from the west-northwest to northwest except during the warm part of the year when they become more southerly. The average windspeed is about 9 miles per hour, although winds may reach 50 to 60 miles per hour and even higher in thunderstorms, hurricanes, and severe winter storms.

Thunderstorms occur on an average of about 32 days per year. Although they may occur in any one month, about 72 percent of them occur from May through August. Tornadoes are rare; the annual average for the state is only two and these have caused mostly minor damage. Tropical storms or hurricanes affect the county about once a year, usually occurring from August through October. Most of them have caused minor damage.

## How this survey was made

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

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

[Data from current Leonardtown station, 3 miles to northwest of Leonardtown, and an earlier station 4 miles to south southwest, near Breton Bay]

| Probability | Dates for given probability and temperature | | | | | |
|---|---|---|---|---|---|---|
| | 32°F or lower | | 24°F or lower | | 16°F or lower | |
| | Leonardtown 3 NW | Leonardtown 4 SSW | Leonardtown 3 NW | Leonardtown 4 SSW | Leonardtown 3 NW | Leonardtown 4 SSW |
| Spring: | | | | | | |
| 9 years in 10 later than | Apr. 16 | Apr. 3 | Mar. 14 | Mar. 7 | Feb. 21 | |
| 3 years in 4 later than | Apr. 23 | Apr. 8 | Mar. 20 | Mar. 13 | Feb. 27 | |
| 2 years in 3 later than | Apr. 25 | Apr. 9 | Mar. 22 | Mar. 15 | Mar. 2 | Does not |
| 1 year in 2 later than | Apr. 30 | Apr. 13 | Mar. 26 | Mar. 19 | Mar. 6 | occur |
| 1 year in 3 later than | May 5 | Apr. 17 | Mar. 30 | Mar. 23 | Mar. 10 | every |
| 1 year in 4 later than | May 7 | Apr. 18 | Apr. 1 | Mar. 25 | Mar. 13 | year |
| 1 year in 10 later than | May 14 | Apr. 23 | Apr. 7 | Mar. 31 | Mar. 19 | |
| Fall: | | | | | | |
| 1 year in 10 earlier than | Oct. 2 | Oct. 22 | Oct. 31 | Nov. 16 | Nov. 27 | |
| 1 year in 4 earlier than | Oct. 9 | Oct. 26 | Nov. 5 | Nov. 22 | Dec. 2 | |
| 1 year in 3 earlier than | Oct. 11 | Oct. 28 | Nov. 7 | Nov. 25 | Dec. 4 | Does not |
| 1 year in 2 earlier than | Oct. 16 | Oct. 31 | Nov. 10 | Nov. 29 | Dec. 7 | occur |
| 2 years in 3 earlier than | Oct. 21 | Nov. 3 | Nov. 13 | Dec. 3 | Dec. 10 | every |
| 3 years in 4 earlier than | Oct. 23 | Nov. 5 | Nov. 15 | Dec. 6 | Dec. 12 | year |
| 9 years in 10 earlier than | Oct. 30 | Nov. 9 | Nov. 20 | Dec. 12 | Dec. 17 | |

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. Beltsville and Bourne, 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 layer 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, Beltsville silt loam, 2 to 5 percent slopes, moderately eroded, is one of several phases within the Beltsville 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 survey was prepared from aerial photographs.

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

Some mapping units are made up of soils of different series, or of different phases within one series. One such kind of mapping unit, the complex, is shown on the soil map of St. Marys County.

A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. Generally, the name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Evesboro-Westphalia complex, 6 to 12 percent slopes, moderately eroded, is an example.

In most areas surveyed there are places where the soil material is so rocky, so shallow, so severely eroded, or so variable that it has not been classified by soil series. These places are shown on the soil map and are described in the survey, and are given descriptive names. Alluvial land is an example in St. Marys 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 kind of soil 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 kind of soil. Yields under defined management are estimated for all the soils.

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants, and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for onsite disposal of sewage fail on a given kind of soil, and they relate this to the slow permeability of the soil or its high water table. They see that streets and road pavements are cracked on a named kind of soil, and they relate this to its high potential frost action.

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

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

## General soil map

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

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

The soil associations in St. Marys County are discussed in the following pages.

## 1. Beltsville-Croom-Sassafras association

*Level to strongly sloping, moderately well drained and well drained, silty and loamy soils, some of which have a fragipan or compact gravelly subsoil; on uplands*

This association is almost entirely south of Route 235 along the length of the county. The area is well dissected except on small upland flats, and there are many V-shaped ravines. Nearly half of the soils are either severely eroded or are subject to a severe hazard of erosion.

This association makes up about 27 percent of the county. It is about 45 percent Beltsville soils, 22 percent Croom soils, 6 percent Sassafras soils, and 27 percent minor soils.

The moderately well drained Beltsville soils are very silty. They have a hard, dense, fragipan in the lower part of the subsoil that inhibits the extension of roots and prevents the downward movement of water. In some seasons the soil above the fragipan is saturated with water, but little or no free water is in the fragipan and immediately below. This condition is most common late in winter and early in spring.

The Croom soils are gravelly and have a compacted or cemented subsoil. They are somewhat droughty and have a shallow root zone.

The well drained Sassafras soils are deep. They have a surface layer of sandy loam or loam and a subsoil that is dominantly sandy clay loam.

Some important minor soils in this association are the well drained Chillum and Caroline soils, the moderately well drained Bourne soils, the poorly drained Leonardtown soils, and the poorly drained Bibb soils on some of the flood plains. Alluvial land is along many small streams in this association.

Beltsville and Sassafras soils are suited to most crops grown in the area. Tobacco is the most important single crop. Where farming is extensive, corn and soybeans are the main crops. Croom soils generally are not used for farming.

A large part of the association was farmed at one time, but has reverted to woodland, mainly hardwoods and Virginia pine.

Most residential development in this association has been limited to individual lots along major highways. Beltsville and Croom soils have severe limitations for septic tank disposal fields, so special types of sewage disposal systems are necessary. Other than slope, Sassafras soils have few limitations for further development.

## 2. Beltsville-Caroline association

*Level to moderately sloping, moderately well drained and well drained, silty soils, some of which are moderately deep to a fragipan; on uplands*

This association is at an elevation of more than 80 feet. The main areas of this association are along Route 235 in a narrow band extending from 5 miles northwest of the Lexington Park area all the way to Ridge, near the southern tip of the county; south of Route 5 in the Callaway area; and south of Chaptico along Route 234. The association is moderately dissected by small streams of the county. Many moderately sloping areas near drainageways are severely eroded.

This association makes up about 11 percent of the county. It is about 40 percent Beltsville soils, 30 percent Caroline soils, and 30 percent minor soils.

The moderately well drained Beltsville soils are very silty. They have a hard, dense, fragipan in the lower part of the subsoil that inhibits the extension of roots and the downward movement of water. In some seasons, the soil above the fragipan is saturated with water, but little or no free water is in the fragipan and immediately below. This condition is most common late in winter and early in spring.

Caroline soils are well drained and have a silty surface layer. The subsoil is very thick and is mainly clay loam. These soils do not have a fragipan as do Beltsville soils, but water moves through the subsoil moderately slowly.

Some important minor soils in this association are the well drained Sassafras and Chillum soils and the poorly drained Bibb soils on the flood plains of streams.

A fairly large acreage of the association is presently cleared. Subdivisions cover the cleared spots around Lexington Park. The area where the most cultivated crops are grown in this association is near Chaptico. Generally, soils that have a slope of less than 5 percent are the only ones cropped. Tobacco is the most important single crop. Where farming is extensive, corn and soybeans are the main crops. A large part of the association was farmed at one time, but has reverted to woodland, mainly oaks, beech, gums, and Virginia pine.

Beltsville and Caroline soils have severe limitations for septic tank disposal fields, and special types of sewage disposal systems are required. These soils have only moderate limitations for most other nonfarm uses.

A cross section of a representative area in this association is shown in figure 2.

## 3. Evesboro-Westphalia-Sassafras association

*Gently sloping to steep, excessively drained to well drained, dominantly sandy and loamy soils; on uplands and terraces*

This association is in one large area and one very small area in the northern part of the county. The large area extends from the Charles County line southeastward toward Hollywood. It makes up most of the uplands between the Patuxent River and Routes 5 and 235. The small area is around Drumcliff. In most of the association slopes are more than 5 percent. Many streams and drainageways dissect this association, and there are many narrow, steep valleys. Erosion is extensive and severe, and in many places the subsoil is exposed. Gullies are common, and some of them are deep and caving.

This association makes up about 10 percent of the county. It is about 50 percent Evesboro soils, 30 percent Westphalia soils, 10 percent Sassafras soils, and 10 percent minor soils.

The excessively drained Evesboro soils are mostly coarse, loose, droughty sands to a depth of 5 feet or more.

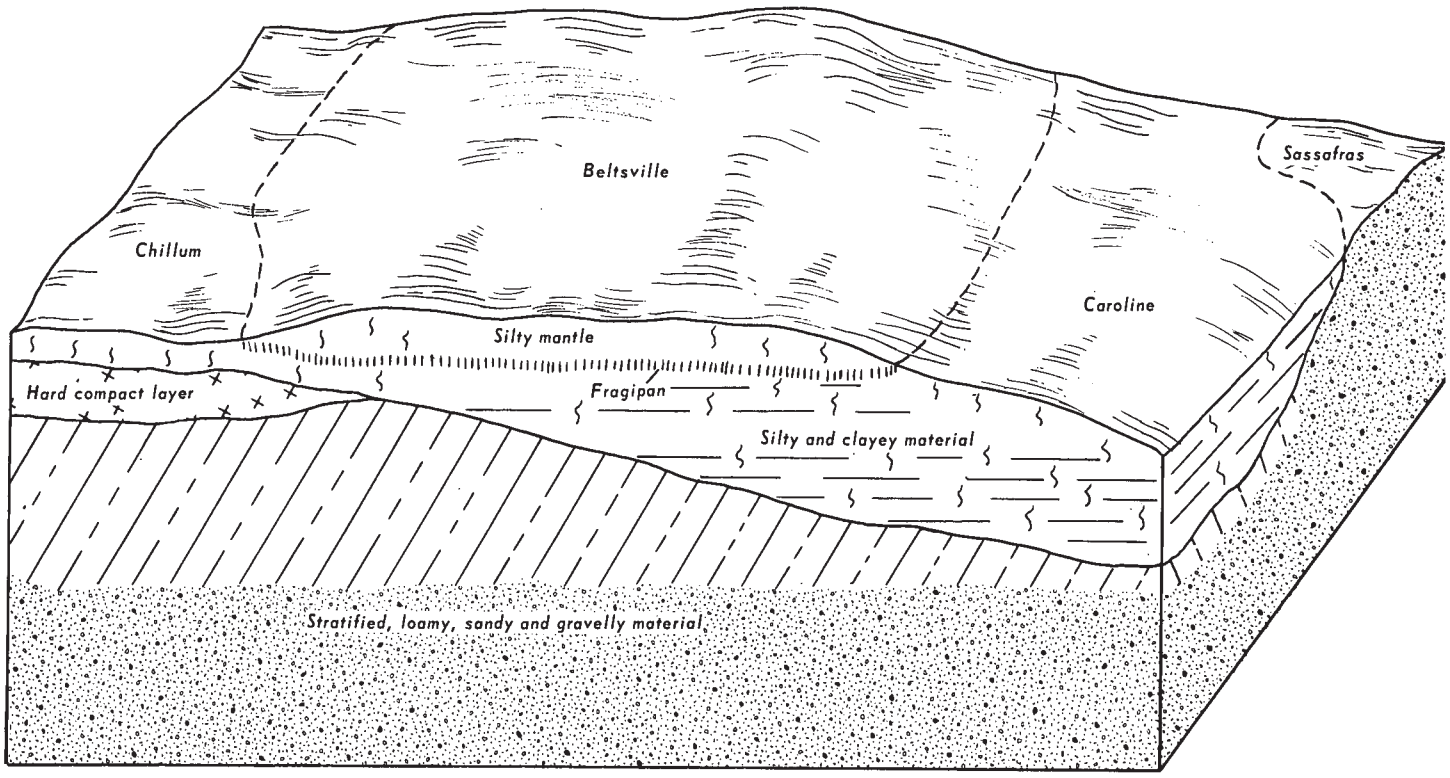


*Figure* 2.—Cross section of soil association 2 showing topography, important soils, and underlying material.

The well drained Westphalia soils have a surface layer and a subsoil of fine sandy loam. The subsoil is friable to very friable, and it is relatively thin. The underlying material is loamy fine sand. This material is commonly loose. In many areas Westphalia soils are severely gullied.

The well drained Sassafras soils have a surface layer of sandy loam or loam and a well developed subsoil of sandy clay loam. In some areas they are gravelly and as much as 20 percent fine smooth pebbles.

Some important minor soils in this association are the moderately well drained Beltsville soils; the well drained Caroline, Marr, and Chillum soils; and the poorly drained Bibb soils on flood plains of streams.

The gently sloping and moderately sloping soils of this association are suitable for farming. Tobacco grown on these soils is generally of very good to excellent quality. Corn and soybeans are extensively raised.

A large part of the association was farmed at one time, but today only about 15 percent is cleared and about 10 percent is farmed. Some fields have reverted to Virginia pine, and valleys have reverted mostly to native hardwoods.

In recent years much of this association has been used for residential development, mostly along Route 6, the Golden Beach area, and along the Patuxent River. Other than slope, the major soils and most of the minor soils of this association have few limitations for nonfarm uses.

A cross section of a representative area in this association is shown in figure 3.

## 4. Beltsville-Croom-Evesboro association

*Nearly level to moderately sloping, moderately well drained to excessively drained, silty, gravelly, and very sandy soils; on uplands*

Sections of Routes 5 and 235 cross this association northwest of Hollywood to the Charles County line. The association is dissected except on small upland flats. The gravelly soils are generally on the sides of V-shaped ravines.

This association makes up about 2.5 percent of the county. It is about 22 percent Beltsville soils, 22 percent Croom soils, 20 percent Evesboro soils, and 36 percent minor soils.

The moderately well drained Beltsville soils are very silty. They have a dense, hard, fragipan in the lower part of the subsoil that inhibits the extension of roots and prevents the downward movement of water. In some seasons the soil above the fragipan is saturated with water, but little or no free water is in the fragipan and immediately below. This condition is common late in winter and early in spring.

The well drained Croom soils are gravelly and have a compacted or cemented subsoil. They are somewhat droughty and have a shallow root zone.

The excessively drained Evesboro soils are mostly coarse, loose, droughty sands to a depth of 5 feet or more.

Some important minor soils in this association are the well drained Sassafras, Westphalia, and Kempsville soils; the somewhat excessively drained Rumford

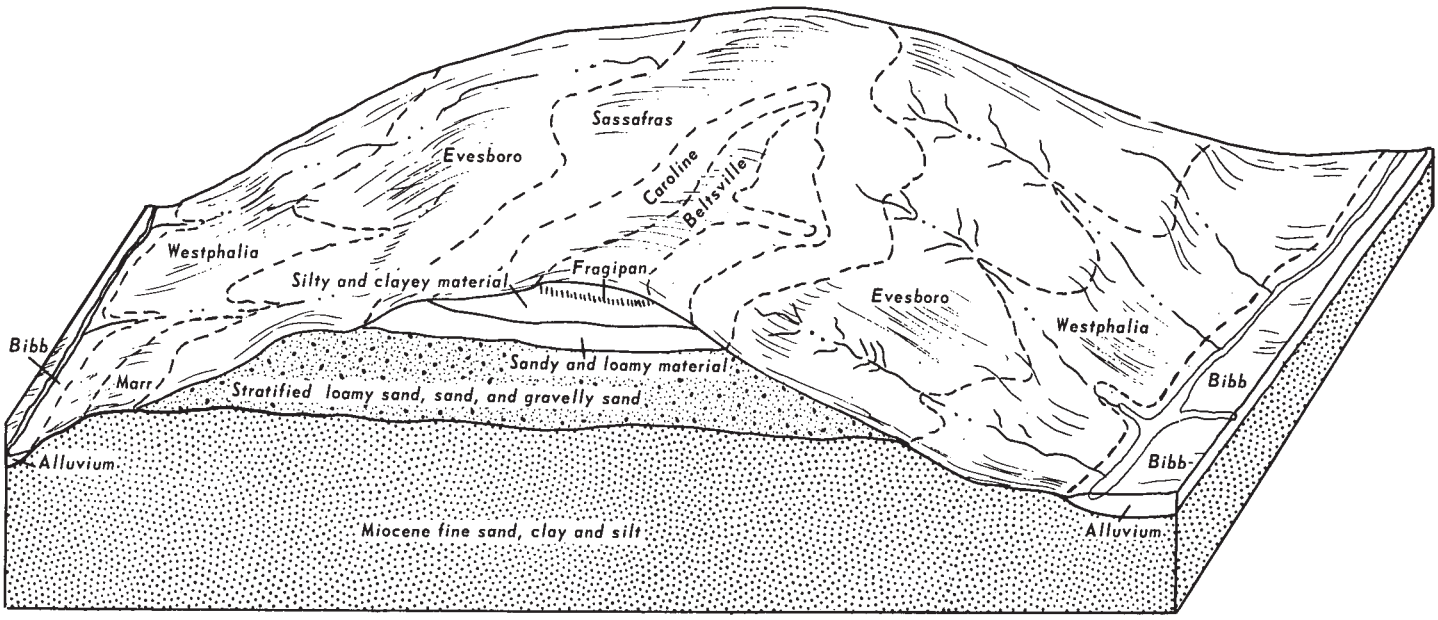


*Figure 3.*—**Cross section of soil association 3 showing topography, important soils, and underlying material.**

soils; and the poorly drained Bibb soils along streams.

In places this association is used for general farming. Tobacco, however, is the most important single crop. Most of the steeper areas are in second growth of hardwoods mixed with Virginia pine.

Most of this association is near one of the major highways in the county and has or is undergoing rapid residential development.

Beltsville and Croom soils have severe limitations for septic tank disposal fields, so special types of sewage disposal systems are necessary. Other than slope, Evesboro soils have few limitations for nonfarm uses.

## 5. Chillum-Beltsville-Sassafras association

*Nearly level to strongly sloping, well drained and moderately well drained, silty and loamy soils underlain by gravelly material that is dense and compact in places; on uplands and terraces*

This association occupies four areas in St. Marys County. The largest is west and northwest of Helen. An associated small area is west of Chaptico. Another large area straddles Route 235 from about Hollywood to Clarks Mill Road, and the other area is south of Route 235 near Oakville.

This association makes up about 3 percent of the county. It is about 50 percent Chillum soils, 20 percent Beltsville soils, 15 percent Sassafras soils, and 15 percent minor soils.

The well drained Chillum soils formed in a thin, silty to somewhat sandy mantle of wind deposited material. They are moderately deep over a substratum of older sandy and gravelly material that is hard or compact.

The moderately well drained Beltsville soils are very silty. They have a hard, dense fragipan in the lower part of the subsoil that inhibits the extension of roots and the downward movement of water. In some seasons the soil above the fragipan is saturated with water, but little or no free water is in the fragipan and immediately below. This condition is most common late in winter and early in spring.

The well drained Sassafras soils are deep. They have a surface layer of sandy loam or loam and a subsoil that is dominantly sandy clay loam.

Some important minor soils in this association are the moderately well drained Bourne soils and the poorly drained Bibb soils. Also included are some areas of gravelly materials.

The major soils of this association are generally suited to most crops grown in the area. Tobacco is the most important single crop. Although some areas of these soils are limited by shallow rooting depth, poor drainage, or both, crops respond well to good management.

Some areas of this association are being used for residential development. Individual septic tanks do not function properly on the soils that have impeded drainage or a compact substratum.

## 6. Sassafras-Beltsville association

*Level to steep, well drained and moderately well drained, loamy and silty soils, some of which are moderately deep to a hard, dense fragipan; on uplands and terraces*

This association is in a large area on both sides of Route 235 in and around Hollywood. From Route 235, it extends northwest about 7 miles, northeast about 3 miles, and southwest to the upper reaches of the McIntosh Run. This association also is in a smaller area about 1 mile wide that is northeast of and parallel to Route 235 from Lexington Park to Clarks Mill Road. The soils are dominantly undulating, but in places slopes are more than 15 percent. These soils are mod-

erately dissected by drainageways that carry water mainly to McIntosh Run and the Patuxent River.

This association makes up about 5 percent of the county. It is about 65 percent Sassafras soils, 25 percent Beltsville soils, and 10 percent minor soils.

The well drained Sassafras soils have a surface layer of sandy loam or loam and a well developed subsoil of sandy clay loam.

The moderately well drained Beltsville soils are very silty. They have a dense, hard fragipan in the lower part of the subsoil that inhibits the extension of roots and prevents the downward movement of water. In some seasons the soil above the fragipan is saturated with water, but little or no free water is in the fragipan or immediately below. This condition is common late in winter and early in spring.

Some important minor soils in this association are the well drained Chillum soils, the excessively drained Evesboro soils, and the poorly drained Bibb soils.

The major soils of the association are suited to most crops grown in the area. Most farms are small and are used mainly for tobacco. A large part of the association was farmed at one time, but it has reverted to oaks and Virginia pine or is used for grazing.

Much of this association is in the path of community expansion. A number of residential developments are in the area. Beltsville soils have severe limitations for septic tank disposal fields, but they have no more than moderate limitations for most other nonfarm uses. Sassafras soils have fewer limitations, but slope is a limitation for nonfarm use. Sassafras soils commonly have no wetness limitations for foundations and basements and they have few limitations for sewage disposal.

## 7. Faceville association

*Level to moderately sloping, deep, well drained soils that have a loamy surface layer and a clayey or loamy subsoil; on uplands*

This association is in two small areas. The larger area is in the Bushwood section along Routes 242 and 238. The other area is between Clements and Morganza west of Route 242. The soils are mostly level to gently sloping and are somewhat dissected. Slopes are as much as 15 percent.

This association makes up about 0.5 percent of the county. It is about 65 percent Faceville soils and 35 percent minor soils.

The well drained Faceville soils are deep. They have a surface layer of silt loam or fine sandy loam, or red clay loam in places where the original surface layer has been eroded. The subsoil is red clay, sandy clay, or clay loam.

Some important minor soils in this association are the well drained Sassafras and Chillum soils, the moderately well drained Beltsville and Bourne soils, and the poorly drained Bibb soils.

Most of this association is farmed. The soils are well suited to the major crops of the area. Under good management crop yields are among the highest in the county.

Faceville soils are suitable for homesites and for basements and foundations. They are also suitable for septic tank disposal fields.

## 8. Elkton-Keyport association

*Nearly level to moderately sloping, poorly drained and moderately well drained, silty soils that have a clayey subsoil; on uplands and terraces*

This association is mainly at low elevations, commonly less than 40 feet above sea level. It borders the rivers and some of the larger creeks of the county. The largest areas border the Potomac River and its tributaries and the Chesapeake Bay.

This association makes up about 3.5 percent of the county. It is about 55 percent Elkton soils, 30 percent Keyport soils, and 15 percent minor soils.

The poorly drained Elkton soils have a surface layer of silt loam and a subsoil of clay or silty clay.

The moderately well drained Keyport soils have a surface layer of silt loam and a subsoil that is mostly clay or silty clay.

The important minor soils are the moderately well drained Mattapex soils and the poorly drained Othello and Bibb soils. Also included in this association are areas of Tidal marsh and Beaches.

If appropriate artificial drainage is used, the major soils of this association are suited to general crops, hay, and pasture. Large areas, mainly of undrained Elkton and Othello soils, are in hardwoods and loblolly pine.

There are no extensive residential developments in this association. Elkton and Keyport soils have severe limitations for septic tank disposal fields. Elkton soils have severe limitations for nearly all other nonfarm uses. Keyport soils have no more than moderate limitations for most other nonfarm uses.

## 9. Othello-Mattapex association

*Level to gently sloping, poorly drained and moderately well drained, silty soils that have a silty subsoil; on uplands and terraces*

This association mainly borders the Potomac River and its tributaries and the Chesapeake Bay up to the Patuxent Naval Air Test Center. Elevation is less than 40 feet above sea level. Most of the association is poorly drained.

This association makes up about 18.5 percent of the county. It is about 50 percent Othello soils, 20 percent Mattapex soils, and 30 percent minor soils.

Othello soils are poorly drained and Mattapex soils are moderately well drained. Othello and Mattapex soils have a surface layer of silt loam and a subsoil of silt loam or silty clay loam.

The important minor soils in this association are the well drained Sassafras and Matapeake soils, the moderately well drained Woodstown soils, and the poorly drained Elkton and Bibb soils. Also included are small areas of coastal beaches and Tidal marsh.

Many areas of this association are used for farming, but other fairly large areas are wooded. Some artificial drainage is required on the Othello soils if they are to be cropped efficiently. The moderately well drained Mattapex soils are suited to most crops grown in this area.

There are some sizeable residential and community developments on the soils of this association, but the use of the major soils for building sites and septic

tank disposal fields is severely limited by wetness. Othello soils have severe limitations for nearly all nonfarm uses. Mattapex soils have slight to moderate limitations for most other nonfarm uses.

A cross section of a representative area in this association is shown in figure 4.

## 10. Matapeake-Mattapex-Sassafras association

*Nearly level to strongly sloping, well drained and moderately well drained, silty and loamy soils generally underlain by a sandy substratum; on uplands and terraces*

This association is mainly along the Patuxent River from the Charles County line to the Patuxent Naval Air Test Center (fig. 5). Other small areas are around St. Jeromes Neck, along the upper part of St. Marys River, along the Potomac River between McKay Beach and Popular Hill Creek. They are also along the upper parts of Breton Bay and St. Clements Bay, and along the Wicomico River around Indiantown.

This association makes up about 10 percent of the county. It is about 30 percent Matapeake soils, 25 percent Mattapex soils, 20 percent Sassafras soils, and 25 percent minor soils.

The Matapeake and Sassafras soils are well drained. Mattapex soils are moderately well drained. The Matapeake and Mattapex soils are very silty; Sassafras soils are loamy. Generally, all these soils have a sandy substratum.

The more important minor soils in this association are the excessively drained Evesboro soils and the poorly drained Othello, Elkton, and Bibb soils. Also included in the association are some areas of Tidal marsh.

The major soils of this association are well suited to cultivated crops. In some areas of the Mattapex soils some artificial drainage is needed for best results, especially if tobacco is to be grown.

Much of this association is used for residential development, chiefly because of its location in regard to the Patuxent River and its proximity to the Patuxent Naval Air Test Center. Mattapeake and Sassafras soils have only slight to moderate limitations for nonfarm use. Mattapex soils have severe limitations for septic tank disposal fields.

## 11. Evesboro association

*Nearly level to steep, excessively drained, very sandy soils; on uplands*

This association is in four areas in the county. The largest area is mainly southwest of Route 235 between St. Andrews Road and the Lawrence Hayden Road. The other areas are along Route 5 in the Mechanicsville and the Charlotte Hall area and along Route 6 in the New Market area.

This association makes up about 3 percent of the county. It is about 60 percent Evesboro soils and 40 percent minor soils.

The excessively drained Evesboro soils tend to be droughty. They are very sandy to a depth of 5 feet or more. In a few areas they are gravelly; here they are as much as 30 percent fine, smooth, subangular quartz pebbles.

Many minor soils are in this association. Most extensive are the somewhat excessively drained Rumford soils, the well drained Sassafras and Chillum soils, the moderately well drained Beltsville and Bourne soils, and the poorly drained Bibb soils.

Because Evesboro soils are naturally droughty they are not as well suited to most crops grown in the county as are most of the minor soils of the association.

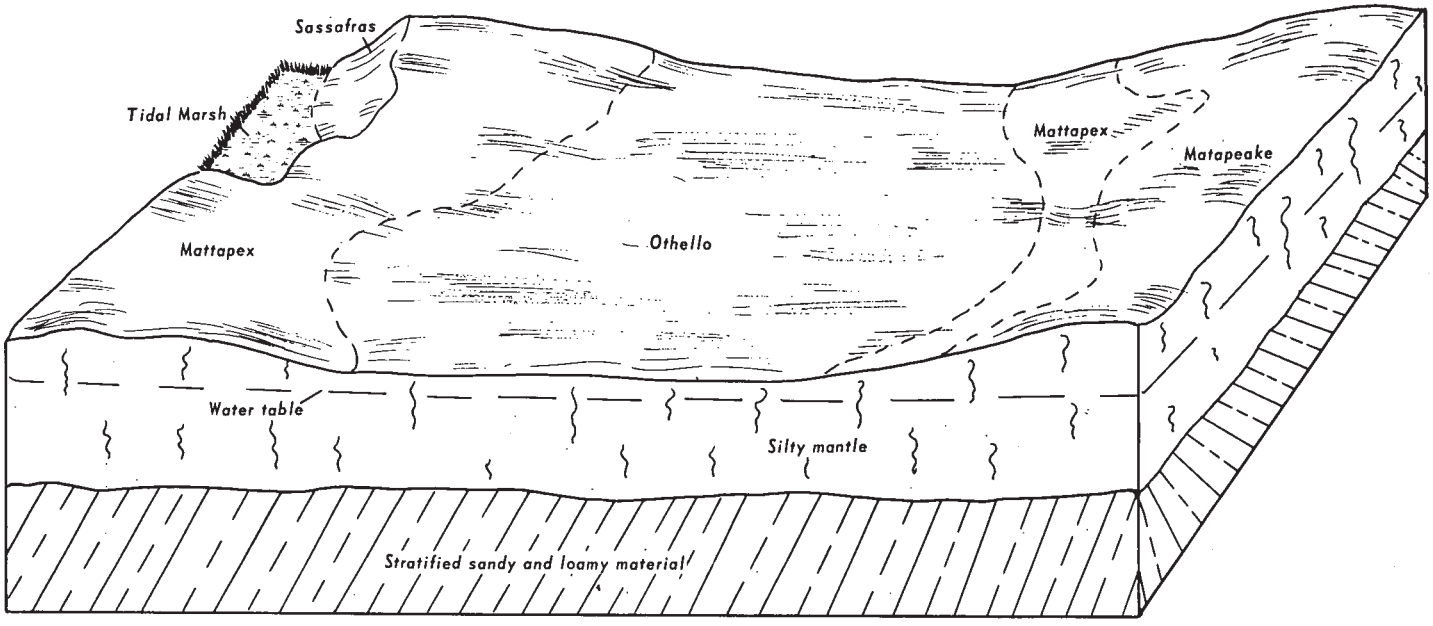


*Figure 4.*—**Cross section of soil association 9 showing topography, important soils, and underlying material.**

*Figure 5.*—Landscape along the Patuxent River south of Golden Beach in the Matapeake-Mattapex-Sassafras association.

However, under improved management and with supplemental irrigation, Evesboro soils produce favorable yields of high quality tobacco.

Other than slope, most areas of the well drained to excessively drained soils in this association have few limitations for residential and community development. Evesboro soils are a source of sand used in road and building construction.

A cross section of a representative area in this association is shown in figure 6.

### 12. Bibb-Tidal Marsh association

*Level or nearly level, poorly drained soils; on flood plains and wetlands subject to flooding by tidal water*

This association is in major flood plains and marshes. The most important of these are along the streams that empty into the Wicomico River, St. Clements Bay, Breton Bay, and St. Marys River.

This association makes up about 6 percent of the county. It is about 70 percent Bibb soils, 25 percent Tidal marsh, and 5 percent minor soils.

The poorly drained Bibb soils are subject to flooding. Tidal marsh is wet, unstable soil material subject to flooding by saline to brackish water.

Where Bibb soils are not subjected to frequent flooding and have been drained, they are suited to corn, soybeans, and grazing. Large areas of these soils were cultivated at one time, but have reverted to hardwood forest. Tidal marsh is not used for farming.

The minor soils in the association are the moderately well drained Mattapex and Keyport soils and the poorly drained Elkton and Othello soils.

The components of this association have severe limitations for nearly all nonfarm uses because of extreme wetness and flooding.

## Descriptions of the soils

In this section the soils of St. Marys County are described and their use and management are discussed. Each soil series is described in detail, and then, briefly, the mapping units in that series. Unless it is specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full informa-

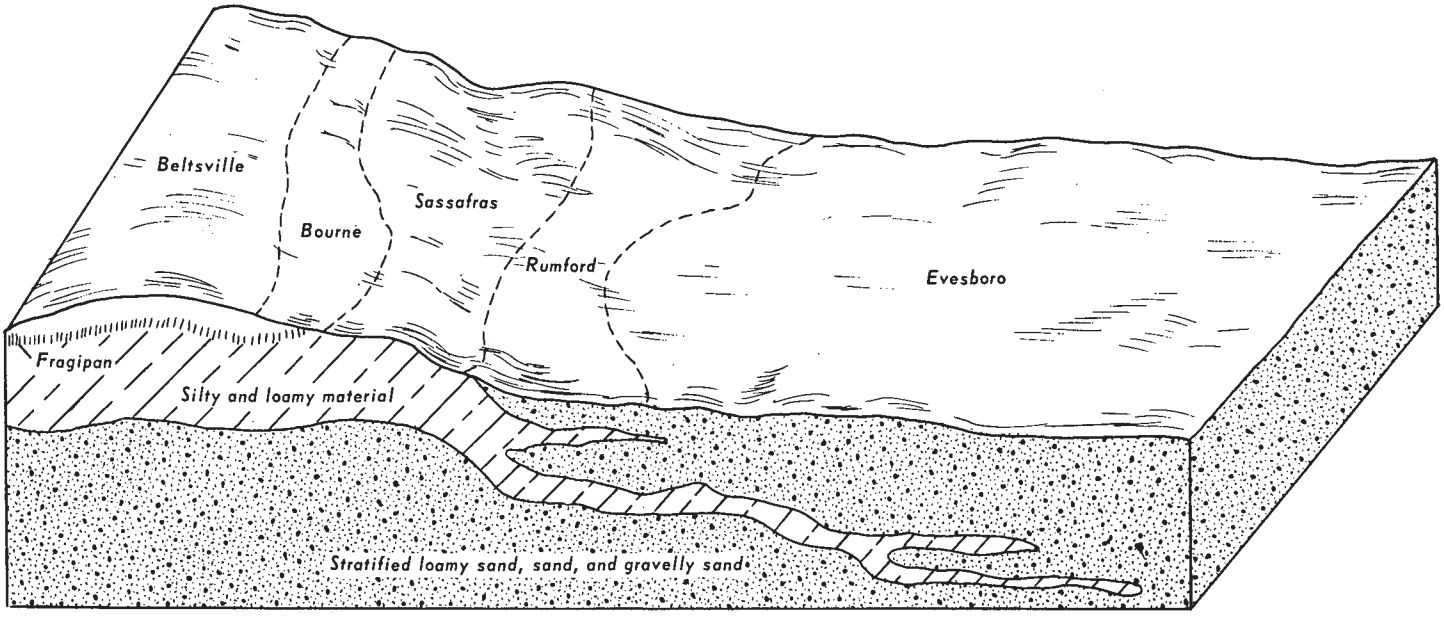


*Figure 6.*—**Cross section of soil association 11 showing topography, important soils, and underlying material.**

tion about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

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

As mentioned in the section "How this survey was made," not all mapping units are members of a soil series. Alluvial land, for example, does not belong to a soil series, but nevertheless is listed in alphabetic order along with the soil series.

Preceding the name of each mapping unit is a symbol. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit are the capability unit and woodland suitability group in which the mapping unit has been placed. The page for the description of each mapping unit or other interpretative group can be learned by referring to the "Guide to Mapping Units" at the back of this survey, or from the table of contents at the front.

The acreage and proportionate extent of each mapping unit are shown in table 3. Many of the terms used in describing soils can be found in the Glossary, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*8*).[3]

## Alluvial land

**Aa—Alluvial land.** This soil material is mainly in depressions and at the foot of slopes. The material was washed from uplands, mostly since farming first began. Some material is still accumulating, but generally accumulation has stopped because the eroded upland fields have been abandoned and allowed to revert to native vegetation.

The soil texture is variable, ranging from clay to sand, and cannot be mapped accurately as separate soil mapping units. Therefore, onsite investigation is needed for specific uses. These soils are moderately well drained to well drained. If managed properly, they are suited to most crops grown in the area and to sown pasture. Good management means providing artificial drainage where needed, using minimum tillage, and using and managing all available crop residue. Capability unit IIw–7; woodland suitability group 1w3.

## Alluvial land, wet

**Ad—Alluvial land, wet** is nearly level. It consists of soils formed in material recently washed from uplands and deposited on flood plains and in some draws and depressions. Most of the flood plains are fairly narrow. The dominant soils are silty, but in places the soils are fairly sandy.

These soils are generally somewhat poorly drained to poorly drained. They generally are flooded once or more each year. Most areas are in woodland or pasture,

[3] Italic numbers in parentheses refer to Literature Cited, p. 89.

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

| Soil | Acres | Percent |
|---|---|---|
| Alluvial land | 4,380 | 1.9 |
| Alluvial land, wet | 1,469 | .6 |
| Beaches | 518 | .2 |
| Beltsville silt loam, 0 to 2 percent slopes | 3,316 | 1.4 |
| Beltsville silt loam, 2 to 5 percent slopes, moderately eroded | 33,192 | 14.2 |
| Beltsville silt loam, 2 to 5 percent slopes, severely eroded | 552 | .2 |
| Beltsville silt loam, 5 to 10 percent slopes, moderately eroded | 3,369 | 1.4 |
| Beltsville silt loam, 5 to 10 percent slopes, severely eroded | 4,524 | 1.9 |
| Bibb silt loam | 12,569 | 5.4 |
| Bourne fine sandy loam, 2 to 5 percent slopes, moderately eroded | 3,270 | 1.4 |
| Bourne fine sandy loam, 5 to 10 percent slopes, severely eroded | 1,580 | .7 |
| Caroline silt loam, 2 to 5 percent slopes, moderately eroded | 1,403 | .6 |
| Caroline silt loam, 5 to 10 percent slopes, moderately eroded | 2,580 | 1.1 |
| Caroline silt loam, 5 to 10 percent slopes, severely eroded | 3,364 | 1.4 |
| Caroline silt loam, 10 to 15 percent slopes, moderately eroded | 878 | .4 |
| Caroline silt loam, 10 to 15 percent slopes, severely eroded | 954 | .4 |
| Chillum loam, 0 to 2 percent slopes | 674 | .3 |
| Chillum loam, 2 to 6 percent slopes, moderately eroded | 3,630 | 1.5 |
| Chillum loam, 6 to 12 percent slopes, moderately eroded | 1,093 | .5 |
| Chillum loam, 6 to 12 percent slopes, severely eroded | 1,221 | .5 |
| Croom gravelly sandy loam, 2 to 5 percent slopes, moderately eroded | 296 | .1 |
| Croom gravelly sandy loam, 5 to 10 percent slopes, moderately eroded | 990 | .4 |
| Croom gravelly sandy loam, 10 to 15 percent slopes, moderately eroded | 5,844 | 2.5 |
| Croom gravelly sandy loam, 10 to 15 percent slopes, severely eroded | 8.203 | 3.5 |
| Cut and fill land | 1,552 | .7 |
| Elkton silt loam | 5,569 | 2.4 |
| Evesboro loamy sand, 0 to 8 percent slopes | 4,454 | 1.9 |
| Evesboro loamy sand, 8 to 15 percent slopes | 1,562 | .7 |
| Evesboro-Westphalia complex, 6 to 12 percent slopes, moderately eroded | 1,264 | .5 |
| Evesboro-Westphalia complex, 12 to 20 percent slopes, moderately eroded | 8,559 | 3.6 |
| Evesboro-Westphalia complex, 20 to 45 percent slopes, moderately eroded | 16,193 | 6.9 |
| Faceville silt loam, 0 to 5 percent slopes | 803 | .3 |
| Fallsington sandy loam | 2,371 | 1.0 |
| Gravel pits | 732 | .3 |
| Kempsville fine sandy loam, 5 to 10 percent slopes, moderately eroded | 1,845 | .8 |
| Kempsville fine sandy loam, 5 to 10 percent slopes, severely eroded | 1,874 | .8 |
| Kempsville fine sandy loam, 10 to 15 percent slopes, moderately eroded | 655 | .3 |
| Kempsville fine sandy loam, 10 to 15 percent slopes, severely eroded | 1,033 | .4 |
| Keyport fine sandy loam, 0 to 2 percent slopes | 420 | .2 |
| Keyport fine sandy loam, 2 to 5 percent slopes, moderately eroded | 430 | .2 |
| Keyport silt loam, 0 to 2 percent slopes | 1,531 | 0.7 |
| Keyport silt loam, 2 to 5 percent slopes, moderately eroded | 1,024 | .4 |
| Keyport silt loam, 5 to 10 percent slopes, moderately eroded | 516 | .2 |
| Klej loamy sand, 0 to 5 percent slopes | 572 | .2 |
| Leonardtown silt loam | 257 | .1 |
| Marr fine sandy loam, 2 to 6 percent slopes, moderately eroded | 460 | .2 |
| Marr fine sandy loam, 6 to 12 percent slopes, moderately eroded | 261 | .1 |
| Marr fine sandy loam, 6 to 12 percent slopes, severely eroded | 164 | .1 |
| Matapeake fine sandy loam, 0 to 2 percent slopes | 1,010 | .4 |
| Matapeake fine sandy loam, 2 to 5 percent slopes, moderately eroded | 1,425 | .6 |
| Matapeake silt loam, 0 to 2 percent slopes | 3,464 | 1.5 |
| Matapeake silt loam, 2 to 5 percent slopes, moderately eroded | 1,341 | .6 |
| Matapeake silt loam, 5 to 10 percent slopes, severely eroded | 327 | .2 |
| Mattapex fine sandy loam, 0 to 2 percent slopes | 4,213 | 1.8 |
| Mattapex fine sandy loam, 2 to 5 percent slopes, moderately eroded | 3,392 | 1.4 |
| Mattapex silt loam, 0 to 2 percent slopes | 5,254 | 2.2 |
| Mattapex silt loam, 2 to 5 percent slopes, moderately eroded | 1,615 | .7 |
| Mattapex silt loam, 5 to 10 percent slopes, moderately eroded | 218 | .1 |
| Othello fine sandy loam | 4,522 | 1.9 |
| Othello silt loam | 18,276 | 7.8 |
| Rumford loamy sand, 0 to 5 percent slopes | 2,131 | .9 |
| Rumford loamy sand, 5 to 10 percent slopes, moderately eroded | 802 | .3 |
| Sassafras sandy loam, 0 to 2 percent slopes | 2,181 | .9 |
| Sassafras sandy loam, 2 to 5 percent slopes, moderately eroded | 5,774 | 2.5 |
| Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded | 2,485 | 1.1 |
| Sassafras sandy loam, 5 to 10 percent slopes, severely eroded | 2,646 | 1.1 |
| Sassafras sandy loam, 10 to 15 percent slopes, moderately eroded | 1,433 | .6 |
| Sassafras sandy loam, 10 to 15 percent slopes, severely eroded | 1,091 | .5 |
| Sassafras loam, 0 to 2 percent slopes | 840 | .4 |
| Sassafras loam, 2 to 5 percent slopes, moderately eroded | 2,546 | 1.1 |
| Sassafras-Chillum complex, 6 to 12 percent slopes, moderately eroded | 1,411 | .6 |
| Sassafras-Chillum complex, 6 to 12 percent slopes, severely eroded | 1,345 | .6 |
| Tidal marsh | 4,027 | 1.7 |
| Westphalia fine sandy loam, 2 to 6 percent slopes, moderately eroded | 483 | .2 |
| Westphalia fine sandy loam, 6 to 12 percent slopes, moderately eroded | 506 | .2 |
| Westphalia fine sandy loam, 6 to 12 percent slopes, severely eroded | 400 | .2 |
| Woodstown sandy loam, 0 to 2 percent slopes | 2,798 | 1.2 |
| Woodstown sandy loam, 2 to 5 percent slopes | 2,432 | 1.0 |
| Woodstown sandy loam, 5 to 10 percent slopes, moderately eroded | 520 | .2 |
| Total | 234,878 | 100.0 |

and they are suitable habitat for various kinds of wildlife. Capability unit VIw–1; woodland suitability group 2w4.

## Beaches

**Be—Beaches** are strips of land along some shores of the tidal parts of the Potomac, Patuxent, and Wicomico rivers, the Chesapeake Bay, and a few of their major tributaries. Typically, the material is mainly loose sand that has been worked and reworked by tides and wave action. The beaches are mostly smooth and nearly level, but a few areas are hummocky and have short slopes. There is no soil development and there is little or no vegetation. This land is best suited to recreation and is used as habitat for selected wildlife. Capability unit VIIIs–2; not assigned to a woodland suitability group.

## Beltsville series

The Beltsville series consists of moderately well drained, nearly level to moderately sloping, moderately deep soils on uplands. These soils are in most upland areas. They are the most extensive soils in the county, and they are the dominant soils on many farms and in many communities. The soils have a fragipan, generally at a depth of less than 30 inches. They formed in silty and moderately sandy material containing moderate amounts of clay. The native vegetation generally is hardwoods, mainly scrub oaks and some Virginia pine and loblolly pine.

In a representative profile the surface layer is silt loam about 6 inches thick. It is generally pale brown, brown, or yellowish brown. In wooded areas, it is grayish brown in the thinner, upper part and light yellowish brown in the lower part. The upper part of the subsoil is yellowish brown silt loam about 18 inches thick. The lower part of the subsoil is a fragipan about 18 inches thick. It is pale brown, mottled loam that is very firm, dense, and brittle when moist and very hard when dry. Water moves very slowly through this fragipan, and roots do not penetrate it readily. Below the fragipan, between depths of 42 and 73 inches, is mixed brownish yellow and yellowish red sandy loam.

Beltsville soils are fairly easy to work if the moisture content is favorable, but the moisture content is extremely variable during the year. These soils are often saturated near the surface but are almost completely dry in the fragipan, which is slowly permeable to very slowly permeable (fig. 7). At other times they are almost completely dry as far down as the fragipan. At such times, the soil is droughty and irrigation is needed for some crops (fig. 8).

The fragipan prevents the downward movement of water and restricts root growth. The water table is seasonally perched within a depth of ½ to 2½ feet. The available water capacity is moderate. In unlimed areas, the soil is commonly very strongly acid.

Large areas of Beltsville soils are farmed. Others are idle or in woodland, and some areas have intensive nonfarm use. These soils have moderate to severe limitations for many nonfarm uses.

Representative profile of Beltsville silt loam, 2 to 5 percent slopes, moderately eroded, in a wooded area about 2 miles east of St. Marys City:

A1—0 to 1 inch; dark grayish brown (10YR 4/2) silt loam; weak medium granular structure; very friable, slightly sticky; many fine roots; extremely acid; abrupt smooth boundary.

A2—1 to 6 inches; light yellowish brown (2.5Y 6/4) silt loam with some grayish brown (10YR 5/2) silt in old root channels; weak medium granular structure; very friable, slightly sticky; few fine roots; very strongly acid; clear smooth boundary.

B1—6 to 13 inches; yellowish brown (10YR 5/6) silt loam; weak fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; thin discontinuous clay films; very strongly acid; clear smooth boundary.

B2t—13 to 24 inches; yellowish brown (10YR 5/6) heavy silt loam; moderate fine subangular blocky structure; friable, slightly sticky and plastic; very few fine roots; thin discontinuous clay films; very strongly acid; clear smooth boundary.

Bx—24 to 42 inches; pale brown (10YR 6/3); common medium distinct strong brown (7.5YR 5/6) and a few medium distinct light gray (5Y 7/1) mottles; moderate thick platy structure and very coarse prismatic structure; very firm, dense and compact, and brittle; slightly sticky and plastic; very few fine roots along faces of prisms; distinct continuous films on polygon faces; strongly acid; gradual smooth boundary.

IIC1—42 to 65 inches; brownish yellow (10YR 6/6) sandy loam; many coarse distinct variegations of yellowish red (5YR 5/8); massive; friable, slightly sticky; very strongly acid; gradual smooth boundary.

IIC2—65 to 73 inches; brownish yellow (10YR 6/8) sandy loam; lenses of yellowish red (5YR 5/8); massive; very friable; very strongly acid.

The solum ranges from about 40 to 64 inches in thickness. Depth to the Bx horizon ranges from about 20 to 32 inches except in places in severely eroded areas where this horizon is as shallow as 12 inches. In the A horizon hue is 2.5Y or 10YR, value is 2 to 7, and chroma is 1 to 6. In the thin A1 horizon value is 3 or 4 and chroma is 1 and 2. In the A2 horizon in places value is 5 to 7 and chroma is 2 to 4.

In the B1 and Bt horizons hue is 10YR, value is 5 or 6, and chroma is 4 or 6. In places the material in these horizons is variegated. Texture is silt loam or silty clay loam. In the Bx horizon hue is 2.5Y, 10YR, or 7.5YR; value is 4 to 6; and chroma is 3 to 6. The Bx horizon is variegated or has mottles that are low or high in chroma. In places both of these characteristics are present. This horizon is loam, silt loam, or silty clay loam, and characteristically is very dense, very firm, and brittle.

The IIC horizon has about the same range in color

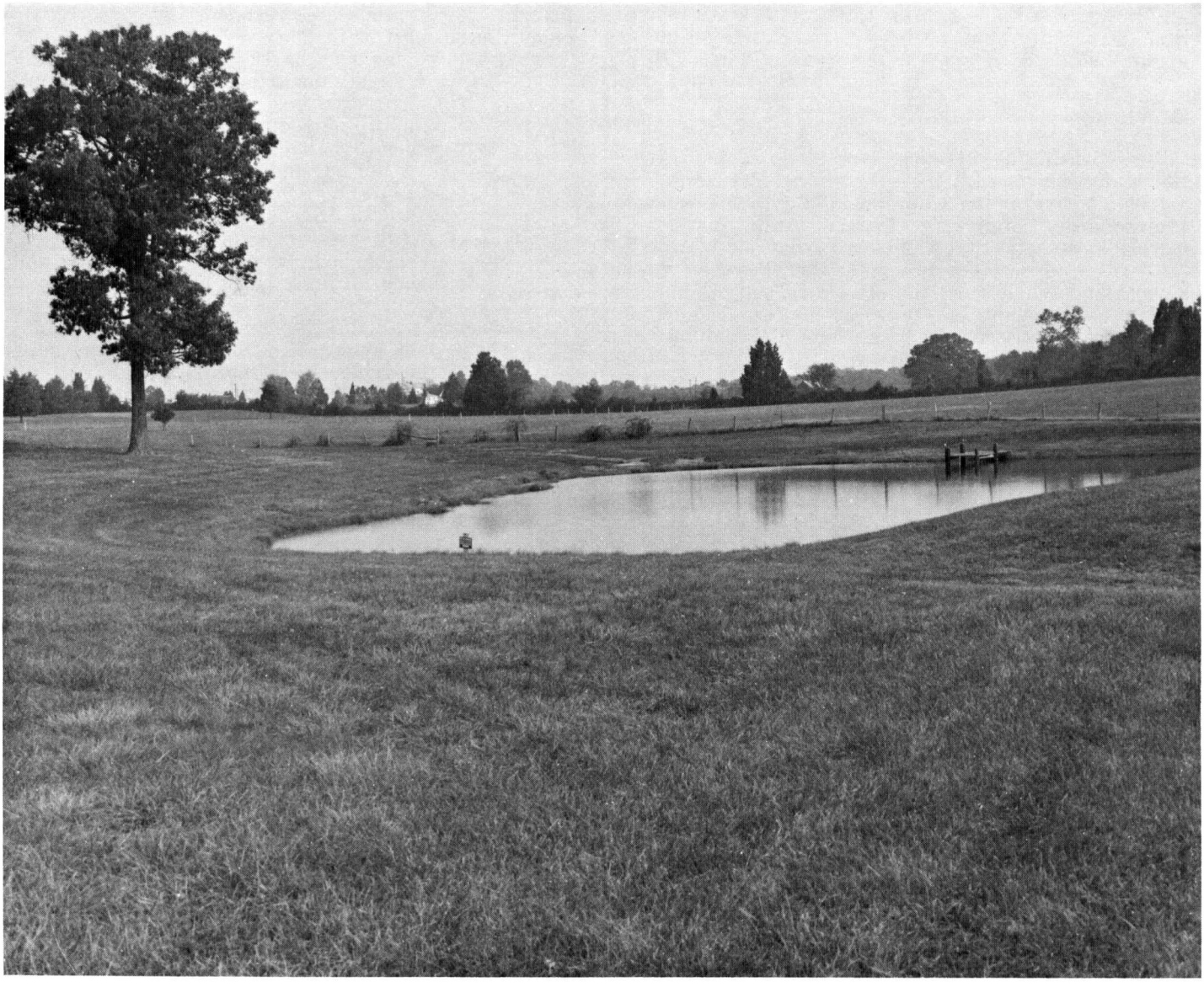

*Figure* 7.—Farm pond on Beltsville silt loam, 2 to 5 percent slopes.

as the Bx horizon. Texture ranges from sandy loam to clay loam, and the material is gravelly in places.

Beltsville soils are similar to Bourne soils in color and in natural drainage, but they are much more silty and less sandy throughout. They are better drained than Leonardtown soils which are dominantly gray throughout. Beltsville soils are not so well drained as Croom soils, which have a hard, gravelly Bt horizon, and they are not so well drained as Chillum soils, which have a hard, dense C horizon.

**BlA—Beltsville silt loam, 0 to 2 percent slopes.** This nearly level soil is on uplands. Depth to the fragipan is more than 24 inches. A small amount of surface soil has been lost in some areas that have been cultivated for many years.

This soil becomes saturated quickly when it rains or when snow melts, and remains wet for a fairly long period because runoff and permeability are slow. The hazard of erosion is slight. The water table is seasonally perched above the fragipan. Included with this soil in mapping are some small depressional areas of poorly drained soils.

This soil is suited to some crops and sown pasture. It is not suited to deep rooted crops or to crops that are subject to damage by frost heaving. Tobacco yields are favorable in places, but the quality is generally not as high as on the sandier and better drained soils. Improving drainage is generally the most important management concern. In addition to artificial drainage, good management includes minimum tillage, use of cover crops, and good use and management of all available crop residue. Tilling within the proper range

*Figure 8.*—**Missing and stunted tobacco caused by drought on a Beltsville silt loam.**

of moisture content is essential to reduce compaction and clodding. Capability unit IIw–8; woodland suitability group 3w3.

**BlB2—Beltsville silt loam, 2 to 5 percent slopes, moderately eroded.** This gently sloping soil is on uplands. It is the most extensive soil in the county. It has the profile described as representative of the series. In practically all cleared areas, surface soil has been lost through erosion. Depth to the fragipan is generally about 22 to 28 inches.

The hazard of further erosion is moderate because water runs off readily, especially when the soil is wet. The water table is seasonally perched above the fragipan. Included with this soil in mapping are some severely eroded areas.

This soil is suited to some crops and sown pasture. It is not suited to deep rooted crops or to crops subject to damage by frost heaving. Tobacco yields are favorable in places, but the quality is generally low to medium. Although artificial drainage is needed for good growth of some crops, protecting against further erosion is the major management concern. Practices that retard erosion include interceptors and diversions to decrease the amount and rate of runoff, sodded waterways, minimum tillage, cover crops, suitable cropping systems, and good use and management of all available crop residue. Capability unit IIe–13; woodland suitability group 3w3.

**BlB3—Beltsville silt loam, 2 to 5 percent slopes, severely eroded.** This gently sloping soil is on the uplands. It generally has a thin surface layer and subsoil. Depth to the fragipan ranges from about 12 to 20 inches.

Runoff is rapid. The hazard of further erosion is severe. The water table is seasonally perched above the fragipan, but surface drainage is good. Included with this soil in mapping are some areas where the surface layer has been completely eroded and the fragipan is exposed.

This soil is suited to a few crops and to sown pasture. It is not suited to deep rooted crops or to crops subject to damage by frost heaving. The quality of tobacco is generally low to medium. Erosion is the most important management concern. Practices that retard erosion include planting on the contour, planting close growing crops in narrow strips on the contour, using cover crops and minimum tillage, providing interceptors and diversions in sodded waterways, and using and managing available crop residue well. Capability unit IIIe–13; woodland suitability group 3w3.

**BlC2—Beltsville silt loam, 5 to 10 percent slopes, moderately eroded.** This moderately sloping soil is on uplands. In almost all cleared areas, surface soil has been lost through erosion. In places plowing has exposed the subsoil, giving newly plowed areas a spotty appearance. Depth to the fragipan ranges from about 20 to 26 inches.

Runoff is rapid. Further erosion is a hazard. The water table is seasonally perched above the fragipan, but surface drainage is good. Included with this soil in mapping are some areas that have shallow gullies and a few small areas where gray mottling is in the subsoil above the fragipan.

If this soil is well managed, it is suited to some crops and sown pasture. It is not suited to deep rooted crops or to crops subject to damage by frost heaving. The quality of tobacco is generally low to medium. The hazard of further erosion is the most important management concern. Practices that retard erosion include planting on the contour, planting close growing crops in narrow strips on the contour, using cover crops and minimum tillage, providing interceptors and diversions in sodded waterways, and using and managing available crop residue well. Capability unit IIIe–13; woodland suitability group 3w3.

**BlC3—Beltsville silt loam, 5 to 10 percent slopes, severely eroded.** This moderately sloping soil is on uplands. It has lost most or all of the original surface layer, and in places some of the subsoil, through erosion. Gullies are abundant, and in places the fragipan is exposed. Depth to the fragipan, where it is not exposed, ranges to 18 inches.

Further erosion is a hazard. The water table is seasonally high, but surface drainage is good.

This soil is suited to some crops and sown pastures. Where gullies occur, this soil is not well suited to cultivated crops. It is better suited to hay, pasture, or woodland. Artificial drainage is seldom necessary. The hazard of further erosion is the most important management concern. Practices that retard further erosion include growing clean-tilled crops at long intervals with close growing crops and pasture, growing clean-tilled crops in narrow strips on the contour, using minimum tillage, using interceptors and diversions in sodded waterways, and using and managing all available crop residue well. Capability unit IVe–9; woodland suitability group 3w3.

## Bibb series

The Bibb series consists of poorly drained, level or

nearly level soils on flood plains. These soils are subject to flooding at irregular intervals. They formed in recently deposited alluvium that was washed mainly from soils of the uplands in the county. The native vegetation is wetland hardwoods, mainly red maple (commonly called swamp maple), blackgum, birch, willow, and oaks, but pond pine and loblolly pine grow in places. Most of the acreage is woodland.

In a representative profile the surface layer is about 13 inches of grayish brown silt loam that has strong brown mottles over 15 inches of gray silt loam that has dark brown mottles. The underlying material, to a depth of about 60 inches, is gray, light gray, dark gray, or light brownish gray. In the upper part it is fine sandy loam that has dark brown mottles, and in the lower part it is sandy loam to sandy clay loam that has yellowish brown and dark brown mottles.

Bibb soils are easy to work if the moisture content is favorable, but the water table is at or near the surface in winter and generally remains there until late in spring. The high water table delays planting where Bibb soils are farmed. These soils are moderately permeable. The available water capacity is high. Poor natural drainage, the seasonally high water table, and the hazard of flooding are severe limitations for most nonfarm uses.

Representative profile of Bibb silt loam, in a wooded area adjacent to St. Clement's Creek, 1½ miles southwest of Morganza:

A11—0 to 13 inches; grayish brown (10YR 5/2) silt loam; many fine distinct mottles of strong brown (7.5YR 5/6); very weak to medium subangular blocky structure; friable, slightly sticky and slightly plastic; many fine root channels, extremely acid; abrupt wavy boundary.

A12g—13 to 28 inches; gray (5Y 6/1) heavy silt loam; many fine distinct mottles of dark brown (7.5YR 4/5); very weak to medium subangular blocky structure; friable, slightly sticky and slightly plastic; very few roots, many fine root channels; gray (5Y 5/1) clay films in large cracks; very strongly acid; abrupt wavy boundary.

C1g—28 to 37 inches; light brownish gray (2.5Y 6/2) fine sandy loam; common, fine prominent mottles of dark brown (7.5YR 4/4); massive; very friable, slightly sticky and slightly plastic; very few roots; few clay films; very strongly acid; abrupt wavy boundary.

C2g—37 to 49 inches; stratified gray (5Y 5/1) dark gray (5Y 4/1), and light gray (5Y 7/1) sandy loam; few medium distinct mottles of dark brown (7.5YR 4/2) and yellowish brown (10YR 5/6); massive; very friable, slightly sticky and slightly plastic; very few roots; strongly acid; abrupt smooth boundary.

C3g—49 to 60 inches; gray (N 5/0 and 5Y 5/1) sandy clay loam; few medium distinct mottles of yellowish brown (10YR 5/6); massive; very friable, slightly sticky and slightly plastic; strongly acid.

In the A11 horizon hue is 10YR or 7.5YR, value is 4 to 7, and chroma is 1 or 2. Mottles are common or many. In the A12g horizon hue is 10YR, 2.5Y, 5Y, or is neutral; value is 4 to 7; and chroma is 1 or 2.

In the C horizon hue is 10YR to 5Y or is neutral, value is 4 to 7, and chroma is 0 to 2. Mottles in this horizon are in shades of red, brown, or yellow. The C horizon is fine sandy loam, sandy loam, silt loam, loam, or sandy clay loam. The lower part of the C horizon is commonly coarser textured than the upper part, but in some places texture is abruptly fine. Depth to the C3g horizon ranges from about 20 inches to more than 40 inches.

Bibb soils are similar to Elkton, Fallsington, and Othello soils in color and in natural drainage, but none of these soils is on flood plains. Unlike the Bibb soils a Bt horizon is a characteristic of Elkton, Fallsington, and Othello soils.

**Bm—Bibb silt loam.** This is the only Bibb soil mapped in the county. It is a nearly level soil on flood plains. In a few places slopes are more than one percent.

The water table is at the surface for long periods. Undrained areas are seasonally ponded (fig. 9). Some areas are subject to flooding. Included with this soil in mapping are some areas, mainly in the Patuxent River Watershed, where the surface layer is sandy loam or fine sandy loam.

If artificially drained, this soil is suited to some crops and sown pasture. It is better suited to woodland. It is not suited to crops that need good soil aeration. Little or no tobacco or small grain are grown on this soil. Where the soil is subject to flooding, it is better suited to woodland or pasture. Good management on this soil includes artificial drainage, minimum tillage, and returning all available crop residue to the soil. Capability unit IIIw–7; woodland suitability group 2w4.

*Figure 9.*—**Water ponded on Bibb silt loam.**

### Bourne series

The Bourne series consists of moderately well drained, gently sloping to moderately sloping soils on uplands. These soils are on broad ridgetops at higher elevations. They have a dense, brittle fragipan in the lower part of the subsoil. The soils formed in thick sandy sediment containing moderate amounts of clay and some silt. The native vegetation is upland oaks and Virginia pine.

In a representative profile the surface layer is pale brown fine sandy loam about 9 inches thick. The upper 10 inches of the subsoil is yellowish brown fine sandy loam. The next 6 inches is yellowish brown loam. Below this is a fragipan about 30 inches thick. It is light olive brown to yellowish brown fine sandy loam that has mottles of various colors. It is dense, and it is very firm and brittle when moist and very hard when dry. Water moves very slowly through this layer and roots ordinarily do not penetrate it. The subsoil, between depths of 55 and 60 inches, is brownish yellow sandy clay loam variegated with mottles of olive, gray, and yellowish red.

Bourne soils are easy to work except where they are severely eroded. The available water capacity is low to moderate and the soils are slowly permeable. Above the fragipan these soils are wet for short periods, but they tend to dry out thoroughly in summer and fall. The fragipan is seldom wet; it acts as a barrier to soil moisture. In unlimed areas these soils are strongly acid to very strongly acid. They have moderate to severe limitations for many nonfarm uses.

Representative profile of Bourne fine sandy loam, 2 to 5 percent slopes, moderately eroded, in a cultivated field north of Bethel Church Road, ¾ mile northeast of Budds Creek:

Ap—0 to 9 inches; pale brown (10YR 6/3) fine sandy loam; weak medium granular structure; friable; many roots; medium acid; abrupt smooth boundary.

B1—9 to 19 inches; yellowish brown (10YR 5/6) fine sandy loam; very weak medium subangular blocky structure; friable, slightly sticky; common roots; discontinuous clay films; very strongly acid; clear smooth boundary.

B2t—19 to 25 inches; yellowish brown (10YR 5/6) loam; weak fine and medium subangular blocky structure; friable, slightly sticky; few roots; discontinuous clay films; very strongly acid; abrupt smooth boundary.

Bx1—25 to 39 inches; light olive brown (2.5Y 5/4) fine sandy loam; many medium faint light olive gray (5Y 6/2) and common medium distinct strong brown (7.5YR 5/6) mottles; moderate thick platy structure; firm, brittle and compact, slightly sticky; thin discontinuous clay films; very strongly acid; clear smooth boundary.

Bx2—39 to 55 inches; yellowish brown (10YR 5/6) fine sandy loam; many medium mottles of pale brown (10YR 6/3) and strong brown (7.5YR 5/8); moderate thick platy structure, firm, brittle and compact, slightly sticky and slightly plastic; patchy clay films on plates and along faces of large polygons; very strongly acid; gradual smooth boundary.

IIB3t—55 to 60 inches; brownish yellow (10YR 6/6) sandy clay loam; many medium distinct olive (5Y 5/6) and gray (5Y 6/1) and a few yellowish red (5YR 4/8) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few thin patchy clay films in vertical cracks; very strongly acid.

The solum ranges from about 40 to 70 inches in thickness. In the A horizon hue is 10YR, value is 4 to 6, and chroma is 2 to 4.

In the B horizon above the Bx horizon, hue is 10YR or 7.5YR, value is 5 or 6, and chroma is 4 to 8. This horizon is loam, fine sandy loam, sandy clay loam, or clay loam. The Bt horizon is 6 inches thick or more. The Bx horizon is at a depth of about 12 to 26 inches. In the Bx horizon hue is 10YR, 2.5Y, or 7.5YR; value is 5 or 6; and chroma is 3 to 6. Mottles range from 5Y to 5YR in hue, and the range in value and chroma is wide. In some profiles the Bx horizon is highly variegated and there is no dominant matrix color. The Bx horizon is loam or fine sandy loam. The B3 horizon is heavy sandy loam or sandy clay loam. Fine, smooth quartz pebbles are in places in any horizon.

Bourne soils are similar to Beltsville soils but they have less silt and more sand in the A and B horizons and in the fragipan than those soils.

**BrB2—Bourne fine sandy loam, 2 to 5 percent slopes, moderately eroded.** This gently sloping soil is on uplands. It has the profile described as representative of the series. In practically all cleared areas some surface soil has been lost through erosion.

Water runs off the soil readily, especially if the soil is saturated. The hazard of further erosion is moderate. Included with this soil in mapping are a few small areas where slopes are less than 2 percent. Also included are small areas where the soil is severely eroded.

This soil is suited to most crops, pasture, and trees. It is not suited to deep rooted crops or to crops subject to damage by frost heaving. Controlling erosion is the major management concern. Impeded drainage is also a concern, and improved drainage is needed for some purposes. Practices that retard erosion include diversions and interceptors to reduce runoff from adjacent soils, minimum tillage, suitable cropping systems, and good use and management of available crop residue. Capability unit IIe-36; woodland suitability group 3w3.

**BrC3—Bourne fine sandy loam, 5 to 10 percent slopes, severely eroded.** This moderately sloping soil is on uplands. The soil has lost most or all of its original surface layer and the subsoil is exposed in many places. Gullies that extend into the lower part of the subsoil are common. If the soil is plowed, part of the subsoil is exposed in places and this gives worked areas a spotted or bright colored appearance.

Water runs off this soil readily. The hazard of further erosion is severe.

This soil is suited to some crops, sown pasture, and trees. It is sometimes used for tobacco, but the quantity is low to medium. The severe hazard of further erosion is the major management concern. Practices that retard erosion include growing clean-tilled crops at long intervals with close growing crops or pasture, growing clean-tilled crops in narrow strips on the contour, using minimum tillage and cover crops, and using and managing all available crop residue well. Even if erosion is controlled, this soil is better suited to hay, pasture, or woodland. Capability unit IVe–7; woodland suitability group 3w3.

## Caroline series

The Caroline series consists of well drained, gently sloping to strongly sloping, deep soils on uplands. These soils formed in old unconsolidated deposits of clay, silt, and sand. The native vegetation is mostly mixed hardwoods and Virginia pine.

In a representative profile the surface layer is yellowish brown silt loam about 7 inches thick. The subsoil, to a depth of about 42 inches, is clay loam mottled or variegated with strong brown, yellowish brown, yellowish red, red, and gray. The lower part of the subsoil, to a depth of 60 inches, is heavy clay loam or clay mottled or variegated with colors similar to those in the upper part of the subsoil.

Caroline soils are moderately easy to work at a favorable moisture content, but care should be taken not to work them when too wet. Permeability is moderately slow, and available water capacity is high. They are low in natural plant nutrients and are commonly strongly acid. Impeded internal drainage, a seasonally perched water table in gently sloping areas, and the hazard of erosion are the major limitations to use of these soils. Larger areas of Caroline soils are farmed; others are idle, in woodland, or used for nonfarm purposes. These soils have severe limitations for septic tank disposal fields, but are not severely limited for most other nonfarm uses.

Representative profile of Caroline silt loam, 2 to 5 percent slopes, moderately eroded, in a cultivated field along Route 234, 1 mile southeast of Chaptico:

Ap—0 to 7 inches; yellowish brown (10YR 5/8) silt loam; weak medium granular structure; friable, slightly sticky, slightly plastic; common fine roots; very slightly acid; clear smooth boundary.

B1—7 to 11 inches; strong brown (7.5YR 5/6) clay loam; a few variegations of yellowish red (5YR 4/6); moderate fine subangular blocky structure; friable to firm, sticky and plastic; few fine roots; very strongly acid; clear smooth boundary.

B21t—11 to 28 inches; strong brown (7.5YR 5/6) clay loam; yellowish brown (10YR 5/6) and yellowish red (5YR 4/8) variegations; moderate medium subangular blocky structure; firm to very firm, sticky and plastic; very few fine roots; distinct continuous clay films of dark brown (7.5YR 4/4); very strongly acid; clear smooth boundary.

B22t—28 to 42 inches; mottled strong brown (7.5YR 5/6), yellowish brown (10YR 5/6), yellowish red (5YR 4/8), red (2.5YR 4/8), and gray (10YR 6/1) heavy clay loam; moderate medium subangular blocky structure; hard, firm, sticky and plastic; distinct continuous clay films of brown (7.5YR 5/4); very strongly acid; gradual smooth boundary.

B23t—42 to 60 inches; mottled strong brown (7.5YR 5/6), yellowish brown (10YR 5/8), yellowish red (5YR 4/8), red (10YR 4/6), and gray (10YR 6/1) clay; weak medium prisms parting to medium subangular and angular blocky structure; hard, firm, sticky and plastic; thin continuous clay films of dark brown (7.5YR 4/4) and yellowish red (5YR 5/6); very strongly acid.

The solum is 60 inches or more in thickness. In the A horizon hue is 10YR, 7.5YR, or 5YR; value is 4 to 6; and chroma is 2 to 8.

The B horizon is mottled or variegated and hue is 10YR, 7.5YR, 5YR, and 2.5YR; value is 4 to 6; and chroma is 1 through 8. The B horizon is commonly clay loam but ranges to clay or silty clay.

Carolina soils resemble Beltsville, Bourne, Keyport, Mattapex, and Woodstown soils in natural drainage. They lack the fragipan of Beltsville and Bourne soils. The subsoil of Caroline is thicker and more clayey than that of Mattapex and Woodstown soils.

**CaB2—Caroline silt loam, 2 to 5 percent slopes, moderately eroded.** This gently sloping soil is on uplands. It has the profile described as representative of the series. In practically all cleared areas some surface soil has been lost through erosion.

Water runs off this soil readily, especially when the soil is wet. The hazard of further erosion is moderate. Included with this soil in mapping are small areas of soils that are severely eroded.

This soil is suited to most crops, sown pasture, and trees. A temporarily perched water table late in winter and early in spring may delay planting somewhat. Yields of tobacco may be high but the quality is generally low. Controlling erosion is the major management concern. Practices that retard erosion include interceptors and diversions to decrease the amount and rate of runoff, sodded waterways, minimum tillage, cover crops, suitable cropping systems, winter cover crops, and good use of all available crop residue. Capability unit IIe–13; woodland suitability group 3w3.

**CaC2—Caroline silt loam, 5 to 10 percent slopes, moderately eroded.** This moderately sloping soil is on uplands. Most of the original surface layer has been lost through erosion. In places, plowing has exposed some subsoil material, which gives the soil a spotty appearance. Shallow gullies have formed in places.

Runoff is rapid in unvegetated areas. The hazard of further erosion is severe.

This soil is suited to some crops, sown pasture, and trees. Yields of tobacco are generally medium to high but the quality is generally low to medium. The hazard of further erosion is the major management concern. Practices that retard erosion include planting on the contour, planting close-growing crops in narrow strips

on the contour, using winter cover crops and minimum tillage, providing interceptors and diversions in sodded waterways, and using all available crop residue well. Capability unit IIIe–13; woodland suitability group 3w3.

**CaC3—Caroline silt loam, 5 to 10 percent slopes, severely eroded.** This moderately sloping soil is on uplands. Most of the original surface layer and, in places, some of the subsoil have been lost through erosion. Some shallow and deep gullies have formed. The present surface layer is sticky and difficult to work when it is too wet or when it is dry.

Runoff is rapid, and the hazard of further erosion is very severe.

Erosion is a severe limitation to use of this soil for tilled crops. The soil is better suited to hay, pasture, or close-growing crops than to other uses. Controlling erosion is the major management concern. Practices which retard erosion include growing clean-tilled crops at long intervals in a cropping system that includes close-growing crops or pasture plants, growing clean-tilled crops in narrow strips that are laid out on the contour, using minimum tillage, placing interceptors and diversions in sodded waterways, using cover crops, and using all available crop residue well. Capability unit IVe–9; woodland suitability group 3w3.

**CaD2—Caroline silt loam, 10 to 15 percent slopes, moderately eroded.** This strongly sloping soil is on uplands. The surface layer is thin, and if the soil is plowed, subsoil material is exposed. Shallow gullies are common.

In unprotected areas, runoff is rapid. The hazard of further erosion is severe. Most of the acreage is in woodland, most of which is second or third growth.

Erosion is a severe limitation to use of this soil for tilled crops. The soil is better suited to hay, pasture, close-growing crops, or woodland than to other uses. Controlling erosion is the major management concern. Practices which retard erosion include growing clean-tilled crops at long intervals in a cropping system that includes close-growing crops or pasture plants, growing clean-tilled crops in narrow strips that are laid out on the contour, using minimum tillage, placing interceptors and diversions in sodded waterways, using cover crops, and using all available crop residue well. Capability unit IVe–9; woodland suitability group 3w3.

**CaD3—Caroline silt loam, 10 to 15 percent slopes, severely eroded.** This strongly sloping soil is on uplands. This soil is gullied in nearly all areas, and subsoil material is exposed (fig. 10). Runoff is rapid.

This soil is very poorly suited to tilled crops because of severe erosion. It is suited to sown pasture, limited hay production, and woodland. The surface needs to be kept under vegetative cover. The most intensive use should be for improved grazing, but measures must be applied to prevent overgrazing, which damages sod and promotes erosion. Capability unit VIe–2; woodland suitability group 3w3.

## Chillum series

The Chillum series consists of well drained, level to moderately sloping soils on uplands. These soils are on ridgetops and the upper slopes of ridges. They formed in silty sediment over deposits of dense, compact gravelly material. The native vegetation is hardwoods, mainly oak, and Virginia pine.

In a representative profile the surface layer is about 8 inches thick. It is dark grayish brown loam in the thinner upper part and grayish brown loam in the lower part. The upper 15 inches of the subsoil is strong brown silt loam. Below that is about 7 inches of yellowish brown gravelly loam. The underlying material, between depths of 30 and 60 inches, is hard and compact gravelly sandy clay loam and gravelly sandy loam variegated with many colors.

Chillum soils are easy to work. They have a moderate available water capacity. They are moderately permeable in the silty upper mantle. In places permeability is moderately slow in the compact, gravelly lower part of the subsoil and in the substratum. Rooting depth is limited. Slope and the hazard of further erosion limit the soils for some uses. Chillum soils are suitable for most kinds of farming. The hard, compact underlying material is sometimes used as a source of gravel and roadfill. Chillum soils have only slight or moderate limitations for most nonfarm uses.

Representative profile of Chillum loam, 2 to 6 percent slopes, moderately eroded, in a wooded area 2 miles north of Morganza:

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

A2—2 to 8 inches; grayish brown (10YR 5/2) loam; weak medium granular structure; friable, slightly sticky; many roots; strongly acid; clear smooth boundary.

B2t—8 to 23 inches; strong brown (7.5YR 5/6) silt loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; thin discontinuous clay films; very strongly acid; abrupt smooth boundary.

IIB3—23 to 30 inches; yellowish brown (10YR 5/6) gravelly loam; variegated with strong brown (7.5YR 5/6); moderate, medium angular blocky structure; firm, slightly sticky; few roots; thin clay films on ped faces; very strongly acid; clear wavy boundary.

IIC1—30 to 42 inches; strong brown (7.5YR 5/8) gravelly sandy clay loam, variegated with red (2.5YR 4/8) and yellowish red (5YR 5/8); massive; very firm in places, brittle; no roots; about 30 percent fine gravel; very strongly acid; clear smooth boundary.

IIC2—42 to 60 inches; strong brown (7.5YR 5/6) gravelly sandy loam; variegated with red (2.5YR 4/8) and yellowish red (5YR 5/8); massive; very firm, about 50 percent gravel; very strongly acid.

The solum ranges from about 20 to 34 inches in thickness. In the A horizon hue is 10YR, value is 3 to 5, and chroma is 2 to 4. In undisturbed A1 horizons less than 6 inches thick, value is 3.

In the B horizon hue is 10YR or 7.5YR, value is 4 or 5,

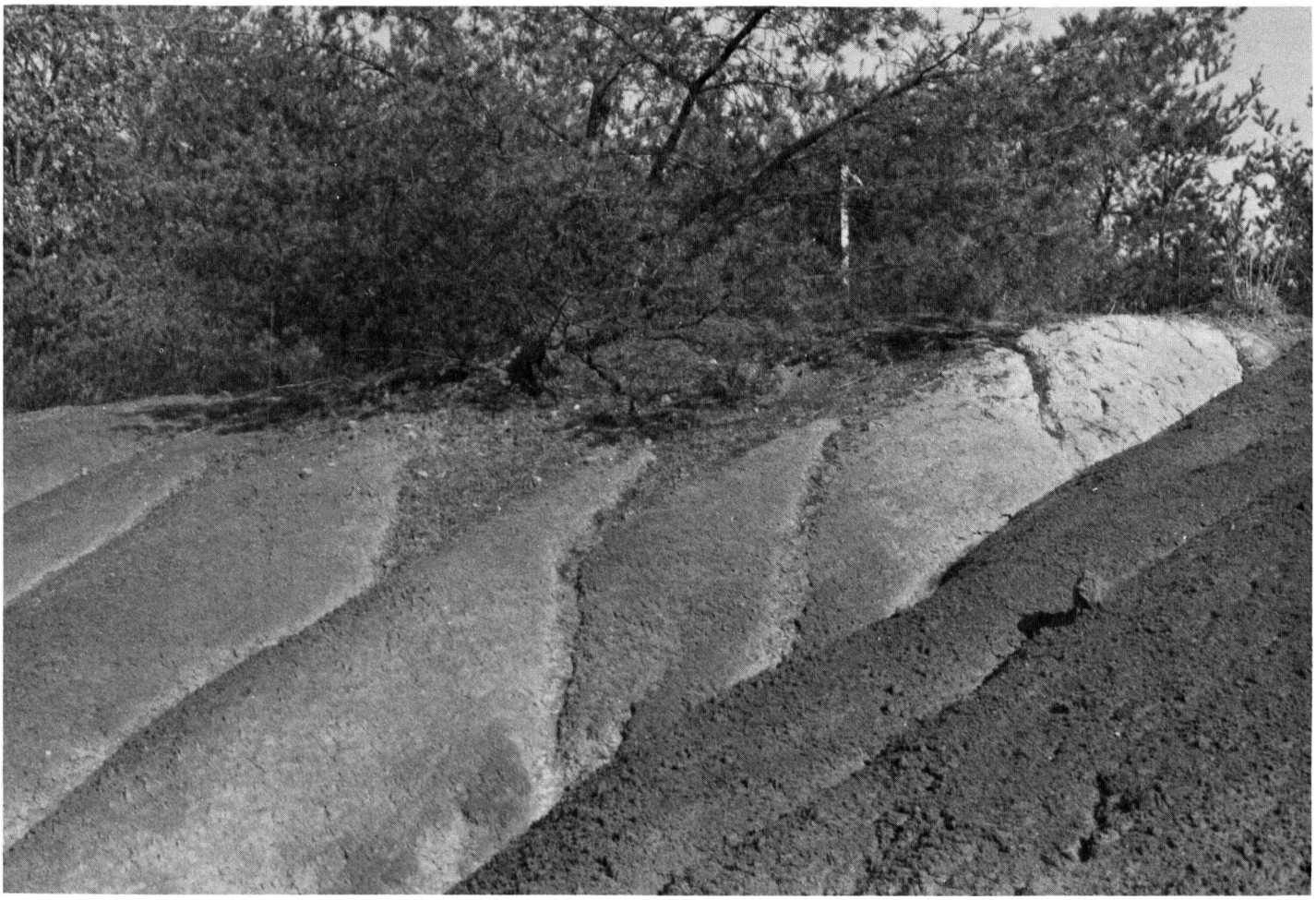

*Figure 10.*—**Unprotected spot of Caroline silt loam, 10 to 15 percent slopes, severely eroded, along Route 235, south of Lexington Park.**

and chroma is 4 or 6. The Bt horizon is silt loam or silty clay loam. Where present, the B3 horizon is heavy sandy loam or loam and is gravelly or sandy in some places.

In the IIC horizon color is variable, and this horizon commonly is variegated. It is hard, firm, and generally quite gravelly.

Chillum soils are similar to Marr, Matapeake, and Sassafras soils in color and natural drainage. Chillum soils have a solum similar to that of Matapeake soils, but Matapeake soils have a friable, loamy C horizon, whereas Chillum soils have a very hard, gravelly C horizon. Chillum soils have more silt and less sand than Marr and Sassafras soils. They formed in materials similar to the materials where Matapeake soils, the moderately well drained Beltsville and Mattapex soils, and the poorly drained Leonardtown and Othello soils formed.

**ChA—Chillum loam, 0 to 2 percent slopes.** This level or nearly level soil is on uplands. The hazard of erosion is slight, although a small amount of surface soil has been lost in some areas that have been cultivated for many years.

Included with this soil in mapping are small areas where the surface layer is silt loam or fine sandy loam.

The soil is suited to cultivated crops, pasture, and trees. Tobacco yields are generally good, and the quality is medium. This soil is somewhat droughty in seasons of low or poorly distributed rainfall. The effective rooting depth is limited by the very firm substratum. Droughtiness is the most important management concern. If measures are taken to conserve soil moisture, crops can be grown safely year after year. Practices that conserve soil moisture include planting on the contour, planting clean-tilled and close-growing crops in narrow alternate strips on the contour, using cover crops and minimum tillage, using all available crop residue well, and providing supplemental irrigation in seasons of low or poorly distributed rainfall. Capability unit IIs–7; woodland suitability group 3o2.

**ChB2—Chillum loam, 2 to 6 percent slopes, moderately eroded.** This gently sloping soil is on uplands. It has the profile described as representative of the series.

The hazard of further erosion is moderate. Included with this soil in mapping are small areas where the surface layer is silt loam or fine sandy loam.

This soil is suited to cultivated crops, pasture, and trees. Tobacco yields are generally good, and the quality is medium. The soil is somewhat droughty in seasons of low or poorly distributed rainfall and the effective

rooting depth is limited by the very firm substratum. Droughtiness is the most important management concern. If measures are taken to conserve soil moisture, crops can be grown year after year. Practices that conserve soil moisture include planting on the contour, planting clean-tilled and close growing crops in narrow alternate strips on the contour, using cover crops and minimum tillage, using all available crop residue well, and providing supplemental irrigation in seasons of low or poorly distributed rainfall. Capability unit IIs–7; woodland suitability group 3o2.

**ChC2—Chillum loam, 6 to 12 percent slopes, moderately eroded.** This moderately sloping soil is on uplands. It has a profile similar to the one described as representative of the series, but the surface layer is thinner.

Included with this soil in mapping are areas where the surface layer is silt loam or fine sandy loam. In some areas plowing has exposed part of the subsoil.

This soil is suited to most cultivated crops, pasture, and trees. Tobacco yields are generally good, and the quality is medium. The restricted depth of root penetration influences management, but the hazard of further erosion is the major management concern. Practices that retard erosion and conserve moisture include contour strips, alternate strips of clean-tilled and close growing crops, minimum tillage, cropping sequences that use close growing crops half or more of the time, good use of available crop residue, sodded waterways, and supplemental irrigation in seasons of low or poorly distributed rainfall. Capability unit IIIe–7; woodland suitability group 3o2.

**ChC3—Chillum loam, 6 to 12 percent slopes, severely eroded.** This moderately sloping soil is on uplands. It has lost most of its original surface layer. The gravelly substratum at a shallow depth restricts root development. In a few places gullies have formed.

This soil is suited to some crops and to sown pasture. It is seldom used for tobacco. It is also used for cultivated crops; however, this use is severely limited. The severe hazard of continued erosion is the main management concern. Practices to retard erosion include cropping sequences that keep row crops to a minimum, contour strip cropping with very narrow strips, minimum tillage, and good use and management of all available crop residue. Even if erosion is controlled, this soil is better suited to hay, pasture, or woodland than to other uses. Capability unit IVe–7; woodland suitability group 3o2.

## Croom series

The Croom series consists of well drained, level to strongly sloping gravelly soils on uplands. These soils formed in very old fluvial deposits of gravel containing sand and clay. The native vegetation is upland hardwoods, mainly oak, and some Virginia pine.

In a representative profile the surface layer and subsurface layer are gravelly sandy loam. Combined, they are about 14 inches thick. The surface layer is very dark grayish brown and the subsurface layer is yellowish brown. The upper 18 inches of the subsoil is yellowish red, very gravelly sandy clay loam. It is very hard and compact and limits root penetration. The lower part of the subsoil, to a depth of about 60 inches or more, is stratified yellowish red and reddish yellow, very gravelly sandy loam.

Croom soils are not particularly difficult to work in places suitable for plowing. The gravel, however, is quite abrasive to farm implements. These soils are seldom used for farming. They have a shallow rooting depth. They have a low to moderate available water capacity and permeability is moderately slow. Many areas have been used as a source of gravel and road fill. These soils provide stable foundations for buildings, but they have moderate to severe limitations for most other nonfarm uses.

Representative profile of Croom gravelly sandy loam, 5 to 10 percent slopes, moderately eroded, in a wooded area 1½ miles north of Morganza:

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

A2—3 to 14 inches; yellowish brown (10YR 5/6) gravelly sandy loam; weak, coarse granular structure; friable, slightly sticky and slightly plastic; few roots; strongly acid; clear wavy boundary.

B2t—14 to 32 inches; yellowish red (5YR 5/6) very gravelly sandy clay loam (more than 50 percent gravel); massive, very firm, very hard, sticky and plastic; red (2.5YR 4/8) and reddish brown (5YR 4/3) distinct clay films on gravel surfaces; very strongly acid; gradual smooth boundary.

B3—32 to 60 inches; yellowish red (5YR 5/8) very gravelly sandy loam (more than 50 percent gravel); stratified with reddish yellow (5YR 6/8) sandy loam; structureless, massive; very firm, very hard, slightly sticky and slightly plastic; some pebbles coated with strong brown (7.5YR 5/8); very strongly acid.

The solum ranges from about 40 to more than 100 inches in thickness. This wide range in thickness is caused mainly by the B3 horizon, which is as much as 8 feet thick. The depth to the extremely hard B2t horizon is no more than 15 inches in uneroded areas. Structure is weak or lacking throughout the B horizon.

In the A horizon hue is 10YR or 2.5Y, value is 3 to 6, and chroma is 2 to 8.

In the B horizon hue is 10YR, 7.5YR, or 5YR; value is 4 to 6; and chroma 4 to 8. The B2t horizon is 50 to 75 percent, by volume, rounded or subangular gravel, mostly less than 2 inches in diameter. The fine earth material in this horizon generally is sandy clay loam, but in places it is heavy loam or clay loam that is low in silt.

The C horizon was not described in the representative profile but resembles the B horizon in color and in gravel content. It is stratified and generally is less hard and compact than the B horizon.

Croom soils formed in material that is similar to the underlying strata of the well drained Chillum soils. Croom soils are commonly in association with the nongravelly, moderately well drained Beltsville soils and

with Sassafras soils, which are deeper and looser than Croom soils.

**CrB2—Croom gravelly sandy loam, 2 to 5 percent slopes, moderately eroded.** This gently sloping soil is in small areas on uplands. In places, much of the surface layer has washed away and in a few areas the subsoil is exposed or almost exposed.

The hazard of further erosion is moderate. This soil is somewhat droughty in seasons of low or poorly distributed rainfall.

Included with this soil in mapping are areas of soils that have a loam surface layer. Also included are areas where the subsoil is redder than the range defined for the series.

This soil is suited to some crops and sown pasture. It is not suited to deep rooted crops. Tobacco yields range from poor to fair, and the quality is generally medium. Droughtiness is the major management concern. If measures are used to conserve soil moisture, crops can be grown year after year. Appropriate practices include planting on the contour, planting clean-tilled and close growing crops in narrow alternate strips that are laid out on the contour, using minimum tillage, cover crops, and supplemental irrigation in seasons of low or poorly distributed rainfall, and using all available crop residue well. Capability unit IIs–7; woodland suitability group 4d2.

**CrC2—Croom gravelly sandy loam, 5 to 10 percent slopes, moderately eroded.** This moderately sloping soil is on uplands. It has the profile described as representative of the series. A few shallow gullies are present. The hazard of further erosion is severe. This soil is somewhat droughty.

Included with this soil in mapping are areas where the subsoil is redder than is described as typical for the series. In these included areas that are severely eroded, the surface layer is shallow to the very hard, very firm gravelly subsoil. Also included in mapping are some areas where the subsoil is less hard and less dense than that described as typical for the series.

This soil is suited to some crops and to pasture. It is not suited to deep rooted crops. Tobacco yields range from low to medium, and the quality is generally medium. Controlling erosion is the major management concern. Practices which retard erosion include planting on the contour, planting clean-tilled, close growing crops in narrow alternate strips that are laid out on the contour, using minimum tillage and supplemental irrigation in seasons of low or poorly distributed rainfall, and using all available crop residue well. Capability unit IIIe–9; woodland suitability group 4d2.

**CrD2—Croom gravelly sandy loam, 10 to 15 percent slopes, moderately eroded.** This strongly sloping to steep soil is on uplands. The surface layer is somewhat thin, and in most places it contains some of the dense, hard subsoil material. Shallow gullies have formed in places where the land is cleared. Where plowed, part of the subsoil is exposed, and this gives the soil a marbled to bright colored appearance. The hazard of further erosion is severe.

Included with this soil in mapping are areas where the surface layer and subsoil are somewhat silty and less gravelly, and some areas where the subsoil is redder than described as typical for the series. Also included are areas where the subsoil is less hard and dense than that described as typical for the series.

This soil is suited to a few crops and to some pasture. It is seldom used for tobacco. Tobacco yields and quality are generally low to medium. Further erosion is the major management concern. Practices which retard erosion include growing clean-tilled crops at long intervals in a cropping system that includes close growing crops or pasture plants, growing clean-tilled crops in narrow strips that are laid out on the contour, using minimum tillage, maintaining cover crops most of the year, and using all crop residue well. Even if erosion is controlled, this soil is best suited to hay, pasture, or woodland. Capability unit IVe–9; woodland suitability group 4d2.

**CrD3—Croom gravelly sandy loam, 10 to 15 percent slopes, severely eroded.** This strongly sloping to steep soil is on uplands. Most of the surface layer of this soil has been lost through erosion. The subsoil is exposed and in many places gullies are deep. The subsoil is commonly hard and very gravelly. Most areas are in woodland, mainly Virginia pine or scrub type hardwoods.

Included with this soil in mapping are areas of soils where the subsoil is somewhat sandier and redder than that described as typical for the series.

This soil is not suited to cultivation. Some areas probably could be improved and used for limited pasture. This soil is best suited to woodland, although areas that are now idle are likely to need special treatment for seedlings to grow. Capability unit VIe–2; woodland suitability group 4d2.

## Cut and fill land

**Cu—Cut and fill land** consists partly of areas where the soil has been cut away by grading and similar operations. Most of the remaining areas are filled with soil and other materials to a depth of many feet, but some are filled to a depth of only 1 or 2 feet.

Included with this soil in mapping are small areas where the fill is garbage or other solid waste. Also included are shopping plazas and other paved areas.

Cut and fill land is not farmed. It is used chiefly for commerical or residential purposes. It is so variable that the suitability of any area for a specific use must be determined by onsite investigation. Not assigned to a capability unit and woodland suitability group.

## Elkton series

The Elkton series consists of poorly drained, nearly level, deep soils. These soils are in areas bordering major rivers and a few small areas on higher upland flats. They have a fine textured subsoil that is slowly permeable to very slowly permeable. These soils formed in old deposits of very clayey marine and alluvial sediment. The native vegetation is wetland hardwoods, mainly red or swamp maple, willow, oak, and birch. In other areas there are stands of loblolly pine and other pines.

In a representative profile the surface layer is light gray silt loam about 8 inches thick. The upper 5 inches of the subsoil is light gray, friable silty clay that has olive yellow mottles. Below this is about 9 inches of light gray clay that is firm, sticky and plastic and has

yellowish brown mottles. The lower part of the subsoil is about 26 inches of gray clay. Permeability in this part of the subsoil is slow to very slow. The underlying material, between depths of 48 and 60 inches, is light gray, mottled silty clay.

Elkton soils must be worked at just the right moisture content. When dry, they are rough and hard; when wet, they do not support heavy machinery. These soils have a high available water capacity and permeability is slow to very slow. They have a high water table and are wet for long periods. Artificial drainage is necessary for farming these soils. Poor drainage and the high water table are severe limitations for most nonfarm uses.

Representative profile of Elkton silt loam, in a level, rewooded area, about 1¼ miles east of Bushwood:

Ap—0 to 8 inches; light gray (5Y 6/1) silt loam; common, medium faint mottles of pale olive (5Y 6/4); moderate, medium and coarse granular structure; friable; many roots; very strongly acid; abrupt smooth boundary.

B1g—8 to 13 inches; light gray (5Y 6/1) silty clay; common, medium, distinct mottles of olive yellow (2.5Y 6/6); moderate, medium and coarse granular structure; friable, sticky and plastic; few fine roots; very strongly acid; clear smooth boundary.

B21tg—13 to 22 inches; light gray (5Y 6/1) clay; common fine to medium prominent mottles of yellowish brown (10YR 5/8); moderate, medium subangular blocky structure; firm, sticky and plastic; very strongly acid; abrupt smooth boundary.

B22tg—22 to 48 inches; gray (5Y 5/1) clay with small light gray (5Y 7/2) pockets; weak fine to medium subangular blocky structure; firm, sticky and plastic; very few fine roots; gray discontinuous clay films on ped faces; about 2 percent small rounded pebbles; very strongly acid; clear smooth boundary.

Cg—48 to 60 inches; light gray (5Y 7/1) silty clay; few fine prominent light olive brown (2.5Y 5/6) mottles; massive; firm, sticky and plastic; about 5 percent small rounded pebbles; very strongly acid.

The solum ranges from about 30 to 50 inches in thickness. Fine, smooth gravel is likely to occur anywhere in the profile. Throughout the profile hue is 10YR to 5Y, or the color is neutral.

In the A horizon value is 3 to 6 and chroma is 1 or 2. In very thin A1 horizons, where present, value is 3.

In the B horizon value is 5 to 7 and chroma is 0 to 2. Mottles are few to many. The Bt horizon is clay, silty clay, or silty clay loam.

The color range in the C horizon is the same as that in the B horizon. This horizon ranges from loamy sand to clay.

Elkton soils are poorly drained. They are similar in color to Bibb, Fallsington, Leonardtown, and Othello soils. They are much more clayey than Fallsington soils. In contrast to Bibb soils, the Elkton soils have a Bt horizon. This horizon has more clay and less silt than similar horizons in Leonardtown and Othello soils. Although Elkton and Keyport soils formed in similar clayey sediment, Elkton soils are poorly drained and Keyport soils are moderately well drained.

**Ek—Elkton silt loam.** This is the only Elkton soil mapped in the county. It is a nearly level soil and is mainly at lower elevations, but a few small areas are on higher upland flats.

The hazard of erosion is none to slight. The water table is at or near the surface most of the year. In some areas water may be ponded for long periods.

Included with this soil in mapping are small areas of gently sloping soils and scattered small areas where the surface layer is black or very dark gray to a depth of about 4 inches.

If artificially drained, this soil is suited to some crops and to sown pasture. Practically no tobacco is grown on this soil. The soil is not suited to crops that need good soil aeration. Drainage is the major management concern. The soil is difficult to drain. Tile drains do not function well because of the slow to very slow permeability. Ditches must be closely spaced. Good management on this soil includes artificial drainage, minimum tillage, and good use of all available crop residue. Capability unit IIIw-9; woodland suitability group 3w4.

## Evesboro series

The Evesboro series consists of excessively drained, level to steep, very deep soils. These soils are on uplands and in some small areas at lower elevations. They formed in old marine deposits of sand that have been at least partially reworked by wind and water. The native vegetation is mainly hardwoods, mostly oak, and some Virginia pine.

In a representative profile the surface layer is dark gray loamy sand about 2 inches thick. The subsoil is about 37 inches thick. It is light yellowish brown loamy sand in the upper part grading into pale yellow loamy coarse sand in the lower part. Underlying this, between depths of 39 inches and 60 inches, is pale yellow sand.

Evesboro soils are very easy to work over a wide range of moisture content. They warm up quickly in spring, and are the first soils in the county to be ready for farming. The available water capacity is low. Permeability is rapid. The soils make good building sites, but in places they are unstable on steep slopes. They are suitable for use as filter fields for septic tanks, but in places effluent moves rapidly through the profile and can be a pollution hazard, particularly on strong slopes.

Representative profile of Evesboro loamy sand, 0 to 8 percent slopes, in a wooded area four miles east of Leonardtown:

A1—0 to 2 inches; dark gray (10YR 4/1) loamy sand with some clear white sand grains scattered through the horizon; single grained, loose; many roots; extremely acid; abrupt smooth boundary.

B2—2 to 25 inches; light yellowish brown (2.5Y 6/4) loamy sand; very weak fine to me-

dium subangular blocky structure parting to single grained; very friable; very few roots; very strongly acid; gradual smooth boundary.

B3—25 to 39 inches; pale yellow (2.5Y 7/4) loamy coarse sand with about 20 percent gravel scattered in the horizon; single grained; very friable; extremely acid; gradual smooth boundary.

C—39 to 60 inches; pale yellow (2.5Y 7/4) sand; single grained; loose; very strongly acid to extremely acid.

The solum ranges from about 25 to 46 inches in thickness. In the A horizon hue is 10YR or 2.5Y, value is 3 to 5, and chroma is 1 to 3.

In the B horizon hue is 2.5Y or 10YR, value is 5 to 8, and chroma is 3 to 6. The B horizon is loamy sand, loamy coarse sand, or sand.

In the C horizon hue is 10YR or 2.5Y, value is 5 to 7, and chroma is 3 to 8. In the lower part of the C horizon chroma generally is lowest, but in places thin strata or bands are high in chroma. Rounded smooth gravel may occur anywhere in the profile, the highest amount being in the C horizon.

Evesboro soils formed in materials similar to those of Klej soils. Evesboro soils are excessively drained, whereas Klej soils are only moderately well drained.

**EvB—Evesboro loamy sand, 0 to 8 percent slopes.** This nearly level to moderately sloping soil is mainly in areas on uplands and in some areas at lower elevations. It has the profile described as representative of the series.

This soil is very droughty in seasons of low or poorly distributed rainfall. The hazard of water erosion is none to slight. Soil blowing is a hazard on loose, dry, unprotected areas during high winds.

Included with this soil in mapping are areas, mainly in the northern part of the county, where the soil is underlain by a loamy or clayey substratum at a depth of about 50 inches or more. This substratum is significant mainly because it serves as a somewhat impermeable barrier, and causes an uncharacteristic, seasonal, moderately high water table. Also included are some small areas where the soil is reddish and somewhat finer in texture than is typical for the series.

This soil is very easy to work and can be worked and planted earlier in spring than other soils in the county. It is suited to most crops, sown pasture, and trees. Tobacco produced on this soil is generally of very high quality. Yields are generally low to medium unless supplemental irrigation is available. Droughtiness and soil blowing are the major management concerns. Practices that retard soil blowing and conserve soil moisture include using close growing crops in cropping sequences, planting crops in strips crosswise to the direction of prevailing winds, planting winter cover crops, providing supplemental irrigation, using minimum tillage, keeping the supply of plant nutrients high, and using all available crop residue. Capability unit IVs–1; woodland suitability group 3s1.

**EvC—Evesboro loamy sand, 8 to 15 percent slopes.** This moderately sloping to strongly sloping soil is on uplands, on ridges and sides of sandy hills and depressions.

This soil is very droughty during periods of low or poorly distributed rainfall. Included with this soil in mapping are areas where the soil is reddish and somewhat finer textured than is typical for the series, and areas that are very gravelly.

This soil is very poorly suited to crops and pasture. It is better suited to woodland or wildlife habitat. Some areas are suited to nonfarm uses such as recreation and large size building lots. Capability unit VIIs–1; woodland suitability group 3s1.

**EwC2—Evesboro–Westphalia complex, 6 to 12 percent slopes, moderately eroded.** The moderately sloping soils in this complex are on uplands, mainly in the northeastern part of the county. The complex consists of intricately mixed areas of Evesboro and Westphalia soils. It is about 60 percent Evesboro soils and 40 percent Westphalia soils.

Part of the surface layer of the Westphalia soils has been washed away, and shallow gullies are in places. A part of the surface layer of the Evesboro soil has been lost through erosion caused by runoff and soil blowing.

The hazard of erosion is slight to moderate. Included with these soils in mapping are small areas of Sassafras soils and areas of soils that are very gravelly.

This soil is suited to general crops grown, limited pasture, and trees. A large part of this complex was once farmed, but has reverted to trees. Tobacco produced on this soil is generally of very high quality. Yields range from low to high depending on local conditions and management. Droughtiness is the major management concern. Practices which conserve soil moisture include supplemental irrigation when needed, minimum tillage, winter cover crops, and good use of all available crop residue. Capability unit IVs–1; woodland suitability group 3s1.

**EwD2—Evesboro–Westphalia complex, 12 to 20 percent slopes, moderately eroded.** The strongly sloping to steep soils in this complex are on uplands, mainly in the northeastern part of the county. The complex consists of intricately mixed areas of Evesboro and Westphalia soils. It is about 60 percent Evesboro soil and 40 percent Westphalia soil. Part of the surface soil has been lost through erosion and gullies have formed in places.

The hazard of erosion is moderate. Included with these soils in mapping are small areas of Sassafras and Marr soils and areas that are very gravelly.

This complex is suited to some locally grown general crops and to trees. Some areas are used for farming and some areas which were once farmed are now rewooded. However, most of the acreage is in woodland. Tobacco produced is generally of very high quality. Yields range from low to high depending on local conditions and management. Slope and droughtiness are limitations to use of these soils. Good management on this complex includes supplemental irrigation when needed, minimum tillage, winter cover crops, and good use of all available crop residue. Capability unit IVs–1; woodland suitability group 3s1.

**EwE2—Evesboro–Westphalia complex, 20 to 45 percent slopes, moderately eroded.** The steep and very steep soils in this complex are in areas on uplands, mainly in the northeastern part of the county. The complex consists of intricately mixed areas of Evesboro and Westphalia soils. It is about 60 percent Evesboro

soil and 40 percent Westphalia soil. It is cut by many deep, V-shaped ravines.

The hazard of erosion is moderate to severe. Included with these soils in mapping are small areas of Sassafras and Marr soils, and areas of soils that are gravelly.

This complex is not suited to cultivated crops because it is droughty and slopes are too steep. It is suited to woodland and some kinds of wildlife habitat. Most of the acreage is in woodland. Capability unit VIIs–1; woodland suitability group 3s1.

## Faceville series

The Faceville series consists of well drained, nearly level to gently sloping, very deep soils. These soils are chiefly on very old alluvial terraces above the Wicomico River. They have a very red subsoil. Almost all areas have been cleared and used. The native vegetation was probably mixed hardwoods with some Virginia and loblolly pine in places.

In a representative profile the surface layer is yellowish brown silt loam about 9 inches thick. The upper 11 inches of the subsoil is brown clay loam. Below this, to a depth of 26 inches, is yellowish red clay. The lower part of the subsoil, between depths of 26 and 60 inches, is red sandy clay grading into sticky clay loam.

Faceville soils are not extensive in St. Marys County. They are easy to work except when wet. They have a high available water capacity and are moderately permeable. They are well suited to farming. Slope and the hazard of further erosion are the only important limitations to use of these soils. Faceville soils have few or no limitations for most nonfarm uses.

Representative profile of Faceville silt loam, 0 to 5 percent slopes, in a field about 1 mile northeast of Bushwood:

Ap—0 to 9 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; friable, slightly sticky and slightly plastic, many fine roots; strongly acid; abrupt smooth boundary.

B1—9 to 20 inches; brown (7.5YR 5/4) clay loam; weak medium granular structure; friable, slightly sticky and plastic; common fine roots; few fine pores and earthworm channels; thin patchy dark clay films; medium acid; gradual smooth boundary.

B21t—20 to 26 inches; yellowish red (5YR 5/6) clay; weak fine subangular blocky structure; friable, sticky and plastic; few fine roots; a few fine waterworn stones and a few 3 millimeter black nodules; thin continuous clay films; medium acid; gradual smooth boundary.

B22t—26 to 37 inches; red (2.5YR 4/6) sandy clay; weak very fine and fine subangular blocky structure; firm, sticky and plastic; few fine roots; thin continuous reddish brown clay films; few 3 millimeter black nodules; strongly acid; gradual smooth boundary.

B23t—37 to 60 inches; red (2.5YR 4/6) clay loam; weak coarse platy structure that parts to weak fine subangular blocky; firm, sticky and plastic; thin discontinuous clay films; strongly acid; clear smooth boundary.

In the A horizon hue is 10YR or 7.5YR, value is 4 or 5, and chroma is 2 to 4.

In the Bt horizon hue is 5YR and 2.5YR, value is 4 or 5, and chroma is 4 to 6. The Bt horizon is sandy clay, clay loam, or clay.

Faceville soils are somewhat similar to Croom soils in color. Croom soils are gravelly throughout.

**FaB—Faceville silt loam, 0 to 5 percent slopes.** This is the only Faceville soil mapped in the county. The hazard of erosion on this soil ranges from none to moderate. Included in mapping are areas where the surface layer is fine sandy loam. Also included are areas of soils where there is little or no erosion, some areas where slopes are more than 6 percent, and some severely eroded spots.

This soil is well suited to cultivated crops, pasture, and trees. It is among the most productive soils in the county. Under good management this soil is suited to intensive cultivation. The moderate hazard of erosion is the major management concern. Proper management includes using minimum tillage, cover crops, and cropping sequences; tilling on the contour where the landscape permits; keeping the plant nutrient supply high; and using all available crop residue well. Capability unit IIe–4; woodland suitability group 2o2.

## Fallsington series

The Fallsington series consists of poorly drained, nearly level and gently sloping soils. These soils are on upland flats and on terraces above major streams. They formed in marine and old alluvial deposits of sandy material containing low to moderate amounts of silt and clay. The native vegetation is chiefly wetland oaks and maples, holly, sweetgum, and black gum. There is also some Virginia and loblolly pine.

In a representative profile the surface layer and subsurface layer, combined, are about 12 inches thick. They are sandy loam. The surface layer is very dark grayish brown and the subsurface layer is gray and has light gray and dark brown mottles. The subsoil is about 28 inches thick. It is gray and dark gray sandy clay loam that has brown, yellowish brown, and light gray mottles. The underlying material, between depths of 40 and about 72 inches, is light gray loamy sand that has mottles in various shades of yellow and brown.

Fallsington soils are easy to work when they are not too wet. In spring farm operations are delayed until the water table has lowered. These soils have a moderate available water capacity and are moderately permeable. Because water moves readily through these soils, they are not very difficult to drain in places where outlets are adequate. Poor drainage and the high water table severely limit the soil for most nonfarm uses.

Representative profile of Fallsington sandy loam, in a level wooded area, 2½ miles southwest of Leonardtown:

A1—0 to 3 inches; very dark grayish brown (10YR 3/2) sandy loam; weak, fine to

medium granular structure; friable, nonsticky, nonplastic; common roots; extremely acid; abrupt smooth boundary.

A2—3 to 12 inches; gray (5Y 6/1) sandy loam; common fine faint mottles of light gray (5Y 7/1) and common fine prominent mottles of dark brown (7.5YR 4/4); weak medium subangular blocky structure; friable, nonsticky, nonplastic; few roots; very strongly acid; clear smooth boundary.

B21t—12 to 22 inches; gray (5Y 6/1) sandy clay loam; common fine distinct mottles of brown (7.5YR 4/4) and many coarse faint mottles of light brownish gray (10YR 6/2); weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; very few roots; patchy clay films on large peds; 7 percent pebbles; very strongly acid; clear smooth boundary.

B22t—22 to 40 inches; dark gray (5Y 4/1) sandy clay loam; common medium distinct mottles of yellowish brown (10YR 5/6) and light gray (5Y 6/1) in pockets; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; very few roots; 10 percent pebbles; very strongly acid; gradual smooth boundary.

IIC—40 to 72 inches; light gray (5Y 7/1) loamy sand; many medium faint mottles of pale yellow (2.5Y 8/4) and common fine distinct mottles of yellowish brown (10YR 5/6); single grained; very friable, nonsticky, nonplastic; very strongly acid.

The solum ranges from about 24 to 40 inches in thickness. Smooth quartz pebbles about 1 inch in diameter are in the B horizon in places, and they make up 0 to 5 percent of the C horizon. The hue throughout the profile is 10YR through 5Y. Some subhorizons are neutral in color. In the A horizon value is 2 to 5 and chroma is 1 to 2; in thin A1 horizons value is 2 and 3.

In the B horizon value is 4 to 6 and chroma is 0 to 2. The B horizon generally has mottles of colors high in chroma. The Bt horizon is sandy clay loam, heavy loam, or heavy sandy loam.

The C horizon is coarser in texture than the B horizon and is commonly coarser than the A horizon. In color it is similar to the B horizon, but value is higher in places. In some profiles the C horizon is as much as 5 percent pebbles.

Fallsington soils are similar to Bibb, Elkton, Leonardtown, and Othello soils in color and in natural drainage. They are sandier in the Bt horizon than Elkton, Leonardtown, and Othello soils. Fallsington soils have Bt horizons that are lacking in Bibb soils. The somewhat excessively drained Rumford soils, the well drained Sassafras soils, and the moderately well drained Woodstown soils are closely associated with Fallsington soils.

**Fs—Fallsington sandy loam.** This nearly level soil is mostly at lower elevations. The hazard of erosion is none to slight.

Included with this soil in mapping are small areas where slope is more than 2 percent. Also included are some small areas where the subsoil is finer textured than is typical for the series.

If artificially drained, this soil is suited to some crops grown in the area. It is not well suited to tobacco. Most undrained areas are in woodland. Fallsington soils are easy to work and not difficult to drain. Tile lines are effective where adequate outlets can be provided. In addition to artificial drainage, good management includes minimum tillage and good use of all available crop residue. Capability unit IIIw–6; woodland suitability group 2w4.

## Gravel pits

**Gp—Gravel pits** are excavations from which gravel and other materials have been or are being removed. These materials are used mainly for road fill or for other kinds of construction. Most pits are exploited for gravel; others yield both sand and gravel.

The total area of these pits is increasing. Possible land uses of these pits must be determined after on-site investigation. Although these areas are no longer suited to farming, some have been regraded and planted to trees (fig. 11). Capability unit VIIIs–4; woodland suitability group not assigned.

## Kempsville series

The Kempsville series consists of well drained, level to strongly sloping, deep soils on uplands. These soils formed in old loamy deposits that have a relatively small amount of silt. The native vegetation is mixed upland hardwoods and Virginia pine.

In a representative profile the surface layer is about 15 inches thick. It is light brownish gray, pale brown,

*Figure 11.*—Abandoned gravel pit near Ridge that has been regraded and planted to loblolly pine.

and light yellowish brown fine sandy loam. The subsoil, between depths of 15 and 60 inches, is reddish brown and yellowish red and has mottles in the lower part. The upper 15 inches of the subsoil is friable loam. The next 16 inches is firm clay loam. The lower part, to a depth of 60 inches, is dominantly yellowish red sandy clay loam.

Kempsville soils are easy to work except in places where they are severely eroded. They have a high available water capacity and are moderately permeable. Slope and the hazard of further erosion are chief limitations for nonfarm uses.

Representative profile of Kempsville fine sandy loam, 5 to 10 percent slopes, moderately eroded, in a wooded area about ½ mile north of Bushwood-Dynard Road in Bushwood:

A1—0 to 3 inches; light brownish gray (10YR 6/2) fine sandy loam; weak fine to medium granular structure; very friable; many roots; very strongly acid; abrupt wavy boundary.

A2—3 to 7 inches; pale brown (10YR 6/3) fine sandy loam; weak medium granular structure; friable; many roots; very strongly acid; clear smooth boundary.

A3—7 to 15 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine subangular blocky structure; friable; many roots; very strongly acid; clear smooth boundary.

B21t—15 to 30 inches; reddish brown (5YR 4/4) loam; moderate medium subangular blocky structure; friable; few roots; very thin clay films on faces of peds; very strongly acid; abrupt wavy boundary.

B22t—30 to 46 inches; yellowish red (5YR 4/6) clay loam; many pale brown (10YR 6/3) mottles; weak thick platy structure and moderate medium subangular blocky structure; firm, brittle and dense in places; few roots; thin clay films on ped faces; very strongly acid; gradual smooth boundary.

B23t—46 to 60 inches; yellowish red (5YR 4/8) sandy clay loam; many yellowish brown (10YR 5/6) mottles; weak fine and medium subangular blocky structure; firm, somewhat brittle in places; very few fine roots; thin clay films on ped faces; very strongly acid.

The solum ranges from about 42 to 60 inches in thickness. In the A horizon hue is 10YR, 7.5YR, or 2.5YR, value is 4 to 6, and chroma is 2 to 4. In the B horizon hue is 5YR or 7.5YR, value is 4 to 6, and chroma is 4 to 8. This horizon is mottled in the lower part. It ranges from loam to sandy clay loam.

The C horizon is not described in the representative profile but is similar in color to the B horizon. It is generally coarser in texture than the B horizon.

Kempsville soils are similar to Sassafras soils, but they are thicker and contain more clay and less sand in the Bt horizon. Kempsville soils are somewhat redder in color and finer textured than the Sassafras soil.

**KeC2—Kempsville fine sandy loam, 5 to 10 percent slopes, moderately eroded.** This moderately sloping soil is on uplands. It has the profile described as representative of the series. Moderate amounts of surface soil have been lost through erosion. The hazard of further erosion is moderate to severe.

Included with this soil in mapping are some areas of soils that are nearly level, and a few severely eroded areas that are cut by shallow gullies.

This soil is well suited to cultivated crops, sown pasture, and trees. It is among the best soils in the county for tobacco. The yields and the quality are generally high to very high. This soil can be worked and planted earlier in spring than soils that are less sandy or less well drained. The hazard of further erosion is the major management concern, and simple, easily applied practices are needed. Practices which retard erosion include planting on the contour, using alternate strips of clean-tilled and close growing crops, using minimum tillage, a suitable cropping system, cover crops, and cropping sequences, and using all available crop residue well. Capability unit IIIe–5; woodland suitability group 2o2.

**KeC3—Kempsville fine sandy loam, 5 to 10 percent slopes, severely eroded.** This moderately sloping soil is on uplands. Most of the original surface layer has been lost through erosion and plowing exposes part of the subsoil. This gives the soil a spotted or marbled to bright colored appearance. Further erosion is a severe hazard.

Included with this soil in mapping are some areas of soils that have a surface layer of sandy clay loam or sandy loam.

This soil is suited to some crops, sown pasture, and trees. Much of the soil that was previously farmed has not reverted to trees. Tobacco is grown on this soil in places, and it is generally of high quality. Yields generally range from medium to high. The hazard of further erosion is the major management concern. Practices which retard erosion include growing clean-tilled crops at long intervals, using a cropping system that includes close growing crops or pasture plants, growing clean-tilled crops in narrow strips that are laid out on the contour, using minimum tillage and winter cover crops, and using all available crop residue well. Capability unit IVe–5; woodland suitability group 2o2.

**KeD2—Kempsville fine sandy loam, 10 to 15 percent slopes, moderately eroded.** This strongly sloping soil is on uplands. Moderate amounts of surface soil have been lost through erosion. In places, plowing exposes part of the subsoil, giving the soil a spotted or marbled to bright colored appearance. This soil is generally less friable, more firm and sticky, and harder to work than soils in places where the subsoil has not been disturbed. The hazard of further erosion is severe.

This soil is suited to some crops, sown pasture, and trees. Tobacco grown on this soil generally is of high quality and yields are generally medium. Although slope is a concern in management, the hazard of further erosion is the major management concern. Practices which retard erosion include growing clean-tilled crops at long intervals, using a cropping system that includes close growing crops or pasture plants, growing clean-tilled crops in narrow strips that are laid out on the contour, using minimum tillage, and

using all available crop residue well. If erosion is controlled, this soil is better suited to hay, pasture, or woodland than to other uses. Capability unit IVe–5; woodland suitability group 2o2.

**KeD3—Kempsville fine sandy loam, 10 to 15 percent slopes, severely eroded.** This strongly sloping soil is on uplands. Most of the original surface soil has been lost through erosion. Gullies have formed in many areas. In spots, where farmed, the surface layer is sticky sandy clay loam and is difficult to work. The hazard of further erosion is severe.

Included with this soil in mapping are some areas of soils that have a surface layer of sandy clay loam or sandy loam.

This soil is not suited to cultivated crops and is used very little for farming. It is suited to hay, pasture, or woodland. Most of the acreage is in woodland. Many areas which were once farmed have now reverted to woodland. Erosion is the major management concern. Practices which retard erosion include using diversions in sodded waterways and outlets, using buffer strips, and controlling over grazing. Capability unit VIe–2; woodland suitability group 2o2.

## Keyport series

The Keyport series consists of moderately well drained, nearly level to moderately sloping, deep soils. These soils are mostly in fairly low areas near major rivers, but some are at higher elevations on uplands. The soils formed in old marine and alluvial deposits of dominantly clay texture. The native vegetation is mixed and wetland hardwoods, but Virginia pine grows in places.

In a representative profile the surface layer and subsurface layer are silt loam. Combined, they are about 8 inches thick. The surface layer is light olive brown, and the subsurface layer is light yellowish brown. The upper 6 inches of the subsoil is yellowish brown silt loam. The next 12 inches is yellowish brown heavy silty clay loam. The subsoil, between depths of 26 and 46 inches, is yellowish brown silty clay and has light gray mottles. The lower part of the subsoil, between depths of 46 and 56 inches, is light brownish gray silty clay that has yellowish brown mottles. The underlying material, to a depth of 60 inches, is variegated gray and olive yellow sandy clay loam.

Keyport soils are easy to work if the moisture content is favorable and erosion is not severe. They have a high available water capacity. Poor drainage, slow movement of water through the subsoil, and the hazard of further erosion are limitations to use of these soils. The soils are not well suited to deep rooted crops that require good drainage and soil aeration or to perennial crops that can be damaged by frost heaving. These soils are slowly permeable; thus they have severe limitations for septic tank disposal fields.

Representative profile of Keyport silt loam, 0 to 2 percent slopes, in a wooded area, 2¼ miles southeast of Leonardtown:

A1—0 to 3 inches; olive brown (2.5Y 4/4) silt loam; weak medium granular structure; friable; many roots; very strongly acid; abrupt smooth boundary.

A2—3 to 8 inches; light yellowish brown (2.5Y 6/4) silt loam; weak medium subangular blocky structure; friable, slightly sticky; few roots; very strongly acid; clear smooth boundary.

B1—8 to 14 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few roots; extremely acid; clear smooth boundary.

B21t—14 to 26 inches; yellowish brown (10YR 5/8) heavy silty clay loam; moderate fine and medium subangular blocky structure; friable to firm, slightly sticky, slightly plastic; few roots; thin continuous yellowish brown (10YR 5/4) clay films; extremely acid; gradual smooth boundary.

B22t—26 to 46 inches; yellowish brown (10YR 5/8) silty clay; many fine prominent mottles of light gray (5Y 7/1); moderate medium angular blocky structure; firm, sticky and plastic; very few roots; distinct, yellowish brown (10YR 5/4) clay films; extremely acid; clear smooth boundary.

B23tg—46 to 56 inches; light brownish gray (2.5Y 6/2) silty clay; many medium prominent mottles of yellowish brown (10YR 5/8); moderate medium angular blocky structure; very firm, sticky and plastic; very few roots; thin clay films on peds; extremely acid; clear wavy boundary.

IICg—56 to 60 inches; variegated gray (5Y 6/1) and olive yellow (2.5Y 6/6) fine sandy clay loam; massive; friable, slightly sticky and slightly plastic; extremely acid.

The solum ranges from about 40 to 60 inches in thickness. In the A horizon hue is 10YR or 2.5Y, value is 3 to 6, and chroma is 2 to 4. The lower values and chromas are confined to undisturbed A1 horizons less than 6 inches thick. The A horizon is generally silt loam or fine sandy loam.

In the B horizon hue is 7.5YR, 10YR, or 2.5Y; value is 4 to 6; and chroma is 1 to 8. The B horizon ranges from heavy silty clay loam or heavy clay loam to clay and silty clay. Mottles that have chroma of 2 or less are below a depth of 20 inches.

In the C horizon hue is 10YR to 5Y, value is 2 to 6, and chroma is 1 to 7. Mottles range in chroma from low to high. This horizon is silty clay loam to loamy sand.

Keyport soils are very similar to Mattapex and Woodstown soils in most major features, but they have a finer textured, more slowly permeable B horizon. They are not so poorly drained as Elkton soils that formed in similar clayey sediment.

**KpA—Keyport fine sandy loam, 0 to 2 percent slopes.** This nearly level soil is mainly at lower elevations. It has a profile similar to the one described as representative of the series, but the surface layer is fine sandy loam.

The hazard of erosion is none to slight. The water table is seasonally high.

This soil is easier to work early in the spring than

Keyport silt loam. It is well suited to some crops, sown pasture, and woodland. It is not suited to crops that are subject to damage by frost heaving. Tobacco is grown on this soil in places, but the quality is medium and the quantity ranges from low to medium. Improving drainage is the major management concern. Drainage ditches are more suitable than tile lines. (The soil is slowly permeable, and clay prevents water from entering the tile.) In addition to artificial drainage, good management includes minimum tillage and good use of all available crop residue. Capability unit IIw–9; woodland suitability group 3w3.

**KpB2—Keyport fine sandy loam, 2 to 5 percent slopes, moderately eroded.** This gently sloping soil is mainly at lower elevations. Some surface soil has been lost through erosion. In some places shallow gullies are present and the subsoil is exposed.

This soil is suited to some crops, pasture, and trees. It is not suited to crops that are subject to damage by frost heaving. Although the water table is seasonally high and the drainage is needed for some crops, controlling further erosion is the main management concern. Practices that retard erosion include constructing interceptors and diversions to reduce runoff from adjacent soils, using minimum tillage and suitable cropping systems, and using all available crop residue well. Capability unit IIe–36; woodland suitability group 3w3.

**KrA—Keyport silt loam, 0 to 2 percent slopes.** This soil is in flat areas at lower elevations. It has the profile described as representative of the series.

The hazard of erosion is none to slight. Included with this soil in mapping are some areas where material has washed from adjacent soils and accumulated on the surface, giving the surface layer a thicker than normal appearance.

This soil is suited to some crops, sown pasture, and trees. It is not as easy to work as Keyport fine sandy loam. It is not suited to deep rooted crops and to crops that are subject to damage by frost heaving. Tobacco yields are favorable in places, but the quality is generally not as high as on the sandier and better drained soils. Improving drainage is the most important management concern. Artificial drainage, minimum tillage, cover crops, and good use and management of all available crop residue are other management needs. Tilling within the proper range of moisture content is essential to reduce compaction and clodding. Capability unit IIw–8; woodland suitability group 3w3.

**KrB2—Keyport silt loam, 2 to 5 percent slopes, moderately eroded.** This gently sloping soil is mainly at lower elevations. In practically all cleared areas surface soil has been lost through erosion. In some small areas the subsoil is exposed. A few gullies are present. The hazard of further erosion is moderate.

This soil is suited to some cultivated crops, pasture, and trees. It is not suited to crops that are subject to damage by frost heaving. The quality of tobacco grown on this soil is generally not as high as that grown on Keyport fine sandy loam. Although the water table is seasonally high and additional drainage is needed for growth of some crops, protecting against further erosion is the major management concern. Practices that retard erosion include providing interceptors and diversions to decrease the amount and rate of runoff; using sodded waterways, minimum tillage, cover crops, and suitable cropping systems; and using and managing all available crop residue well. Capability unit IIe–13; woodland suitability group 3w3.

**KrC2—Keyport silt loam, 5 to 10 percent slopes, moderately eroded.** This moderately sloping soil is in areas mainly at lower elevations. In practically all cleared areas surface soil has been lost through erosion. Plowing exposes the subsoil in many places and gives the soil a spotty appearance. Shallow gullies are present. Runoff is rapid.

Included with this soil in mapping are areas of severely eroded soils that now have a surface layer of silty clay loam. Also included are some small areas of soils that have slopes of more than 10 percent.

Under good management, this soil is suited to some crops, pasture, and trees. The quality of tobacco grown on this soil is generally low to medium. The hazard of further erosion is the most important management concern. Practices that retard erosion include planting on the contour, planting close growing crops in narrow strips on the contour, using cover crops and minimum tillage, providing interceptors and diversions in sodded waterways, and using all available crop residue well. Capability unit IIIe–13; woodland suitability group 3w3.

## Kitchen middens

On the soil map, a number of places are marked by a special symbol that indicates a *kitchen midden.* As used in this survey, a kitchen midden is an area believed to have been intensively used by American Indians, and prolonged use of these areas has drastically altered the nature of the original soil.

In St. Marys County these kitchen middens are in low bluff areas, mainly along the Potomac and Wicomico Rivers. Heavy concentration of oyster shells on the surface and in the upper part of the soil identify the areas. Arrow heads and other Indian artifacts are commonplace but difficult to find and identify among the shells. Kitchen middens are of considerable interest to archeologists.

In many places, the shells are in soil material as much as two feet thick. The fine soil that is mixed with the shells is black or almost black. Lime from the shell deposits has changed the natural reaction of the soil in most of these areas from strongly or very strongly acid to moderately alkaline. The alkalinity of the soil is so intense in some areas that it limits the growth of some plants (fig. 12).

The soils in these areas which have been affected by the kitchen middens are mainly of the Mattapex, Woodstown, Keyport, and Elkton series. Also affected are smaller areas of Matapeake, Sassafras, and Othello soils. Although these areas may limit some plant growth, limitations are likely to be few for nonfarm uses.

## Klej series

The Klej series consists of somewhat poorly drained, deep soils. These soils formed in beds of sandy material. The native vegetation is mixed oaks, sweetgum, loblolly pine, and red maple.

*Figure 12.*—Kitchen midden deposit of oyster shells on Matapeake fine sandy loam, 2 to 5 percent slopes, moderately eroded, near Bushwood.

In a representative profile the surface layer is about 6 inches thick. It is very dark grayish brown loamy sand. The subsoil, between depths of 6 and 16 inches, is light yellowish brown loamy sand. The lower part of the subsoil, to a depth of about 30 inches, is light yellowish brown loamy sand that has yellowish brown and light brownish gray mottles. Underlying this layer, to a depth of 60 inches or more, is gray sand that has yellowish brown mottles.

The Klej soils are not extensive in the county. In most places, they are in small scattered spots. The soils are so sandy that they do not retain plant nutrients well, and they are droughty in dry periods. Erosion generally is not a hazard. The available water capacity is low and permeability is rapid. If adequately drained and properly managed, these soils can be used for most crops grown in the area. Klej soils have severe limitations for most nonfarm uses.

Representative profile of Klej loamy sand, 0 to 5 percent slopes, in a wooded area about 1 mile west of Leonardtown:

A1—0 to 6 inches; very dark grayish brown (10YR 3/2) loamy sand; weak fine granular structure; very friable, nonsticky and nonplastic; many roots; very strongly acid; abrupt smooth boundary.

B21—6 to 16 inches; light yellowish brown (2.5Y 6/4) loamy sand; weak, fine, granular structure; very friable, nonsticky and nonplastic; common roots; very strongly acid; clear smooth boundary.

B22—16 to 30 inches; light yellowish brown (2.5Y 6/4) loamy sand; few fine distinct mottles of yellowish brown (10YR 5/8) and common, coarse, faint mottles of light brownish gray (2.5Y 6/2); single grained; loose to very friable, nonsticky and nonplastic; few roots; medium acid; gradual smooth boundary.

Cg—30 to 60 inches; gray (5Y 6/1) sand; common coarse distinct mottles of yellowish brown (10YR 5/8); single grained; loose; no roots; slightly acid.

Depth to finer textured material ranges from about 42 to 84 inches. Hue throughout the profile is 10YR and 2.5Y in the upper part and 5Y in the lower part.

In the A horizon value is 3 through 6 and chroma is 1 to 4. In the B and C horizons value is 5 or 6 and chroma is 4 to 6. Mottles in the lower part of the B horizon have chroma of 2 or less while those in the C horizon have chroma of 4 through 8. The B and C horizons are loamy sand, loamy fine sand, or sand.

Klej soils are similar to Keyport, Mattapex, and Woodstown soils in color. They formed in the same kinds of sandy material as the excessively drained Evesboro soils. In St. Marys County, Klej soils have higher reactions in the B and C horizons than the defined range for the series. However, this does not effectively alter these soils' usefulness and behavior.

**Kz—Klej loamy sand, 0 to 5 percent slopes.** This is the only Klej soil mapped in the county. This soil is in small areas, mostly at low elevations. It has a high water table during winter and spring, but becomes very droughty during hot dry periods. Nutrient holding capacity is very low.

Included with this soil in mapping are small areas of soils that are moderately well drained and poorly drained. Also included are small areas of soils that have slopes of more than 5 percent.

If drained and managed properly, this soil is suited to some crops grown in the county. Very little tobacco is grown on this soil. Tile lines are suitable for drainage. Ditches are difficult to maintain because the sandy soil flows when saturated and fills the ditches. In addition to artificial drainage, good management includes practices which increase organic matter content and proper additions of fertilizer and lime. Even if drainage is possible, this soil is better suited to woodland than to farming. Capability unit IIIw-10; woodland suitability group 3w6.

## Leonardtown series

The Leonardtown series consists of nearly level, poorly drained soils that are only moderately deep to a fragipan in the subsoil. These soils are on upland flats that commonly lack channeled drainageways. They formed in silty deposits over older marine sediment.

The native vegetation is wetland hardwoods, including oaks, holly, maples, and gums.

In a representative profile the surface layer and subsurface layer are silt loam. Combined, they are about 12 inches thick. The surface layer is olive gray and the subsurface layer is light olive gray. The upper 9 inches of the subsoil is gray light silty clay loam that has yellowish brown mottles. The lower 24 inches of the subsoil is light gray silt loam and silty clay loam that has yellowish brown mottles. It is a fragipan that is very firm, brittle, and very slowly permeable. The underlying material, between depths of 45 and 65 inches, is light gray heavy silt loam that has strong brown mottles.

Leonardtown soils have a moderate available water capacity and are slowly to very slowly permeable. Generally they are low in natural fertility. These soils have severe limitations for farming because natural drainage is poor, the water table is seasonally perched, and the rooting zone is limited by a fragipan. They also have severe limitations for most nonfarm uses. Leonardtown soils are poorly suited to residential and industrial development.

Representative profile of Leonardtown silt loam, in a level cleared area ½ mile east of Park Hall:

A1—0 to 2 inches; olive gray (5Y 5/2) silt loam mixed with black specks of organic leaf litter; weak coarse granular structure; very friable, slightly sticky; many fine roots; extremely acid; abrupt wavy boundary.

A2g—2 to 12 inches; light olive gray (5Y 6/2) silt loam; many medium prominent strong brown (7.5YR 5/6) mottles; weak, fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; many roots; extremely acid; clear wavy boundary.

B2tg—12 to 21 inches; gray (5Y 5/1) light silty clay loam; common, medium prominent yellowish brown (10YR 5/6) mottles; weak fine and medium subangular blocky structure; friable, sticky, plastic; few fine roots; thin gray clay films; extremely acid; abrupt smooth boundary.

Bx1g—21 to 31 inches; light gray (5Y 6/1) silt loam; many fine white specks and common medium prominent yellowish brown (10YR 5/8) mottles; strong very coarse prisms parting to moderate thick platy structure and weak medium subangular blocky structure; very dense, very hard, very firm and brittle, slightly sticky and slightly plastic; very few roots only in polygon cracks; gray (N 5/0) clay films as much as ¼ inch thick on vertical faces of prisms; extremely acid; clear smooth boundary.

Bx2g—31 to 45 inches; light gray (5Y 6/1) silty clay loam; many fine prominent yellowish brown (10YR 5/8) mottles; strong, very coarse prisms parting to moderate thick platy structure and weak medium subangular blocky structure; very dense, very hard, very firm, and brittle, sticky and slightly plastic; very few roots only in polygon cracks; gray (N 5/0) clay films as much as ⅛ inch thick on vertical faces of prisms and yellowish brown clay films on some horizontal and vertical faces; extremely acid; gradual smooth boundary.

C—45 to 60 inches; light gray (5Y 6/1) heavy silt loam; common fine prominent mottles of strong brown (7.5YR 5/6); very weak thick platy structure; very hard, very firm, sticky and plastic; thin discontinuous yellowish brown clay films; very strongly acid.

The solum ranges from about 28 to 45 inches in thickness. Depth to the fragipan ranges from about 21 to 30 inches. In the profile hue is commonly 2.5Y or 5Y, but in some subhorizons it is neutral in places. All horizons contain mottles in places. Smooth pebbles are in the C horizon in places.

In the A horizon value is 3 to 6 and chroma is 0 to 2.

In the B and C horizon value generally is 5 or 6, or, in places, 4, and chroma is 1 or 2. The B horizon ranges from sandy loam to heavy silt loam.

Leonardtown soils are similar to Bibb, Elkton, Fallsington, and Othello soils in color and in natural drainage. Leonardtown soils are more poorly drained than the closely associated Beltsville soils. The well drained Chillum and Matapeake soils, the moderately well drained Beltsville soils, and the poorly drained Othello soils formed in the same kind of silty material as Leonardtown soils.

**Le—Leonardtown silt loam.** This is the only Leonardtown soil mapped in the county. This soil is in level areas and some depressions on uplands. It quickly becomes saturated when it rains or when snow melts, and it remains wet for long periods because runoff and permeability are very slow. The fragipan in the subsoil prevents the downward movement of water and restricts root growth below this layer. The water table is perched at or near the surface much of the year and in places is seasonally ponded. The hazard of erosion is none to slight.

If artificially drained, this soil is suited to a few crops and sown pasture, but yields are generally low even under good management. The soil is not suited to deep rooted crops or to crops that are subject to damage by frost heaving. This Leonardtown soil is little used for farming. Most of the acreage is in woodland. Drainage is the major management concern. This soil is difficult to drain. Shallow V-shaped ditches help remove excess water that accumulates above the fragipan. Good management also includes minimum tillage, cover crops to improve tilth, and good use of all available crop residue. If artificially drained, this soil is better suited to hay, pasture, or woodland than to other uses. Capability unit IVw–3; woodland suitability group 3w4.

## Marr series

The Marr series consists of well drained, gently sloping to moderately sloping, deep soils. These soils are on uplands along the Patuxent River side of the county. They formed in old deposits of fine sandy

sediment containing moderate amounts of silt and clay. The sand particles in Marr soils are remarkably uniform in size. The native vegetation was probably mixed hardwoods and some Virginia pine.

In a representative profile, the surface layer is about 10 inches thick. It is yellowish brown fine sandy loam. The subsoil is strong brown fine sandy clay loam or fine sandy loam about 28 inches thick. The underlying material, between depths of 38 and 60 inches or more, is brownish yellow loamy fine sand.

Marr soils are easy to work. They have a high available water capacity and are moderately permeable. Slope and the hazard of further erosion are limitations to their use. Some areas are cultivated. The soils are especially valuable for tobacco production. Slope is the main limitation for some nonfarm uses.

Representative profile of Marr fine sandy loam, 2 to 6 percent slopes, moderately eroded, in a rewooded area about two miles west of Golden Beach:

Ap—0 to 10 inches; yellowish brown (10YR 5/4) fine sandy loam; very weak medium granular structure; very friable, nonplastic; common roots; medium acid; clear smooth boundary.

B1—10 to 18 inches; strong brown (7.5YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few roots; very strongly acid; clear smooth boundary.

B21t—18 to 28 inches; strong brown (7.5YR 5/6) fine sandy clay loam; moderate medium subangular blocky structure; firm, slightly sticky, slightly plastic; very few roots; thin clay films on ped faces; very strongly acid; gradual smooth boundary.

B22t—28 to 38 inches; strong brown (7.5YR 5/8) fine sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; very few roots; discontinuous strong brown (7.5YR 5/6) clay films; very strongly acid; gradual smooth boundary.

C—38 to 60 inches; brownish yellow (10YR 6/8) loamy fine sand; massive; very friable, nonsticky, nonplastic; very strongly acid.

The solum is about 30 to 40 inches in thickness. In the A horizon hue is 10YR or 7.5YR, value is 3 to 5, and chroma is 2 to 4. The value of 3 generally is confined to undisturbed A1 horizons less than 6 inches thick.

In the B horizon hue generally is 7.5YR, but in places it is 10YR in subhorizons. Value is 5 or 6 and chroma is 6 or 8. Where present, B1 and B3 horizons have chroma of 4 in places. The Bt horizons are fine sandy loam, but in places they have a thin subhorizon of heavy, fine or very fine sandy loam.

The C horizon ranges from loamy fine sand to light fine sandy loam. In places, this horizon is variegated in color, and it has colors of high value and chroma.

Marr soils are similar to Westphalia soils except the Bt horizon of Westphalia soils is no more than 10 inches thick and contains less than 18 percent clay. Marr soils do not contain as much medium and coarse sand as Sassafras soils. Marr soils have a finer textured profile than Sassafras soils.

**MaB2—Marr fine sandy loam, 2 to 6 percent slopes, moderately eroded.** This soil has the profile described as representative of the series. In practically all cleared areas a significant amount of surface soil has been lost through erosion. The hazard of further erosion is moderate.

Included with this soil in mapping are areas where shallow gullies have formed.

This soil is well suited to cultivated crops, pasture, and trees. It is especially well suited to tobacco and the quality is generally high to very high. Under good management this soil is suited to intensive cultivation. The hazard of further erosion is the major management concern. Practices which retard erosion include maintaining a cover crop most of the year, using minimum tillage, planting on the contour, using alternate strips of clean-tilled and close growing crops, and using all available crop residue well. Capability unit IIe–4; woodland suitability group 3o2.

**MaC2—Marr fine sandy loam, 6 to 12 percent slopes, moderately eroded.** This soil has lost significant amounts of surface soil through erosion. It is potentially one of the most erodible soils in the county.

Included with this soil in mapping are small areas of soils which are severely eroded. Some of these areas were once tilled but now are wooded.

If properly managed, this soil is suited to most crops, pasture, and trees. Tobacco grown on this soil is generally of high quality. The severe hazard of further erosion is the major management concern. Practices that retard erosion include stripcropping on the contour, providing diversion terraces and sodded waterways, maintaining a close growing crop most of the year, planting clean-tilled and close growing crops in narrow alternate strips on the contour, using minimum tillage, and using all available crop residue well. Capability unit IIIe–5; woodland suitability group 3o2.

**MaC3—Marr fine sandy loam, 6 to 12 percent slopes, severely eroded.** This soil is so severely eroded that little or no surface soil is left. Deep gullies have formed in places. Most areas of this soil were once farmed, but because of severe erosion they have reverted to woodland.

Included with this soil in mapping are areas where the surface layer is now fine sandy clay loam.

Under a high level of management this soil is suited to some crops grown in the area. Tobacco of medium to high quality is grown in places. The severe hazard of erosion is the major management concern. Extensive conservation practices are needed. These practices include contour cultivation, contour stripcropping that includes buffer strips, growing clean-tilled crops a minimum of once in 5 years, providing diversion terraces and sodded waterways, and using all available crop residue well. Even if erosion is controlled, this soil is better suited to hay, pasture, or woodland. Capability unit IVe–5; woodland suitability group 3o2.

## Matapeake series

The Matapeake series consists of well drained, level to moderately sloping, deep soils. These soils are on terraces above major rivers and on uplands. They formed in loamy deposits over older and coarser sedi-

ment. The native vegetation is mixed upland hardwoods, mainly oaks.

In a representative profile the surface layer is about 10 inches thick. It is dark brown silt loam. The subsoil is about 20 inches thick. It is brown heavy silt loam in the upper part grading into strong brown light silty clay loam in the lower part. The underlying material, between depths of 30 and 60 inches, is yellowish brown sandy loam grading into yellowish brown loamy sand.

Matapeake soils are easy to work at a favorable moisture content and they warm up readily in spring. They have a high available water capacity and are moderately permeable. They are among the most suitable soils for farming in the county. These soils are suited to practically all uses. Slope and the hazard of further erosion are the main factors that influence use; however, underlying some of these soils is an iron pan which forms an impermeable barrier. These pans have significance mainly because if septic tank disposal tile lines are installed, there is a hazard of pollution down slope.

Representative profile of Matapeake silt loam, 0 to 2 percent slopes, in a field 1¼ miles northeast of Hollywood:

Ap—0 to 10 inches; dark brown (10YR 4/3) silt loam; weak medium granular structure; friable; many roots; slightly acid; abrupt smooth boundary.

B21t—10 to 18 inches; brown (7.5YR 5/4) heavy silt loam; moderate, fine and medium subangular blocky structure; friable, slightly sticky, plastic; common fine roots; thin continuous clay films; strongly acid; gradual smooth boundary.

B22t—18 to 30 inches; strong brown (7.5YR 5/6) light silty clay loam; moderate, medium subangular blocky structure; friable to firm, sticky and plastic; few fine roots; distinct continuous clay films; strongly acid; clear wavy boundary.

IIC1—30 to 44 inches; yellowish brown (10YR 5/6) sandy loam; massive; very friable, slightly sticky; very strongly acid; clear smooth boundary.

IIC2—44 to 60 inches; yellowish brown (10YR 5/8) loamy sand, single grained; loose to very friable; very strongly acid.

The solum generally ranges from 24 to 58 inches in thickness. Fine smooth pebbles are in the profile in places, but these are common only in the C horizon. In the A horizon hue is 10YR or 2.5Y, value is 3 to 6, and chroma is 1 to 4. In undisturbed A1 horizons less than 6 inches thick, value is 3 and chroma is 1. The A horizon is fine sandy loam or silt loam.

In the B horizon hue is 10YR or 7.5YR, value is 4 or 5, and chroma is 4 to 8. The Bt horizon is silt loam or light silty clay loam.

The IIC horizon is variable in color and is stratified in some places. Where it is not stratified, it ranges from loam to sand.

Matapeake soils are similar to Chillum, Marr, and Sassafras soils in color and in natural drainage. They have a C horizon that is more friable and contains less gravel than the C horizon of Chillum soils. They contain much more silt and less sand in the solum than Marr and Sassafras soils. They formed in the same kind of material as the well drained Chillum soils, the moderately well drained Beltsville and Mattapex soils, and the poorly drained Leonardtown and Othello soils.

**MmA—Matapeake fine sandy loam, 0 to 2 percent slopes.** This nearly level soil is mainly along major rivers and on uplands. It has a profile similar to the one described as representative of the series, but the surface layer is fine sandy loam. The hazard of erosion is none to slight.

Included with this soil in mapping are areas of soils on uplands which are underlain by a discontinuous iron pan at a depth of about 48 to 60 inches. This iron pan serves as an impermeable barrier below septic disposal fields, which could cause pollution down slope.

This soil is well suited to all crops grown in the area, to pasture, and to trees. It is considered one of the best soils in producing both high quantity and high quality tobacco. This soil can be worked and planted earlier in the year than many other soils in the county. It does not require special conservation practices, and under proper management can be tilled year after year. Good management practices include using minimum tillage, keeping plant nutrients high, using cover crops and cropping sequences, and using all available crop residue well. Capability unit I–5; woodland suitability group 3o2.

**MmB2—Matapeake fine sandy loam, 2 to 5 percent slopes, moderately eroded.** This gently sloping soil is along major rivers and on uplands. An appreciable amount of surface soil has been lost in most places. Deep plowing turns up some of the finer textured subsoil material. The hazard of further erosion is moderate.

Included with this soil in mapping are areas of soils on uplands which are underlain by a discontinuous iron pan at a depth of about 40 to 50 inches. This iron pan serves as an impermeable barrier below septic tank disposal fields, which could cause down slope pollution.

This soil is well suited to all crops grown in the area, to sown pasture, and to trees. It is especially suited to the production of tobacco and the quality is generally high to very high. Controlling further erosion is the major management concern. Practices which retard erosion include maintaining a cover crop as much of the time as possible; planting on the contour; using alternate strips of clean-tilled and close growing crops, minimum tillage, and suitable cropping systems; and using all available crop residue well. Capability unit IIe–5; woodland suitability group 3o2.

**MnA—Matapeake silt loam, 0 to 2 percent slopes.** This soil is in sizeable areas along the major rivers and in some areas on uplands. It has the profile described as representative of the series. The hazard of erosion is none to slight.

Included with this soil in mapping are some areas on uplands which are underlain by a discontinuous iron pan at a depth of about 50 to 60 inches. This iron pan serves as an impermeable barrier below septic tank disposal fields, which could cause down slope pollution.

This soil is well suited to all crops grown in the area, to sown pasture, and to trees. This soil is especially well suited to tobacco, although the quality may not be

as high as on Matapeake fine sandy loam. These soils require no special conservation practices, and general crops respond well to good management. Good management includes using minimum tillage, keeping the plant nutrient supply high, planting cover crops, using cropping sequences, and using all available crop residue well. Capability unit I–4; woodland suitability group 3o2.

**MnB2—Matapeake silt loam, 2 to 5 percent slopes, moderately eroded.** This gently sloping soil is mainly along the major rivers and in some areas on uplands. Some surface soil has been lost through erosion. The hazard of further erosion is moderate.

Included with this soil in mapping are soils that are severely eroded and some that are slightly eroded. Also included are some areas on the uplands which are underlain by a discontinuous iron pan at a depth of about 40 to 50 inches. This iron pan serves as an impermeable barrier below septic tank disposal fields, which could cause down slope pollution.

This soil is well suited to crops grown in the area, to pasture, and to trees. It is especially well suited to tobacco, although the quality may not be as high as on Matapeake fine sandy loam. The hazard of further erosion is the major management concern. Practices that retard erosion include maintaining a plant cover as much of the time as possible; planting on the contour; using minimum tillage, alternate strips of clean-tilled crops and close growing crops, and suitable cropping systems; and using all available crop residue well. If erosion is controlled, all crops can be grown year after year. Capability unit IIe–5; woodland suitability group 3o2.

**MnC3—Matapeake silt loam, 5 to 10 percent slopes, severely eroded.** This moderately sloping soil is in areas mainly on uplands and in isolated spots on lower terraces. Most of the original surface soil has been lost through erosion, and the surface layer now contains much subsoil material. Gullies, some of them deep, have formed in places. The hazard of further erosion is very severe.

Included with this soil in mapping are some areas of soils that are only moderately eroded. Also included are some areas of soils which are underlain by a discontinuous iron pan, some of which has been exposed through erosion. This pan serves as an impermeable barrier and could cause seeping or downslope pollution if septic tank disposal fields are installed.

The soil is not suited to cultivation unless extensive conservation practices are followed and maintained. Yields of tobacco may be favorable, and the quality is medium. Practices which retard erosion include using a cropping system that includes close growing crops or pasture plants, planting clean-tilled and close growing crops in narrow alternate strips that are laid out on the contour, using minimum tillage, maintaining cover crops most of the year, terracing where warranted, installing buffer strips, and using all available crop residue well. Even where these measures are taken, the soil is better suited to hay, pasture, or woodland. Capability unit IVe–3; woodland suitability group 3o2.

## Mattapex series

The Mattapex series consists of moderately well drained, level to moderately sloping, deep soils. These soils are chiefly in slightly elevated areas bordering major rivers of the county. They formed in silty deposits underlain by older, coarser sediment. The native vegetation is mixed wetland hardwoods.

In a representative profile the surface layer is light olive brown silt loam about 7 inches thick. The subsurface layer is yellowish brown silt loam about 9 inches thick. The subsoil is 12 inches of yellowish brown heavy silt loam that has light olive brown mottles in the lower part. The underlying material is yellowish brown and strong brown fine sandy loam to a depth of 60 inches. It has mottles of various colors.

Mattapex soils are easy to work at a favorable moisture content, but in winter and spring they are limited by the presence of a seasonal high water table. The available water capacity is high and permeability is moderately slow. These soils are generally intensively farmed. Seasonal wetness and impeded drainage are the main limitations for nonfarm use.

Representative profile of Mattapex silt loam, 0 to 2 percent slopes, in a pasture on Maryland Route 249 three miles south of Valley Lee:

Ap—0 to 7 inches; light olive brown (2.5Y 5/4) silt loam; very weak medium granular structure; very friable; many roots; slightly acid; abrupt smooth boundary.

A2—7 to 16 inches; yellowish brown (10YR 5/4) silt loam; weak fine subangular blocky structure; friable; common roots; medium acid; clear smooth boundary.

B2t—16 to 28 inches; yellowish brown (10YR 5/6) heavy silt loam with a few pockets of light olive brown (2.5Y 5/4); weak medium subangular blocky structure; friable, slightly plastic and slightly sticky; few roots; thin clay films on all faces of peds in larger cracks; strongly acid; clear smooth boundary.

IIC1—28 to 41 inches; yellowish brown (10YR 5/6) light fine sandy loam; common medium distinct light gray (5Y 7/1) mottles; few thin clay films in large cracks; very strongly acid; clear wavy boundary.

IIC2—41 to 60 inches; yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) heavy fine sandy loam; common medium distinct light gray (5Y 7/1) mottles; friable, slightly sticky and slightly plastic; very strongly acid.

The solum ranges from about 24 to 48 inches in thickness. In the A horizon hue is 10YR or 2.5Y, value is 3 to 5, and chroma is 1 to 4. The A horizon is silt loam or fine sandy loam.

In the B horizon hue is 10YR or 2.5Y, value is 5 or 6, and chroma is 4 to 8. The B2t horizon has mottles in the lower part. The B horizon is silt loam or silty clay loam.

The IIC horizon is similar in color to the B2t horizon. It is loam, sandy loam, or fine sandy loam. The C horizon is gravelly in places.

Mattapex soils are similar to Beltsville, Bourne, Keyport, and Woodstown soils in color and natural drainage. Mattapex soils have a Bt horizon that is less clayey than in Keyport soils. They do not have a fragipan which is characteristic of Beltsville and Bourne soils. The Bt horizon has more silt and less sand than in Woodstown soils.

**MtA—Mattapex fine sandy loam, 0 to 2 percent slopes.** This level soil is mainly at lower elevations along the major rivers in the county. It has a profile similar to the one described as representative of the series, but the surface layer is fine sandy loam.

This soil is easier to work and can be worked earlier in spring than Mattapex silt loam. It has a seasonal high water table. The hazard of erosion is none to slight.

Included with this soil in mapping are areas of soils which are underlain by a substratum of clay or clay loam at a depth of about 48 inches. These areas are mainly adjoining the Potomac River and its tributaries. Also included are small areas of soils that have a thick, loamy sand surface layer.

This soil is suited to most crops if managed properly, and it is suited to sown pasture and trees. Planting can be delayed by seasonal wetness. Yields of tobacco are generally medium to high, and the quality is medium. Seasonal wetness is the major management concern. Good management includes providing artificial drainage by tile lines or ditches, using minimum tillage and cover crops, and using all available crop residue well. Capability unit IIw–5; woodland suitability group 3w3.

**MtB2—Mattapex fine sandy loam, 2 to 5 percent slopes, moderately eroded.** This gently sloping soil is mainly at lower elevations. It has a profile similar to the one described as representative of the series, but the surface layer is fine sandy loam and is moderately eroded.

The water table is seasonally moderately high, but these soils are generally easier to drain and can be worked earlier than other moderately well drained soils that are less sandy. The hazard of further erosion is moderate.

Included with this soil in mapping are small areas of soils which are only slightly eroded and areas of soils which are severely eroded. Also included are areas, mainly along the Potomac River and its tributaries, which are underlain by a substratum of clay or clay loam at a depth of about 48 inches, and areas which have a thick, loamy sand surface layer.

This soil is suited to most crops, sown pasture, and trees. It is not suited to crops that are subject to damage by frost heaving. Yields of tobacco are generally medium to high and the quality is generally medium. Although the water table is seasonally high and drainage is desirable for some crops, controlling further erosion is the major management concern. Practices which retard erosion include constructing interceptors and diversions to reduce runoff from adjacent soils, using minimum tillage and suitable cropping systems, maintaining cover crops much of the year, and using all available crop residue well. Capability unit IIe–36; woodland suitability group 3w3.

**MuA—Mattapex silt loam, 0 to 2 percent slopes.** This level soil is in sizeable areas mainly at lower elevations adjacent to the major rivers and streams. It has the profile described as representative of the series.

This soil has a seasonal high water table. It is harder to work, and planting is generally later in spring, than on Mattapex fine sandy loam, 0 to 2 percent slopes. The hazard of erosion is none to slight.

Included with this soil in mapping are areas of soils which are underlain by a substratum of clay or clay loam at a depth of about 48 inches. These areas are mainly adjoining the Potomac River and its tributaries.

This soil is suited to most crops, to sown pasture, and to trees. It is not suited to crops that are subject to damage by frost heaving. Yields of tobacco on this soil are generally higher but the quality is generally lower than tobacco grown on Mattapex fine sandy loam. Seasonal wetness is the major management concern. Ditches and tile lines are suitable for disposing of excess water. As well as artificial drainage, good management includes minimum tillage, suitable cropping systems, and good use of all available crop residue. Capability unit IIw–1; woodland suitability group 3w3.

**MuB2—Mattapex silt loam, 2 to 5 percent slopes, moderately eroded.** This gently sloping soil is in areas at lower elevations along the major rivers in the county and in a few small isolated places on uplands. Shallow gullies have formed in places and in a few small areas slopes are somewhat steeper than 5 percent.

This soil has a seasonal moderately high water table, but surface drainage is fairly good and artificial drainage is not generally needed. The hazard of further erosion is moderate.

Included with this soil in mapping are small areas of soils that are severely eroded.

This soil is suited to most crops, to sown pasture, and to trees. It is not suited to crops that are subject to damage by frost heaving. Yields of tobacco are generally higher but the quality is generally lower than tobacco grown on Mattapex fine sandy loam. The hazard of further erosion is the major management concern. Practices that retard erosion include constructing interceptors and diversions for the disposal of runoff from adjacent soils; using minimum tillage, a suitable cropping system, and winter cover crops; and using all available crop residue well. Capability unit IIe–16; woodland suitability group 3w3.

**MuC2—Mattapex silt loam, 5 to 10 percent slopes, moderately eroded.** This moderately sloping soil is mainly in areas along the tributaries of the major streams of the county. In practically all areas some surface soil has been lost through erosion. In plowing, part of the subsoil is exposed, which gives a spotted appearance in freshly worked areas.

The hazard of further erosion is severe unless good conservation methods are used. The water table is seasonally moderately high, but surface drainage is good, and additional drainage is not needed for pasture plants and most crops.

Included with this soil in mapping are areas of severely eroded soils.

This soil is suited to most crops, sown pasture, and trees. It is not suited to plants which are easily damaged by frost heaving. Yields of tobacco are generally

medium to high and the quality is generally low to medium. The hazard of further erosion is the major management concern. Practices which retard erosion include planting on the contour, planting clean-tilled and close growing crops in narrow alternate strips that are laid out on the contour, using minimum tillage, using a cropping system that includes close growing crops on each strip for half or more of the time, providing interceptors and diversions in sodded waterways, planting winter cover crops, and using all available crop residue well. Capability unit IIIe–16; woodland suitability group 3w3.

### Othello series

The Othello series consists of poorly drained, nearly level, deep soils. These soils are on low terraces adjacent to some major rivers. They formed in silty deposits that are underlain by older sandy sediment. The native vegetation is wetland hardwoods, but some loblolly pine and pond pine also grow.

In a representative profile, the surface layer and subsurface layer are silt loam. Combined, they are about 13 inches thick. The surface layer is gray and the subsurface layer is light gray and has yellowish brown mottles in the lower part. The subsoil is about 13 inches thick. It is light gray heavy silt loam, that has yellowish brown mottles. The underlying material, between depths of 26 and 60 inches, is light gray fine sandy loam that has yellowish brown and strong brown mottles.

Othello soils are easy to work at a favorable moisture content. However, the seasonal water table is high and the soils are wet for long periods. These soils have a high available water capacity, and permeability is moderately slow. Artificial drainage is needed for most crops. Poor internal drainage and a high water table severely limit these soils for nonfarm uses.

Representative profile of Othello silt loam, in a level wooded area 3/4 mile south of Drayden:

A1—0 to 2 inches; gray (5Y 5/1) silt loam; very weak fine and medium granular structure; very friable, slightly plastic; many roots; extremely acid; abrupt wavy boundary.

A2g—2 to 13 inches; light gray (5Y 7/1) silt loam; few fine prominent mottles of yellowish brown (10YR 5/6); very weak coarse granular structure; very friable, slightly plastic; common roots; extremely acid; clear smooth boundary.

B2tg—13 to 26 inches; light gray (5Y 7/1) heavy silt loam; many medium prominent mottles of yellowish brown (10YR 5/6); weak fine and medium subangular blocky structure; firm, slightly sticky and slightly plastic; few roots; thin light gray (5Y 6/1) discontinuous clay films; extremely acid; clear wavy boundary.

IIC1—26 to 36 inches; light gray (5Y 6/1) fine sandy loam; common medium faint light yellowish brown (2.5Y 6/4) mottles; massive; friable; few roots; extremely acid; gradual smooth boundary.

IIC2—36 to 53 inches; light gray (5Y 7/2) heavy fine sandy loam; common medium prominent yellowish brown (10YR 5/8) mottles; massive; friable, slightly sticky and slightly plastic; no roots; extremely acid; gradual boundary.

IIC3—53 to 60 inches; light gray (5Y 6/1) fine sandy loam; many medium prominent strong brown (7.5YR 5/6) mottles; massive; very friable; very strongly acid.

The solum ranges from about 24 to 40 inches in thickness. In the A horizon hue is 10YR to 5Y, value is 4 to 7, and chroma is 0 to 2. Undisturbed A2 horizons are highest in value. The A horizon is fine sandy loam or silt loam.

In the B horizon hue is 10YR to 5Y, value is 5 to 7, and chroma is 0 to 1. Mottles have hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 3 to 8. The B horizon is silt loam or silty clay loam.

In the C horizon color is similar to that of the B horizon. This horizon is fine sandy loam or coarser. Fine smooth pebbles are present in the C horizon in some profiles.

Othello soils are similar to Bibb, Elkton, Fallsington, and Leonardtown soils in color and natural drainage. They have a Bt horizon that is not present in the Bibb soils. Othello soils are not as clayey as Elkton soils and do not have a fragipan in the lower part of the B horizon as do the Leonardtown soils.

**On—Othello fine sandy loam.** This level soil is mainly in areas at lower elevations along the major rivers in the county. It has a profile similar to the one described as representative of the series, but the surface layer is fine sandy loam.

The water table is at or near the surface for long periods, and undrained areas are seasonally ponded. The hazard of erosion is none to slight.

If artificially drained, this soil is well suited to some crops, sown pasture, and trees. It is not well suited to tobacco or crops which need good soil aeration. A small amount of tobacco is grown on this soil. Wetness is the major management concern. This soil is not difficult to drain and can be drained by tile lines or ditches if good drainage outlets are available. Other than artificial drainage, good management includes cropping sequences, minimum tillage, and good use of all available crop residue. Capability unit IIIw–6; woodland suitability group 3w4.

**Ot—Othello silt loam.** This level soil is in sizeable areas, mainly at lower elevations bordering on the major rivers of the county. It has the profile described as representative of the series.

This soil is not as easy to drain or work as Othello fine sandy loam. The water table is at or near the surface for long periods. Some areas are seasonally ponded. The hazard of erosion is none to slight.

If artificially drained, this soil is well suited to some crops, sown pasture, and trees. It is not well suited to tobacco or crops which need good soil aeration. Little or no tobacco is grown on this soil. Wetness is the major management concern. Where good drainage outlets are available, the soil is moderately difficult to drain, either by ditches or tile drains. Other than artificial drainage, good management includes cropping sequences, minimum tillage, and good use and management of all crop residue. Capability unit IIIw–7; woodland suitability group 3w4.

## Rumford series

The Rumford series consists of somewhat excessively drained, level to moderately sloping, deep soils. These soils are on uplands. They formed in stratified sandy marine deposits containing small amounts of silt and clay and variable amounts of fine gravel. The native vegetation is chiefly mixed hardwoods and Virginia pine.

In a representative profile the surface layer is about 8 inches thick. It is loamy sand. It is grayish brown in the thinner upper part and light olive brown in the lower part. The subsoil is about 24 inches thick. It is yellowish brown sandy loam in the upper part, grading into strong brown sandy loam in the lower part. The underlying material, between depths of 32 and 60 inches, is strong brown and yellowish brown loamy sand.

Rumford soils are very easy to work. Permeability is rapid, and the available water capacity is low to moderate. These soils warm quickly in spring and are one of the earliest soils in the county to be ready for planting. Other than slope in some places, these soils have few limitations for nonfarm use.

Representative profile of Rumford loamy sand, 0 to 5 percent slopes, in a wooded area about 4 miles east of Leonardtown:

A1—0 to 1 inch; grayish brown (2.5Y 5/2) loamy sand; very weak medium granular structure; very friable, nonsticky; very strongly acid; clear smooth boundary.

A2—1 to 8 inches; light olive brown (2.5Y 5/4) and grayish brown (2.5Y 5/2) loamy sand; very weak coarse granular structure; very friable, nonsticky and nonplastic, few roots; very strongly acid; clear smooth boundary.

B1—8 to 17 inches; yellowish brown (10YR 5/6) sandy loam; very weak medium and coarse subangular blocky structure; very friable, nonsticky and nonplastic; few roots; very strongly acid; clear smooth boundary.

B2t—17 to 32 inches; strong brown (7.5YR 5/8) sandy loam; very weak medium and coarse subangular blocky structure; very friable, slightly sticky and slightly plastic; very few roots; very strongly acid; clear smooth boundary.

C1—32 to 48 inches; strong brown (7.5YR 5/8) loamy sand; single grained; loose, nonsticky and nonplastic; very strongly acid; gradual smooth boundary.

C2—48 to 60 inches; yellowish brown (10YR 5/8) loamy sand; single grained; very friable, nonsticky and nonplastic; very strongly acid.

The solum ranges from about 28 to 40 inches in thickness. In places the material in any horizon is as much as 15 percent fine, smooth gravel. In the A horizon hue is 10YR or 2.5Y, value is 4 to 6, and chroma is 2 to 4. The value of 6 is confined to the A2 horizon.

In the B horizon hue is 10YR to 5YR, value is 4 or 5, and chroma is 4 to 8. The B horizon is sandy loam or light sandy clay loam.

The C horizon is variegated with colors and is commonly stratified. It is generally coarser than the B horizon.

Rumford soils are similar to Westphalia soils but the sands are not as uniform in size as the Westphalia soils. Rumford soils are coarser textured throughout their profile than Westphalia soils.

**RuB—Rumford loamy sand, 0 to 5 percent slopes.** This level to gently sloping soil is mainly on uplands and in a few areas at lower elevations. It has the profile described as representative of the series. The surface layer contains a considerable amount of medium and coarse sand.

This soil is very easy to work and it can be worked and planted earlier in the year than soils that are not so sandy or well drained. It is somewhat droughty in seasons of low or poorly distributed rainfall. The hazard of erosion is slight to moderate.

Included with this soil in mapping are a few areas of soils where the surface layer is thin and plowing has exposed some subsoil material.

This soil is suited to cultivated crops, sown pasture, and trees. Tobacco grown on this soil is generally of very high quality, although yields may be low. Droughtiness and the moderate hazard of erosion are the major management concerns. Practices which conserve moisture and retard erosion include using minimum tillage and supplemental irrigation in seasons of low or poorly distributed rainfall, planting on the contour, growing clean-tilled and close growing crops in narrow alternate strips that are laid out on the contour, planting winter cover crops, and using all available crop residue well. Capability unit IIs–4; woodland suitability group 3o2.

**RuC2—Rumford loamy sand, 5 to 10 percent slopes, moderately eroded.** This moderately sloping soil is on uplands. It has lost some of its surface layer through erosion.

This soil warms up early in the spring, is very easy to work, and can be planted earlier than soils that are less sandy. It is somewhat droughty in seasons of low or poorly distributed rainfall. The hazard of further erosion is severe unless conservation measures are taken.

Included with this soil in mapping are some severely eroded spots where plowing turns up some of the finer textured subsoil material. Also included are small areas of the excessively drained, sandy Evesboro soils which are so intricately mixed with this Rumford soil that they cannot be mapped separately.

This soil is suited to most crops, to pasture, and to trees. Tobacco grown on this soil is generally of high or very high quality and yields are generally low to medium. Although this soil is seasonally droughty and supplemental irrigation is desirable, the hazard of further erosion is the main management concern. Practices which retard erosion include growing crops in narrow alternate strips that are laid out on the contour, using minimum tillage and winter cover crops, providing interceptors and diversions in sodded waterways, and using all available crop residue well. Capability unit IIIe–33; woodland suitability group 3o2.

### Sassafras series

The Sassafras series consists of well drained, nearly level to strongly sloping, deep soils. These soils are on uplands and on lower terraces bordering major rivers. They formed in loose deposits of loamy and sandy sediment of marine and alluvial origin. The native vegetation is mixed hardwoods, mainly oaks, but Virginia pine and loblolly pine grow in places.

In a representative profile the surface layer is brown sandy loam about 9 inches thick. The upper 12 inches of the subsoil is yellowish brown loam. The lower 19 inches is brown sandy clay loam grading into strong brown sandy loam. The underlying material, between depths of 40 and 70 inches, is strong brown gravelly sandy loam grading into brownish yellow loamy sand.

Sassafras soils are easy to work, and they warm up quickly in spring. They have a moderate to high available water capacity and are moderately permeable. These soils are among the most productive in the county. They are suited to practically all uses except where limited by slope, erosion, and, in a few places, an underlying discontinuous iron pan, which may act as an impermeable barrier below septic disposal field tile lines, thus causing down slope pollution.

Representative profile of Sassafras sandy loam, 0 to 2 percent slopes, in a cultivated field about 3/4 mile northeast of Laurel Grove:

Ap—0 to 9 inches; brown (10YR 5/3) sandy loam; very fine subangular blocky structure; friable, sticky, slightly plastic; few roots; strongly acid; abrupt smooth boundary.

B1—9 to 21 inches; yellowish brown (10YR 5/4) loam; very fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few roots; strongly acid; clear smooth boundary.

B2t—21 to 32 inches; brown (7.5YR 5/4) sandy clay loam; weak, medium, subangular blocky structure; friable, slightly sticky, slightly plastic; thin clay films; very few roots; very strongly acid; clear smooth boundary.

B3—32 to 40 inches; strong brown (7.5YR 5/6) sandy loam; weak, thick platy structure and weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; thin strong brown (7.5YR 5/6) clay films in large cracks; very few roots; very strongly acid; abrupt smooth boundary.

C1—40 to 52 inches; strong brown (7.5YR 5/6) gravelly sandy loam; single grained; friable, slightly sticky, nonplastic; very strongly acid, 3 percent light yellowish brown (10YR 6/4) clay balls; very strongly acid; clear smooth boundary.

IIC2—52 to 70 inches; brownish yellow (10YR 6/8) loamy sand; single grained; friable, nonsticky, nonplastic; 5 percent by volume strong brown (7.5YR 5/8) small gravel; extremely acid.

The solum ranges from about 25 to 45 inches in thickness. Some profiles contain as much as 10 percent by volume of smooth quartz pebbles in the A and B horizons and as much as 20 percent in the C horizon. In the A horizon hue is 10YR or 7.5YR, value is 3 to 5, and chroma is 1 to 4. The lowest chroma are confined to A1 horizons less than 4 inches thick. The A horizon is loam or sandy loam.

In the B horizon hue is 10YR, 7.5YR, or 5YR; value is 5 or 6; and chroma is 4 to 8. The Bt horizon is generally sandy clay loam but ranges to heavy sandy loam and heavy loam.

The C horizon is similar to the B horizon in color but it ranges from sandy loam to sand. In some profiles the C horizon is moderately hard and brittle when dry.

Sassafras soils are similar to Chillum, Marr, Matapeake, and Rumford soils. They contain less silt and more sand in the solum than Chillum and Matapeake soils. Sassafras soils have more clay in the Bt horizon than Rumford soils. They contain more medium and coarse sand and weatherable minerals than Marr soils.

**SaA—Sassafras sandy loam, 0 to 2 percent slopes.** This nearly level soil is in sizeable areas on uplands and at lower elevations. It has the profile described as representative of the series.

This soil can be worked and planted earlier in spring than soils that are less sandy or less well drained. The hazard of erosion is none to slight.

Included with this soil in mapping are areas of soils where the subsoil is redder than is described for the series. Also included are areas on uplands where there is an underlying discontinuous iron pan which serves as an impermeable barrier below septic tank disposal tile lines and could cause down slope pollution.

This soil is well suited to cultivated crops, sown pasture, and trees. It is among the best soils in the county for growing tobacco. The yield and the quality of tobacco are generally high. This soil requires no special conservation practices, and, if managed properly, crops can be grown year after year. Good management includes using minimum tillage, winter cover crops, and cropping sequences; keeping plant nutrients high; and using all available crop residue well. Capability unit I–5; woodland suitability group 3o2.

**SaB2—Sassafras sandy loam, 2 to 5 percent slopes, moderately eroded.** This gently sloping soil is mainly on uplands and on lower terraces above major rivers. It has a profile similar to the one described as representative of the series, but the surface layer is thinner. In places plowing has exposed some of the subsoil material.

This soil can be planted earlier in spring than soils that are less sandy or less well drained. The hazard of further erosion is moderate.

Included with this soil in mapping are areas of soils which are severely eroded and are cut by shallow gullies, and areas of soils that have a surface layer and subsoil which are redder than is described for the series. Also included are small areas on uplands where the soil is underlain by a discontinuous iron pan which serves mainly as an impermeable barrier beneath septic disposal tile lines, which could cause down slope pollution.

This soil is well suited to cultivated crops, sown pasture, and trees. It is among the best soils in the county for growing tobacco. The yield and the quality

of tobacco are generally high. The hazard of further erosion is the major management concern. Practices which retard erosion include planting on the contour; using alternate strips of clean-tilled and close growing crops; using minimum tillage, a suitable cropping system, and winter cover crops; and using all available crop residue well. Capability unit IIe–5; woodland suitability group 3o2.

**SaC2—Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded.** This moderately sloping soil is on uplands. It has lost part of the surface layer through erosion. Plowing exposes subsoil material in places, giving the surface a spotty appearance.

This soil warms up quickly in spring and can be worked and planted earlier than soils that are less sandy or less well drained. The hazard of further erosion is severe (fig. 13).

Included with this soil in mapping are small areas of soils which have a loam surface layer, and areas of soils which have a redder subsoil than is described for the series. Also included are small areas of Chillum loam which are either too intermixed or too small to map separately.

This soil is well suited to common crops, sown pasture, and trees. The yield and the quality of tobacco grown on this soil are generally high. The hazard of further erosion is the major management concern. Practices which retard erosion include planting clean-tilled and close growing crops in narrow alternate strips that are laid out on the contour, and which use a close growing crop on each strip for half or more of the time; using winter cover crops and minimum tillage; and using all available crop residue well. Capability unit IIIe–5; woodland suitability group 3o2.

**SaC3—Sassafras sandy loam, 5 to 10 percent slopes, severely eroded.** This moderately sloping soil is on uplands. It has lost most of the original surface layer and, in places, part of the subsoil through erosion. The present surface layer is somewhat sticky and in places the soil is difficult to cultivate. Gullies have formed in many places. The hazard of further erosion is severe.

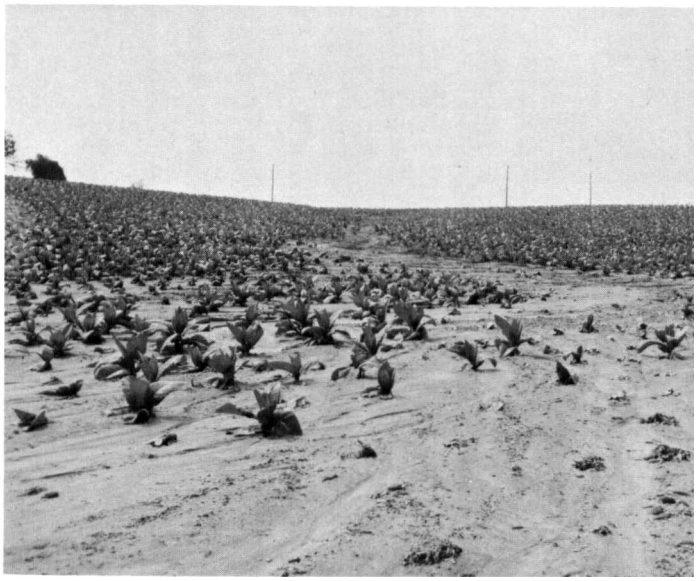

*Figure 13.*—Tobacco ruined and soil washed in an unprotected area of Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded.

This soil is suited to some crops, sown pasture, and trees. It can be used only occasionally for cultivated crops. The hazard of further severe erosion is the major management concern. Practices which retard further erosion include growing clean-tilled crops at long intervals in narrow strips laid out on the contour, using a cropping system that includes close growing crops or pasture, using minimum tillage, and using all available crop residue well. Even if erosion is controlled, this soil is better suited to hay, pasture, or woodland. Capability unit IVe–5; woodland suitability group 3o2.

**SaD2—Sassafras sandy loam, 10 to 15 percent slopes, moderately eroded.** This strongly sloping soil is on uplands. Most of the acreage is in woodland. Where the land has been cleared, moderate amounts of surface soil have been lost through erosion. The hazard of further erosion is severe.

This soil is suited to a few cultivated crops, to pasture, or to trees. Tobacco, where grown, is generally of high quality, although the quantity may be medium. The severe hazard of erosion is the major management concern. Practices which retard erosion include growing clean-tilled crops at long intervals in narrow strips laid out on the contour, using a cropping system that includes close growing crops or pasture, using minimum tillage, and using all available crop residue well. This soil is better suited to hay, pasture, or woodland than to cultivated crops, even if erosion is controlled. Capability unit IVe–5; woodland suitability group 3o2.

**SaD3—Sassafras sandy loam, 10 to 15 percent slopes, severely eroded.** This strongly sloping soil is on uplands. The present surface layer consists mostly of material formerly in the subsoil. Many gullies are present. The hazard of further erosion is severe.

This soil is poorly to very poorly suited to tilled crops. It is best suited to pasture, limited hay production, and woodland. Most of the acreage is in woodland. Applying practices to safely till this soil is not generally economically feasible. Practices which are beneficial to pasture or hay production include using diversions and sodded waterways and preventing overgrazing, which damages sod and promotes erosion. Capability unit VIe–2; woodland suitability group 3o2.

**SfA—Sassafras loam, 0 to 2 percent slopes.** This nearly level soil is on uplands and at lower elevations. It has a profile similar to the one described as representative of the series, but the surface layer is loam; the soil is also a little higher in silt and the subsoil is generally a little higher in clay. The hazard of erosion is none to slight.

This soil is well suited to cultivated crops, sown pasture, and woodland. Yields of tobacco are generally high, although the quality is generally not as high as on Sassafras sandy loam. This soil requires no special conservation practices and responds well to good management. Good management includes using minimum tillage and winter cover crops, keeping plant nutrients high, using cropping sequences, and using all available crop residue well. Capability unit I–4; woodland suitability group 3o2.

**SfB2—Sassafras loam, 2 to 5 percent slopes, moderately eroded.** This soil has a profile similar to the one

described as representative of the series, but the surface layer is loam; the soil is also a little higher in silt and the subsoil is generally higher in clay. A moderate amount of surface soil has been lost through erosion.

The hazard of further erosion is moderate.

Included with this soil in mapping are areas of soils that are only slightly eroded and a few areas that are severely eroded. Also included on the uplands are small areas of a soil that is less permeable and has a somewhat compact gravelly or sandy subsoil.

This soil is well suited to cultivated crops, sown pasture, and trees. Yields of tobacco are generally high but the quality is generally not as high as on Sassafras sandy loam. The hazard of further erosion is the major management concern. Practices that retard erosion include contour cropping, minimum tillage, use of a suitable cropping system, winter cover crops, and good use of all available crop residue. Capability unit IIe–4; woodland suitability group 3o2.

**SmC2—Sassafras–Chillum complex, 6 to 12 percent slopes, moderately eroded.** The moderately sloping to strongly sloping soils in this complex are on uplands.

This complex consists of intricately mixed areas of Sassafras and Chillum soils. It is about 65 percent Sassafras soils and 35 percent Chillum soils. Most areas, especially on the steeper slopes, are very gravelly and some areas are quite compact. A moderate amount of surface soil has been lost through erosion and in places shallow gullies have formed. The hazard of further erosion is moderate to severe.

Included with these soils in mapping are small areas of sandy soils that are similar to Evesboro soils.

These soils are suited to some crops, to sown pasture, and to trees. Yields and quality of tobacco grown on these soils range from medium to high. In places these soils are somewhat droughty during periods of low or poorly distributed rainfall, but the hazard of further erosion is the major management concern. Practices which retard erosion include planting on the contour, growing clean-tilled and close growing crops in narrow strips that are laid out on the contour, using minimum tillage, providing supplemental irrigation when needed, using winter cover crops, and using all available crop residue well. Capability unit IIIe–4; woodland suitability group 3o2.

**SmC3—Sassafras–Chillum complex, 6 to 12 percent slopes, severely eroded.** The moderately sloping to strongly sloping soils of this complex are in areas on uplands.

This complex consists of intricately mixed areas of Sassafras and Chillum soils. It is about 65 percent Sassafras soils and 35 percent Chillum soils. Most areas, especially on the steeper slopes, are very gravelly, and some areas are quite compact. In many areas the surface layer has been completely lost through erosion. Gullies have formed in many places. The hazard of further erosion is severe.

Included with these soils in mapping are areas of sandy soils that are similar to Evesboro soils.

These soils are suited to some crops, to sown pasture, and to trees. They are seldom used for tobacco. Where tobacco is grown, yields are generally medium and the quality is medium to high. These soils are somewhat droughty in periods of low or poorly distributed rainfall, but the hazard of further severe erosion is the major management concern. Practices which retard erosion include growing clean-tilled crops at long intervals in a cropping system that includes close growing crops or pasture plants, planting on the contour, using minimum tillage and winter cover crops, and using all available crop residue well. Even if erosion is controlled, these soils are beter suited to hay, pasture, or woodland. Capability unit IVe–5; woodland suitability group 3o2.

## Tidal marsh

**Tm—Tidal marsh** consists of many small areas and a few fairly large, level areas that are periodically covered by tidal water. In St. Marys County most areas of Tidal marsh border the Chesapeake Bay, the Potomac River, and the St. Marys and Patuxent Rivers, and they are along the lower ends of streams. The water varies in salinity from almost fresh water to strongly brackish water. The soil material ranges from sand to clay, and in places it is peaty or mucky.

Tidal marsh commonly supports only marsh grasses and sedges and a few other salt tolerant herbs and low shrubs. It is not suited to crops, pasture, or trees. It is suitable for use as habitat for wetland wildlife and, in places where channels are deep enough, it is suitable for fishing, boating, and hunting migratory water fowl. Capability unit VIIIw–1; not assigned to a woodland suitability group.

## Westphalia series

The Westphalia series consists of well drained, gently sloping to moderately sloping, very deep soils. These soils are on uplands. They are mostly on the Patuxent side of the county. They formed in old deposits containing sands of remarkably uniform size. The native vegetation is mixed upland hardwoods, but Virginia pine is in rewooded areas.

In a representative profile the surface layer is brown fine sandy loam about 3 inches thick. The subsurface layer is yellowish brown fine sandy loam about 5 inches thick. The upper 8 inches of the subsoil is strong brown fine sandy loam that is friable and slightly sticky. The lower 10 inches of the subsoil is strong brown friable heavy fine sandy loam. The underlying material, between depths of 26 and 60 inches, is brownish yellow, stratified loamy fine sand and fine sand that is very friable.

Westphalia soils are easy to work and are among the earliest to warm up in spring and be ready for planting. The available water capacity is moderate to high. Permeability is moderate to moderately rapid. These soils are not naturally very fertile, but they are well suited to tobacco production. Slope and the hazard of erosion are the major limitations for nonfarm use.

Representative profile of Westphalia fine sandy loam, 6 to 12 percent slopes, moderately eroded, in a forested area on Golden Beach Road, about two miles west of Golden Beach:

A1—0 to 3 inches; brown (10YR 4/3) fine sandy loam; very weak medium granular structure; very friable, nonsticky and non-

plastic; many roots; very strongly acid; abrupt smooth boundary.

A2—3 to 8 inches; yellowish brown (10YR 5/4) fine sandy loam; very weak medium granular structure; very friable, nonsticky and nonplastic; few roots; very strongly acid; abrupt smooth boundary.

B1—8 to 16 inches; strong brown (7.5YR 5/6) fine sandy loam; pockets of light yellowish brown (2.5Y 6/4) mixed in; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few roots; thin patchy clay films; very strongly acid; gradual smooth boundary.

B2t—16 to 26 inches; strong brown (7.5YR 5/6) heavy fine sandy loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few roots; thin patchy clay films; very strongly acid; gradual smooth boundary.

C—26 to 60 inches; stratified brownish yellow (10YR 6/8) loamy fine sand and fine sand; single grained; very friable, nonsticky and nonplastic; very few roots; very strongly acid.

The solum ranges from about 20 to 36 inches in thickness. In the A horizon hue is 10YR, value is 3 to 5, and chroma is 2 to 4. In undisturbed A1 horizons less than 6 inches thick value is 3.

In the B horizon hue is 10YR or 7.5YR, value is 4 to 6, and chroma is 6 or 8. The B2t horizon is as much as 10 inches thick and is heavy fine sandy loam or very fine sandy loam.

In the C horizon hue is 10YR or 2.5Y; value and chroma are higher than in the B horizon and may be variegated or streaked. The C horizon is fine sand, loamy fine sand, or loamy very fine sand.

Westphalia soils are similar to Marr and Rumford soils. They have a thinner, finer textured A horizon than Rumford soils and the sand throughout is finer and more uniform in size. The Bt horizon in Westphalia soils is thinner and contains less clay than that of Marr soils.

**WeB2—Westphalia fine sandy loam, 2 to 6 percent slopes, moderately eroded.** This gently sloping soil is on uplands, mainly along the northeastern side of the county. In practically all cleared areas some surface soil has been lost through erosion. The hazard of further erosion is moderate.

Included with this soil in mapping are a few small areas where slope is less than 2 percent.

This soil is well suited to most cultivated crops, to pasture, and to trees. It is among the best soils in the county for the production of tobacco. The yields and the quality of tobacco are generaliy high to very high. The moderate hazard of further erosion is the major management concern. Practices which retard erosion include planting on the contour; using alternate strips of clean-tilled and close growing crops; using minimum tillage, suitable cropping systems, and winter cover crops; and using all available crop residue well. If erosion is controlled, most crops can be grown year after year. Capability unit IIe–5; woodland suitability group 3o2.

**WeC2—Westphalia fine sandy loam, 6 to 12 percent slopes, moderately eroded.** This moderately sloping soil is on uplands, mainly in the northeastern part of the county. It has the profile described as representative of the series. Some surface soil has been lost through erosion. Shallow gullies extend into the subsoil in many places.

This is one of the most potentially erodible soils in the county. The hazard of further erosion is moderate to severe.

This soil is suited to crops, sown pasture, and trees. It is especially well suited to tobacco. The yields and the quality are generally high. The hazard of erosion is the major management concern. Practices which retard erosion and conserve moisture include diversion terraces, sodded waterways, contour stripcropping, a cropping system that includes close growing crops on each strip for half or more of the time, and good use of all available crop residue. Capability unit IIIe–5; woodland suitability group 3o2.

**WeC3—Westphalia fine sandy loam, 6 to 12 percent slopes, severely eroded.** This moderately sloping soil is on uplands, mainly in the northeastern part of the county. This soil has lost most of the surface layer through erosion. Gullies are common and some have cut into the loose underlying material. Many areas were formerly farmed but have now been let grow back to woods. In areas that are now farmed, plowing turns up subsoil material.

This soil is highly erodible. The hazard of further erosion is severe.

This soil is suited to some crops, sown pasture, and trees. Little tobacco is grown on this soil, but where it is grown, it is generally of very high quality. The yields are generally somewhat lower than on other Westphalia soils. The hazard of further erosion is the major management concern. Practices which retard erosion include growing clean-tilled crops at long intervals, using a cropping system that includes close growing crops or pasture plants, growing clean-tilled crops in narrow strips that are laid out on the contour, using minimum tillage and winter cover crops, and using all available crop residue well. Even if erosion is controlled, this soil is marginal for clean-tilled crops. It is better suited to hay, pasture, or woodland. Capability unit IVe–5; woodland suitability group 3r4.

## Woodstown series

The Woodstown series consists of moderately well drained, level to moderately sloping, deep soils. These soils are on uplands and on low terraces bordering major rivers. They formed in loamy sediment containing moderate amounts of silt and clay. The native vegetation is mixed hardwoods that can tolerate some wetness, and some loblolly pine.

In a representative profile the surface layer is light olive brown sandy loam about 7 inches thick. The subsurface layer is light yellowish brown sandy loam 8 inches thick. The subsoil, about 25 inches thick, is sandy loam in the upper part grading into light sandy clay loam and sandy loam in the lower part. It is light olive brown and has light gray, strong brown and grayish brown mottles in the lower part. The under-

lying material, between depths of 40 and 60 inches, is light gray, mottled heavy sandy loam.

Woodstown soils are easy to work, but they have a seasonal water table that rises to within a depth of about 2 feet. Wetness generally prevents early plowing of the soil and early planting of crops. These soils have a moderate available water capacity. Permeability is moderate. Seasonal wetness limits this soil for some nonfarm uses.

Representative profile of Woodstown sandy loam, 0 to 2 percent slopes, in a wooded area, ¾ mile north of Avenue:

A1—0 to 7 inches; light olive brown (2.5Y 5/4) sandy loam; weak fine granular structure; friable; many roots; very strongly acid; clear wavy boundary.

A2—7 to 15 inches; light yellowish brown (2.5Y 6/4) sandy loam; weak medium granular structure; friable, slightly sticky; common roots; very strongly acid to extremely acid; clear smooth boundary.

B1—15 to 22 inches; light olive brown (2.5Y 5/6) sandy loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; common roots; extremely acid; clear smooth boundary.

B2t—22 to 36 inches; light olive brown (2.5Y 5/6) light sandy clay loam; common medium distinct mottles of light gray (10YR 6/1) and a few medium distinct mottles of strong brown (7.5YR 5/8); weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few roots; extremely acid; clear smooth boundary.

B3—36 to 40 inches; light olive brown (2.5Y 5/6) sandy loam; common medium distinct mottles of grayish brown (10YR 5/2) and strong brown (7.5YR 5/8); very weak medium subangular blocky structure; friable; very few fine roots; abrupt smooth boundary.

Cg—40 to 60 inches; gray to light gray (5Y 6/1) heavy sandy loam; common fine prominant mottles of yellowish brown (10YR 5/4) and strong brown (7.5YR 5/8); massive; friable, slightly sticky and slightly plastic; about 15 percent rounded gravel; extremely acid.

The solum ranges from about 25 to 45 inches in thickness. Hue generally is 10YR or 2.5Y through the profile, but in places in the C horizon hue is 5Y.

In the A horizon value is 4 to 6 and chroma is 1 to 4.

In the B horizon value is 5 or 6 and chroma is 4 to 8. This horizon has mottles that have chroma of 2 or less everywhere in the lower part. In places, mottles high in chroma are anywhere in this horizon. The B horizon ranges from sandy loam to sandy clay loam.

In the C horizon value generally is higher and chroma is lower than in the B horizon. In some profiles this horizon is not mottled. The C horizon ranges from sandy loam to loamy sand. The profile is as much as 20 percent smooth gravel in the C horizon.

Woodstown soils are similar to Keyport and Mattapex soils in color and natural drainage. They have less clay in the Bt horizon than the Keyport soils. The solum of the Woodstown soils is less silty and more sandy than that of the Mattapex soils.

**WsA—Woodstown sandy loam, 0 to 2 percent slopes.** This nearly level soil is on uplands and on lower terraces bordering major rivers. It has the profile described as representative of the series.

This soil is easy to work at the right moisture content. It has a seasonally high water table which delays planting in spring in some years. The hazard of erosion is none to slight.

Included with this soil in mapping are areas of soils that have a surface layer of loam.

This soil is well suited to most crops if drainage is provided. It is also well suited to sown pasture and trees. It is not suited to plants that are subject to damage by frost heaving. Tobacco yields are generally medium to high but the quality is generally only medium. Improving drainage is the major management concern. Good management practices include providing artificial drainage by tile lines or ditches, using minimum tillage and cover crops, and using all available crop residue well. Capability unit IIw–5; woodland suitability group 2w3.

**WsB—Woodstown sandy loam, 2 to 5 percent slopes.** This gently sloping soil is on uplands and on lower terraces along the major rivers.

This soil is easy to work at the right moisture content. It has a seasonally moderately high water table. The hazard of erosion is moderate.

Included with this soil in mapping are areas of soils that have a surface layer of loam. Also included are areas that are moderately eroded.

This soil is suited to most crops, to sown pasture, and to trees. It is not well suited to plants that are subject to damage by frost heaving. Tobacco yields are generally medium to high but the quality is generally only medium. Although drainage is needed for some crops, the hazard of erosion is the major management concern. Practices which retard erosion include constructing interceptors and diversions to reduce runoff from adjacent soils; using minimum tillage, a suitable cropping system, and winter cover crops; and using available crop residue well. Capability unit IIe–16; woodland suitability group 2w3.

**WsC2—Woodstown sandy loam, 5 to 10 percent slopes, moderately eroded.** This moderately sloping soil is mainly at lower elevations and in some small areas on uplands. It has lost some of its original surface layer through erosion. In places shallow gullies have formed. In places plowing has exposed subsoil material giving freshly worked areas a spotted appearance.

The water table is seasonally moderately high, but surface drainage is good. This soil generally warms up earlier in spring and can be planted sooner than other moderately well drained soils that are less sandy. The hazard of further erosion is severe. Included with this soil in mapping are some severely eroded areas and some small areas which have gravel on the surface.

This soil is suited to most crops, sown pasture, and trees. It is not suited to crops easily damaged by frost heaving. Tobacco is grown in some areas. The yields are generally medium to high but the quality is generally only medium. The hazard of further erosion is the major management concern. Practices which re-

tard erosion include growing crops in narrow alternate strips that are laid out on the contour, using a cropping system that includes close growing crops on each strip for half or most of the time, using minimum tillage, providing interceptors and diversions and sodded waterways, using winter cover crops, and using all available crop residue well. Capability unit IIIe–36; woodland suitability group 2w3.

## Use and management of the soils

This section explains the system of capability classification used by the Soil Conservation Service, gives general management practices, and gives estimated yields of principal crops and pasture grasses grown in the county. It also contains information on the use and management of the soils in the survey area as woodland, for wildlife, in engineering, for town and county planning, and for recreational development.

To determine the capability classification of a given soil, refer to the Guide to Mapping Units at the back of this survey. The use and management of individual soils for crops and pasture are discussed in the section "Descriptions of the soils."

### Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops requiring special management.

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

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

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

Class I soils have few limitations that restrict their use.

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

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

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife.

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 plants and restrict their use to recreation, wildlife, water supply, or to esthetic purposes.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold to 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–6. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

The capability units in St. Marys County are described in the following list. They are not numbered consecutively within the subclass because not all units in the state wide system are represented in this county.

Class I. Soils having few limitations to restrict their use (no subclasses).

Unit I–4.—Deep, well drained, nearly level, medium textured soils.

Unit I–5.—Deep, well drained, level or nearly level, moderately coarse textured soils.

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

Subclass IIe.—Soils subject to moderate erosion unless protected.

Unit IIe–4.—Deep, well drained, gently sloping, medium textured soils.
Unit IIe–5.—Deep, well drained, gently sloping, moderately coarse textured soils.
Unit IIe–13.—Moderately deep to deep, moderately well drained, gently sloping, medium textured soils that have a slowly permeable or very slowly permeable subsoil. Some have a fragipan in the lower part of the subsoil.
Unit IIe–16.—Deep, moderately well drained, gently sloping, medium textured soils.
Unit IIe–36.—Moderately deep to deep, moderately well drained, gently sloping, moderately coarse textured soils that have a slowly permeable to moderately slowly permeable subsoil. Some have a fragipan in the lower part of the subsoil.

Subclass IIw.—Soils moderately limited by excess water.
Unit IIw–1.—Level or nearly level, moderately well drained, medium textured soils that have a moderately permeable to moderately slowly permeable subsoil.
Unit IIw–5.—Level or nearly level, moderately well drained, moderately coarse textured soils that have a moderately permeable subsoil. Some have a fragipan in the lower part of the subsoil.
Unit IIw–7.—Deep, level or nearly level, moderately well drained, alluvial soils.
Unit IIw–8.—Deep, level or nearly level, moderately well drained, medium textured soils that have a slowly permeable to very slowly permeable subsoil.
Unit IIw–9.—Deep, moderately well drained, level or nearly level soils that have a slowly permeable subsoil.

Subclass IIs.—Soils moderately limited by slow permeability.
Unit IIs–4.—Deep, somewhat excessively drained, level to gently sloping, coarse textured soils.
Unit IIs–7.—Moderately deep to deep, well drained, medium textured soils that have a very hard substratum.

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

Subclass IIIe.—Soils subject to severe erosion if cultivated and not protected.
Unit IIIe–4.—Deep, well drained, moderately sloping, medium textured soils.
Unit IIIe–5.—Deep, well drained, moderately sloping, moderately coarse textured soils.
Unit IIIe–7.—Moderately deep, well drained, moderately sloping, medium textured soil over a very hard substratum.
Unit IIIe–9.—Deep, well drained, moderately sloping, medium textured soils over a very hard substratum.
Unit IIIe–13.—Moderately deep to deep, moderately well drained, gently sloping to moderately sloping, medium textured soils that have a slowly permeable to very slowly permeable subsoil. Some have a fragipan in the lower part of the subsoil.
Unit IIIe–16.—Deep, moderately well drained, moderately sloping, medium textured soils.
Unit IIIe–33.—Deep, somewhat excessively drained, moderately sloping, coarse textured soils.
Unit IIIe–36.—Deep, moderately well drained, moderately sloping, medium textured soils that have a moderately permeable to moderately slowly permeable subsoil.

Subclass IIIw.—Soils severely limited by excess water.
Unit IIIw–6.—Deep, poorly drained, nearly level, moderately coarse textured soils that have a moderately permeable or moderately slowly permeable subsoil.
Unit IIIw–7.—Deep, poorly drained, nearly level, medium textured soils that have a moderately permeable to moderately slowly permeable subsoil.
Unit IIIw–9.—Deep, poorly drained, nearly level, medium textured soils that have a slowly permeable subsoil.
Unit IIIw–10.—Deep, moderately well drained, nearly level, coarse textured soils.

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

Subclass IVe.—Soils subject to very severe erosion if cultivated and not protected.
Unit IVe–3.—Deep, well drained, moderately sloping, medium textured soils that are moderately permeable.
Unit IVe–5.—Deep, well drained, moderately sloping, severely eroded, moderately coarse textured soils and steep, moderately eroded, moderately coarse textured soils that are severely eroded.
Unit IVe–7.—Deep and moderately deep, well drained and moderately well drained, moderately sloping to strongly sloping, moderately coarse textured and medium textured soils that have a fragipan or hard compacted subsoil.
Unit IVe–9.—Moderately deep to deep, well drained and moderately well drained, moderately sloping, medium textured soils that have a slowly permeable to very slowly permeable subsoil.

Subclass IVw.—Soils very severely limited by excess water.
Unit IVw–3.—Moderately deep, poorly drained, nearly level, medium textured soils that have a very slowly permeable subsoil. They have a fragipan in the lower part of the subsoil.

Subclass IVs.—Soils very severely limited by high salinity or poor tilth.
Unit IVs–1.—Deep, well drained to excessively drained, moderately sloping, moderately coarse textured and coarse textured soils.

Class V. Soils not likely to erode, but having other limitations, impractical to remove, that limit their

use largely to pasture or range, woodland, or wildlife. (None in St. Marys County.)

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

Subclass VIe.—Soils severely limited, chiefly by risk of erosion, unless protective cover is maintained.

Unit VIe–2.—Moderately deep to deep, well drained, strongly sloping medium textured and moderately coarse textured soils.

Subclass VIw.—Soils that are severely limited by excess water and generally are unsuited to cultivation.

Unit VIw–1.—Nearly level, wet soils that have a hazard of flooding.

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

Subclass VIIs.—Soils very severely limited to available moisture capacity, stones, or other soil features.

Unit VIIs–1.—Deep, well drained to excessively drained, strongly sloping to steep, moderately coarse textured and coarse textured soils.

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

Subclass VIIIw.—Extremely wet marsh land.

Unit VIIIw–1.—Very wet tidal marsh, subject to flooding by brackish tidal water.

Subclass VIIIs.—Stony land and miscellaneous land areas that have little potential for commercial production of vegetation.

Unit VIIIs–2.—Nearly bare, loose sands; beaches.

Unit VIIIs–4.—Gravel pits.

## General management practices

Some of the management practices needed to obtain a good growth of crops and, at the same time, conserve soil and water can be summarized for the soils of the county. Among the practices are draining wet soils, irrigating soils in dry periods, applying adequate soil amendments, using cropping systems and proper tillage practices, and managing crop residue.

### Drainage

Improving drainage is one of the important management needs in St. Marys County. Drainage has already been improved in many areas. Some farms are made up mostly or entirely of well drained soils, but many are made up partly of soils that need drainage, and some farms consist mostly of soils that have drainage problems. For information about methods of improving natural drainage, see the Drainage Guide for Maryland.[4]

Soils that are not limited by drainage problems are Caroline, Chillum, Croom, Evesboro, Faceville, Kempsville, Marr, Matapeake, Rumford, Sassafras, and Westphalia soils.

Soils that are moderately limited for some uses by impeded natural drainage are Beltsville, Bourne, Keyport, Klej, Mattapex, and Woodstown soils.

Soils that are severely limited for most uses by poor natural drainage are Bibb, Elkton, Fallsington, Leonardtown, and Othello soils, and most areas of Alluvial land, wet.

The rest of the county consists of areas generally not suitable for farming, regardless of drainage conditions.

### Irrigation

Irrigation is important whenever soils are used intensively for crops and whenever the rainfall drops to a critical level during dry seasons. The nature of the soils determines how much water can be applied efficiently and without waste, and the rate at which the water can be applied without loss through runoff.

In general, the soils with the lowest available water holding capacity need irrigation most. Soils with the highest available water holding capacity are the last to need water from irrigation, but when properly irrigated, they absorb and hold the largest amounts of water.

Soil factors that affect the suitability of individual soils for irrigation are listed in table 8 in the section "Engineering uses of the soils." Information concerning sprinkler irrigation systems suitable for soils of St. Marys County is given in the "Maryland Guide for Sprinkler Irrigation Design"[5] which can be obtained from the Maryland Agricultural Experiment Station.

### Soil amendments

Most soils in the county are low in natural plant nutrients, and some are very low. All of the soils are acid, and some are extremely acid. For these reasons, additions of lime and fertilizer are needed for most crops. The amount of lime and the kind and amount of fertilizer needed can be judged by observing how well crops have responded in the past, by determining the yield level the farmer desires, by studying records of previous management, and by having soil tests performed. Assistance in determining the specific requirements can be obtained from the Soil Testing Laboratory of the University of Maryland.

Lime should be applied whenever soil tests indicate that the level of lime in the soil has fallen below the optimum for the kinds of crops to be grown. Generally, applications are needed about every 3 years. Very sandy soils, such as Evesboro, Klej, and Rumford soils, need small, frequent applications, but wet, fine textured soils such as Elkton soils, require larger quantities. Different soils in the same field commonly need different amounts of lime. Excessive amounts of lime are damaging, particularly on sandy soils.

Soils that are cultivated regularly become deficient in nitrogen, phosphorus, and potassium if these elements are not replenished regularly. Soils can also be-

[4] United States Department of Agriculture (In cooperation with the Cooperative Extension Service and the Agricultural Experiment Station, University of Maryland). Maryland Drainage Guide, Revised September, 1973.

[5] United States Department of Agriculture (in cooperation with the University of Maryland), April 1975.

come deficient in other elements, such as sulfur, boron, manganese, and zinc. Soil tests reveal such deficiencies and indicate the kinds and amounts of fertilizer and the frequency of application needed.

### Cropping systems

Using a good cropping system helps to maintain organic matter in the soil and to control erosion. Level or nearly level soils do not need rotations to control erosion, but they benefit from green manure crops or cover crops grown between successive row crop seasons.

Generally, the length of the rotation should increase as the hazard of erosion increases. Gently sloping soils benefit from a 2 year rotation, steeper soils that are severely eroded may need a 4 year or a 5 year rotation for maximum protection. The Cooperative Extension Service or the St. Marys Soil Conservation District can help plan rotations for specific sites and soils.

In addition to replenishing organic matter and retarding erosion, a good cropping system helps to slow the rate at which some plant nutrients are depleted.

### Tillage

Excessive tillage breaks down soil structure, causes loss of organic matter, and increases the hazard of erosion. All the soils of St. Marys County should be tilled only as much as necessary in preparing a good seedbed to ensure adequate growth of the seedlings and to ensure the maturing of a normal crop. This "minimum tillage" means disturbing the soil no more than is compatible with productive farming.

Soils that are susceptible to erosion but suited to cultivation—soils in capability subclasses IIe, IIIe, and IVe—should be tilled on the contour if the topography permits. Stripcropping on the contour is even more effective in checking erosion. Effectiveness is increased when crops are rotated on each of the strips, and when narrower strips are used on steeper or more severely eroded soils. Assistance in planning tillage practices can be obtained from the St. Marys Soil Conservation District.

Over a period of time, the heavy equipment used in cultivating and harvesting certain crops compacts the soil and makes it difficult to work. Such damage is most severe if the soil is too wet when the machinery is used. The moderately well drained and poorly drained soils that have a loam or finer textured surface layer are most likely to be damaged. These include some Beltsville, Bourne, Elkton, Caroline, Keyport, Leonardtown, Mattapex, and Othello soils. Soils in these series that have a fine sandy loam or coarser surface layer are less seriously affected.

### Residue management

Residue, as used in this survey, refers to parts of plants left in the field after harvesting the crop. The amount of residue varies with the kind of crop grown. A cover crop or green manure crop is generally all residue. A hay crop that is cut and removed leaves only stubble; however, if a hay crop is grown for seed, most of the plant material is left in the field.

All of the plant material that is not needed for harvest can be left in the field. Leaving residue in the field helps check soil erosion. If the residue later is turned under, it supplies organic matter, improves soil structure, increases aeration, reduces runoff, and increases intake of water.

## Estimated yields

Table 4 gives the estimates of the average yields of the principal crops grown in St. Marys County. Yields are given for each soil in the county that is used in farming. Yields are averages expected over a period of years in which there is a wide range of rainfall and other climatic conditions. Yields listed are those that are expected when the best current management practices are followed. These practices include:

1. Contour tillage, stripcropping, keeping tillage to a minimum, cropping systems, or similar measures to control erosion; the soils that need drainage are drained (those already artificially drained must have drainage systems that are well maintained); excess water is disposed of safely, and supplemental irrigation is given to soils that need it during periods of short moisture supply.
2. Winter cover crops are used as seasonal protection for soils that are intensively used for crops during the regular growing seasons. Besides furnishing protection from winter erosion, this cover crop helps improve or maintain soil structure, tilth, and fertility. When turned under, it also supplies organic matter to the soil.
3. Manure and crop residue are turned under to supply nitrogen, other nutrients, and organic matter. This also improves the physical condition of the soil and reduces erosion.
4. Fertilizers and lime are applied according to the needs of crops and the levels of lime and plant nutrients in the soil as indicated by soil tests. The Extension Service can be consulted about making the tests. Applications of fertilizer in excess of needs are wasted, and can also contribute to pollution of water resources.
5. Cultivating the soils is kept to a minimum because cultivation breaks down soil structure. Suitable methods of plowing, preparing the seedbed, and cultivating are used as needed.
6. Planting, cultivating, and harvesting are done at the proper time and in the proper way.
7. Weeds, diseases, and insects are controlled.

The yield estimates in table 4 are not the highest obtainable, but they set a minimum goal that is practical and that has been reached or surpassed by many farmers in the county. Yields on any kind of soil vary even under the best management. Differences in the weather, in crop varieties used, and in the prevalence of insects and diseases account for variations in crop yields. Variations in average yields, however, should not be greater than 10 percent for tilled crops or 20 percent for hay crops and pasture.

Yields in table 4 reflect the status of technology in 1970. Adjustments in estimated yields must be made to keep abreast of technology. However, the relative

differences in yields on different kinds of soil should remain approximately the same.

## Use of soils for woodland [6]

Approximately 157,200 acres, about 67 percent of the total land area in St. Marys County, is in woodland. Forest ownership studies show that 97 percent is privately owned, and about ⅓ of this is owned by farmers. The rest of the forest land is owned by individuals whose interests and occupations are greatly diversified.

The forest base of St. Marys County has undergone several changes in its extent and location during the last 100 years because of varying economic and social trends. Presently, increasing population, as well as other needs for land, are causing some loss of forest acreage. However, the gradual trend away from agriculture has left large acreages of old fields to revert naturally to forest.

Three general forest types exist in St. Marys County and can be expressed as follows: hardwoods, 49 percent; mixed hardwoods—pine, 15 percent; and pine, 36 percent. More specifically, these three basic forest types can be broken down by percent into five categories as follows:

| *Forest Type* | *Percent of total forest* [7] |
|---|---|
| Pine | 36 |
| Oak—Pine | 15 |
| Oak—Gum | 15 |
| Oak—Hickory | 32 |
| Elm—Ash—Red maple | 2 |
| Total | 100 |

These five basic forest types are found throughout the county because of the ecological diversities in the varying topography. Pine forest is composed mainly of Virginia pine and loblolly pine. Both species occur on sandy ridges that are well drained; Virginia pine is better able to adapt itself to those drier sites. Both of these species are remarkably adept at seeding themselves into nearby untilled fields.

White and red oaks are predominant in three of the forest types and generally occupy those sites that have adequate drainage but more available moisture.

Oak-gum forest makes up only 15 percent of the commercial forest area, but contains a large sawtimber volume. This type also includes yellow-poplar and is found on the lower slopes and in bottom lands where the soils are moderately well drained. Sweet gum and red maple grow on soils that are more poorly drained. With increasing soil moisture, this type eventually gives way to the elm, ash, and red maple type. These five forest types include the five most desirable commercial trees in Maryland: red and white oak, yellow-poplar, sweet gum, and loblolly pine.

The values of the forest land in the county are many and varied. Benefits to the public include incomes from wood products and jobs in the wood products industry, efficient hydrologic control of ground water and stream flow, provision of food and habitat for wildlife, and areas for outdoor recreation. Climatological controls and esthetic effects are other important benefits that forest lands provide, but these are not readily apparent and are hard to measure.

### Woodland suitability groups

The soils of St. Marys County have been placed in woodland suitability groups to help owners plan 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 about the same management where the vegetation on them is similar, and that have the same potential production.

Each woodland group is identified by a three part symbol, such as 1w3, 2o2, or 3w3. The potential productivity of the soils in the group is indicated by the first number in the symbol: 1, very high; 2, high; 3, moderately high; 4, moderate; and 5, low. These ratings are based on field determination of average site index of indicator species. Site index of a given soil is the height, in feet, that the taller trees of a given species reach in a natural, essentially unmanaged stand in a stated number of years. Site index can be converted into approximate expected growth and yield per acre in cords and board feet.

The second part of the symbol identifying a woodland group is a small letter. In this survey w, d, s, r, and o are used. Except for the *o*, the small letter indicates an important soil property that imposes a hazard or limitation in managing the soils of the group for trees. The letter *o* shows that the soils have few limitations that restrict their use for trees. The letter *w* means excessive wetness, either seasonal or all year. These soils have restricted drainage, a high water table, or are subject to flooding. The letter *d* indicates that the soil has a restricted rooting depth. The letter *s* stands for sandy soils that have little or no difference in texture between surface layer and subsoil (B horizon). These soils are moderately to severely restricted for woodland use. They have low available water capacity and are low in available plant nutrients. The letter *r* shows that the main limitation is steep slopes; there is a hazard of erosion and there are possibly limitations to use of equipment. In this county *r* is used if slopes are greater than 12 percent.

The last part of the symbol, another number, differentiates woodland suitability groups that have identical first and second parts in their identifying symbol. Soils in woodland group 3w3, for example, require somewhat different management than soils in group 3w4.

In table 5 each woodland suitability group in the county is rated for various management hazards or limitations. These ratings are slight, moderate, or severe, and they are described in the following paragraphs.

*Equipment limitations* depend on soil characteristics that restrict or prohibit the use of harvesting equipment, either seasonally or continually. *Slight* means no restrictions in the kind of equipment or time of year it is used; *moderate* means that use of equipment is restricted for 3 months of the year or less; *severe* means that special equipment is needed and that its use is severely restricted for more than 3 months of the year.

*Seedling mortality* refers to mortality of naturally

[6] JOHN HOUSER of the Maryland Department of Forests and Parks helped prepare this section.

[7] The Timber Resources of Maryland, Forest Service, Upper Darby, Pa.—1967.

TABLE 4.—*Estimated average acre yields of*

[Absence of a figure indicates crop is not suited to the soil specified or is not commonly grown. Alluvial land (Aa), Alluvial land, crops and pastures are not grown in these areas. The

| Soil | Corn (grain) | Corn (silage) |
|---|---|---|
| | *Bu* | *Tons* |
| Beltsville silt loam, 0 to 2 percent slopes | 95 | 19 |
| Beltsville silt loam, 2 to 5 percent slopes, moderately eroded | 95 | 19 |
| Beltsville silt loam, 2 to 5 percent slopes, severely eroded | 80 | 16 |
| Beltsville silt loam, 5 to 10 percent slopes, moderately eroded | 80 | 16 |
| Beltsville silt loam, 5 to 10 percent slopes, severely eroded | 70 | 14 |
| Bibb silt loam | 120 | 24 |
| Bourne fine sandy loam, 2 to 5 percent slopes, moderately eroded | 85 | 17 |
| Bourne fine sandy loam, 5 to 10 percent slopes, severely eroded | 80 | 16 |
| Caroline silt loam, 2 to 5 percent slopes, moderately eroded | 100 | 20 |
| Caroline silt loam, 5 to 10 percent slopes, moderately eroded | 90 | 18 |
| Caroline silt loam, 5 to 10 percent slopes, severely eroded | 70 | 14 |
| Caroline silt loam, 10 to 15 percent slopes, moderately eroded | 80 | 16 |
| Caroline silt loam, 10 to 15 percent slopes, severely eroded | | |
| Chillum loam, 0 to 2 percent slopes | 130 | 26 |
| Chillum loam, 2 to 6 percent slopes, moderately eroded | 130 | 26 |
| Chillum loam, 6 to 12 percent slopes, moderately eroded | 120 | 24 |
| Chillum loam, 6 to 12 percent slopes, severely eroded | 100 | 20 |
| Croom gravelly sandy loam, 2 to 5 percent slopes, moderately eroded | 70 | 14 |
| Croom gravelly sandy loam, 5 to 10 percent slopes, moderately eroded | 65 | 13 |
| Croom gravelly sandy loam, 10 to 15 percent slopes, moderately eroded | | |
| Croom gravelly sandy loam, 10 to 15 percent slopes, severely eroded | | |
| Elkton silt loam | 105 | 21 |
| Evesboro loamy sand, 0 to 8 percent slopes | 60 | 12 |
| Evesboro loamy sand, 8 to 15 percent slopes | | |
| Evesboro-Westphalia complex, 6 to 12 percent slopes, moderately eroded: | | |
| Evesboro soil | 65 | 13 |
| Westphalia soil | 115 | 23 |
| Evesboro-Westphalia complex, 12 to 20 percent slopes, moderately eroded: | | |
| Evesboro soil | | |
| Westphalia soil | 95 | 19 |
| Evesboro-Westphalia complex, 20 to 45 percent slopes, moderately eroded: | | |
| Evesboro soil | | |
| Westphalia soil | | |

*principal crops under improved management*

wet (Ad), Beaches (Be), Cut and fill land (Cu), Gravel pits (Gp), and Tidal marsh (Tm) are not included in this table because symbol < means less than; the symbol > means more than]

| Wheat | Soybeans | Alfalfa grass hay | Clover grass hay | Tallgrass legume pasture | Yields of tobacco | Quality of tobacco |
|---|---|---|---|---|---|---|
| *Bu* | *Bu* | *Tons* | *Tons* | *Cow-acre-days* [1] | *Lbs* | |
| 45 | 35 | | 3.0 | 170 | 1,100–1,500 | Low. |
| 45 | 35 | | 3.0 | 170 | 1,100–1,500 | Low. |
| 40 | 30 | | 3.0 | 170 | 1,100–1,500 | Low. |
| 40 | 30 | | 3.0 | 170 | 1,110–1,500 | Low. |
| 35 | | | 3.0 | 170 | 1,100–1,500 | Low. |
| | 35 | | 3.0 | 170 | | |
| 40 | 30 | | 2.5 | 170 | 700–1,500 | Medium. |
| 35 | 30 | | 2.5 | 170 | 700–1,500 | Medium. |
| 40 | 35 | 4.0 | 3.0 | 230 | 1,100–1,500 | Low. |
| 35 | 30 | | 3.0 | 200 | 1,100–1,500 | Low. |
| 25 | | | 2.0 | 145 | 700–1,100 | Low. |
| 30 | | | 2.5 | 170 | 700–1,100 | Low. |
| | | | | 115 | | |
| 50 | 45 | 5.0 | 3.5 | 285 | 1,100–1,500 | Medium. |
| 50 | 45 | 5.0 | 3.5 | 285 | 1,100–1,500 | Medium. |
| 45 | 40 | 4.5 | 3.5 | 255 | 1,100–1,500 | Medium. |
| 40 | | 4.0 | 3.0 | 230 | 700–1,100 | Medium. |
| 35 | 25 | | 2.5 | 145 | <700 | Medium. |
| 30 | | | 2.5 | 145 | <700 | Medium. |
| | | | | 115 | | |
| | | | | 115 | | |
| | 40 | | 3.5 | 200 | | |
| 25 | 20 | 2.5 | 2.0 | 145 | 700–1,100 | Very high. |
| | | | | 115 | | |
| 30 | | 3.0 | 2.0 | 170 | 700–1,100 | Very high. |
| 45 | 40 | 4.5 | 3.0 | 255 | 1,100–1,500 | Very high. |
| | | | | 80 | 700–1,100 | Very high. |
| 40 | | 4.0 | 3.0 | 230 | 1,100–1,500 | Very high. |
| | | | | 80 | | |
| | | | | 200 | | |

TABLE 4.—*Estimated average acre yields of principal*

| Soil | Corn (grain) | Corn (silage) |
|---|---|---|
| | *Bu* | *Tons* |
| Faceville silt loam, 0 to 5 percent slopes | 140 | 28 |
| Fallsington sandy loam | 120 | 24 |
| Kempsville fine sandy loam, 5 to 10 percent slopes, moderately eroded | 110 | 22 |
| Kempsville fine sandy loam, 5 to 10 percent slopes, severely eroded | 90 | 18 |
| Kempsville fine sandy loam, 10 to 15 percent slopes, moderately eroded | 90 | 18 |
| Kempsville fine sandy loam, 10 to 15 percent slopes, severely eroded | | |
| Keyport fine sandy loam, 0 to 2 percent slopes | 110 | 22 |
| Keyport fine sandy loam, 2 to 5 percent slopes, moderately eroded | 110 | 22 |
| Keyport silt loam, 0 to 2 percent slopes | 110 | 22 |
| Keyport silt loam, 2 to 5 percent slopes, moderately eroded | 110 | 22 |
| Keyport silt loam, 5 to 10 percent slopes, moderately eroded | 90 | 18 |
| Klej loamy sand, 0 to 5 percent slopes | 90 | 14 |
| Leonardtown silt loam | 70 | 14 |
| Marr fine sandy loam, 2 to 6 percent slopes, moderately eroded | 130 | 26 |
| Marr fine sandy loam, 6 to 12 percent slopes, moderately eroded | 120 | 24 |
| Marr fine sandy loam, 6 to 12 percent slopes, severely eroded | 100 | 20 |
| Matapeake fine sandy loam, 0 to 2 percent slopes | 140 | 28 |
| Matapeake fine sandy loam, 2 to 5 percent slopes, moderately eroded | 140 | 28 |
| Matapeake silt loam, 0 to 2 percent slopes | 140 | 28 |
| Matapeake silt loam, 2 to 5 percent slopes, moderately eroded | 140 | 28 |
| Matapeake silt loam, 5 to 10 percent slopes, severely eroded | 110 | 22 |
| Mattapex fine sandy loam, 0 to 2 percent slopes | 135 | 27 |
| Mattapex fine sandy loam, 2 to 5 percent slopes, moderately eroded | 135 | 27 |
| Mattapex silt loam, 0 to 2 percent slopes | 135 | 27 |
| Mattapex silt loam, 2 to 5 percent slopes, moderately eroded | 135 | 27 |
| Mattapex silt loam, 5 to 10 percent slopes, moderately eroded | 130 | 26 |
| Othello fine sandy loam | 115 | 23 |
| Othello silt loam | 115 | 23 |
| Rumford loamy sand, 0 to 5 percent slopes | 110 | 22 |
| Rumford loamy sand, 5 to 10 percent slopes, moderately eroded | 100 | 20 |
| Sassafras sandy loam, 0 to 2 percent slopes | 130 | 26 |
| Sassafras sandy loam, 2 to 5 percent slopes, moderately eroded | 130 | 26 |
| Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded | 120 | 24 |
| Sassafras sandy loam, 5 to 10 percent slopes, severely eroded | 100 | 20 |
| Sassafras sandy loam, 10 to 15 percent slopes, moderately eroded | 100 | 20 |

*crops under improved management*—Continued

| Wheat | Soybeans | Alfalfa grass hay | Clover grass hay | Tallgrass legume pasture | Yields of tobacco | Quality of tobacco |
|---|---|---|---|---|---|---|
| *Bu* | *Bu* | *Tons* | *Tons* | *Cow-acre-days* [1] | *Lbs* | |
| 50 | 45 | 5.5 | 3.5 | 315 | >1,500 | Medium. |
| | 35 | | 3.0 | 170 | | |
| 40 | 35 | 4.5 | 3.0 | 255 | 700–1,500 | High. |
| 40 | | 4.0 | 3.0 | 230 | 700–1,100 | Medium. |
| 40 | | 4.0 | 3.0 | 230 | 700–1,100 | High. |
| | | | | 200 | | |
| 40 | 40 | | 3.0 | 170 | 700–1,500 | Medium. |
| 40 | 40 | | 3.0 | 170 | 700–1,500 | Medium. |
| 40 | 40 | | 3.0 | 170 | 1,100–1,500 | Low. |
| 40 | 40 | | 3.0 | 170 | 1,100–1,500 | Low. |
| 35 | 30 | | 3.0 | 170 | 1,100–1,500 | Low. |
| 30 | 30 | 3.4 | 2.7 | 170 | 700–1,500 | Medium. |
| | 25 | | 2.5 | 145 | | |
| 50 | 45 | 5.5 | 3.5 | 315 | 1,100–1,500 | High. |
| 45 | 40 | 5.0 | 3.5 | 285 | 1,000–1,500 | High. |
| 40 | | 4.5 | 3.0 | 255 | 1,000–1,500 | High. |
| 50 | 45 | 5.5 | 3.5 | 315 | 1,100–1,500 | High. |
| 50 | 45 | 5.5 | 3.5 | 315 | 1,100–1,500 | High. |
| 50 | 40 | 5.5 | 3.5 | 315 | >1,500 | Medium. |
| 50 | 45 | 5.5 | 3.5 | 315 | >1,500 | Medium. |
| 40 | | 4.5 | 3.0 | 255 | 1,100–1,500 | Medium. |
| 45 | 45 | 4.5 | 3.5 | 255 | 1,100–1,500 | Medium. |
| 45 | 45 | 4.5 | 3.5 | 255 | 1,100–1,500 | Medium. |
| 45 | 45 | 4.5 | 3.5 | 255 | >1,500 | Low. |
| 45 | 45 | 4.5 | 3.5 | 255 | >1,500 | Low. |
| 40 | 40 | 4.0 | 3.5 | 230 | 1,100–1,500 | Low. |
| | 40 | | 3.5 | 200 | | |
| | 40 | | 3.5 | 200 | | |
| 45 | 40 | 5.0 | 3.5 | 285 | 700–1,100 | Very high. |
| 40 | 35 | 4.5 | 3.0 | 255 | 700–1,100 | Very high. |
| 50 | 45 | 5.5 | 3.5 | 315 | 1,100–1,500 | High. |
| 50 | 45 | 5.5 | 3.5 | 315 | 1,100–1,500 | High. |
| 45 | 40 | 5.0 | 3.5 | 285 | 1,100–1,500 | High. |
| 40 | | 4.5 | 3.0 | 255 | 1,100–1,500 | High. |
| 40 | | 4.5 | 3.0 | 255 | 1,100–1,500 | High. |

TABLE 4.—*Estimated average acre yields of principal*

| Soil | Corn (grain) | Corn (silage) |
|---|---|---|
| | *Bu* | *Tons* |
| Sassafras sandy loam, 10 to 15 percent slopes, severely eroded | | |
| Sassafras loam, 0 to 2 percent slopes | 130 | 26 |
| Sassafras loam, 2 to 5 percent slopes, moderately eroded | 130 | 26 |
| Sassafras-Chillum complex, 6 to 12 percent slopes, moderately eroded: | | |
| Sassafras soil | 120 | 24 |
| Chillum soil | 120 | 24 |
| Sassafras-Chillum complex, 6 to 12 percent slopes, severely eroded: | | |
| Sassafras soil | 100 | 20 |
| Chillum soil | 100 | 20 |
| Westphalia fine sandy loam, 2 to 6 percent slopes, moderately eroded | 130 | 26 |
| Westphalia fine sandy loam, 6 to 12 percent slopes, moderately eroded | 115 | 23 |
| Westphalia fine sandy loam, 6 to 12 percent slopes, severely eroded | 95 | 19 |
| Woodstown sandy loam, 0 to 2 percent slopes | 130 | 26 |
| Woodstown sandy loam, 2 to 5 percent slopes | 130 | 26 |
| Woodstown sandy loam, 5 to 10 percent slopes, moderately eroded | 120 | 24 |

[1] Cow-acre-days is 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

occurring or planted tree seedlings, as influenced by kinds of soil or topographic conditions when plant competition is assumed not to be a factor. *Slight* means a loss of 0 to 25 percent; *moderate* means a loss of 25 to 50 percent; and *severe* means a loss of more than 50 percent of the seedlings. It is assumed that seed supplies are adequate.

*Plant competition* is the degree to which undesirable plants invade openings in the tree canopy. Considered in the ratings are available water capacity, fertility, drainage, and degree of erosion. Conifers and hardwoods are rated separately in table 5. A rating of *slight* means that plant competition does not prevent adequate natural regeneration and early growth or interfere with seedling development; *moderate* means that competition delays natural or artificial establishment and growth rate, but does not prevent the development of fully stocked normal stands; *severe* means that competition prevents adequate natural or artificial regeneration unless the site is prepared properly and maintenance practices are used.

*Erosion hazard* refers to the degree of potential soil erosion following cutting operations and also where the soil is exposed along roads, skid trails, fire lanes, and log decking areas. The degree of hazard varies with the slope and the erodibility of a particular kind of soil.

*Windthrow hazard* depends on the soil characteristics that enable trees to resist being blown down by wind. *Slight* means that most trees withstand the wind; *moderate* means that some trees are expected to blow down during excessive wetness and high wind; *severe* means that many trees are expected to blow down during periods when the soil is wet and winds are moderate or high.

The estimated *site index* in table 5 is the height, in feet, that the tallest trees reach at 50 years of age on the soils of each group. Table 5 also lists suitable species to favor in existing stands and suitable species for planting.

There are 12 combinations of woodland suitability groups in St. Marys County. Descriptions of each of the 12 woodland suitability groups follow. The names of the soil series represented are mentioned in the description of each woodland suitability group. The listing of a series name does not mean that all the soils of a series are always in the same woodland suitability group. All estimated yields shown in the suitability group description are based on the "International 1/8 rule."

The woodland suitability group to which individual soils have been assigned is shown at the end of each mapping unit description and also in the "Guide to Mapping Units" at the back of this survey.

*crops under improved management*—Continued

| Wheat | Soybeans | Alfalfa grass hay | Clover grass hay | Tallgrass legume pasture | Yields of tobacco | Quality of tobacco |
|---|---|---|---|---|---|---|
| *Bu* | *Bu* | *Tons* | *Tons* | *Cow-acre-days* [1] | *Lbs* | |
| | | | | 230 | | |
| 50 | 45 | 5.5 | 3.5 | 315 | 1,100–1,500 | High. |
| 50 | 45 | 5.5 | 3.5 | 315 | 1,100–1,500 | High. |
| 45 | 40 | 5.0 | 3.5 | 285 | 1,100–1,500 | High. |
| 45 | 40 | 4.5 | 3.5 | 255 | 1,100–1,500 | Medium. |
| 40 | | 4.5 | 3.0 | 255 | 1,100–1,500 | High. |
| 40 | | 4.0 | 3.0 | 230 | 700–1,100 | Medium. |
| 50 | 15 | 5.0 | 3.5 | 285 | 1,100–1,500 | Very high. |
| 45 | 40 | 4.5 | 3.0 | 255 | 1,100–1,500 | Very high. |
| 40 | | 4.0 | 3.0 | 230 | 1,100–1,500 | Very high. |
| 40 | 40 | 4.5 | 3.5 | 285 | 1,100–1,500 | Medium. |
| 40 | 40 | 4.5 | 3.5 | 285 | 1,100–1,500 | Medium. |
| 40 | 40 | 4.0 | 3.5 | 255 | 1,100–1,500 | Medium. |

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

### Woodland suitability group 1w3

This group is made up of highly productive areas of Alluvial land. These soils have few significant restrictions or limitations for woodland use or management. These soils are dominantly moderately well drained and are level to gently sloping.

In a normal stand of timber 50 years old, the average annual increase per acre is as follows: for mixed oaks, 370 board feet; for loblolly pine, 900 board feet or 1.5 cords of pulpwood; and for yellow-poplar, 640 board feet. At the same age, a normal stand of mixed oaks yields an average of about 13,750 board feet; loblolly pine yields about 34,100 board feet, and yellow-poplar yields about 24,400 board feet.

There are no reliable estimates of growth or yields of Virginia pine on these soils.

### Woodland suitability group 2o2

This group is made up of highly productive soils of the Faceville and Kempsville series. These soils have no major limitations for woodland use or management. They are well drained and have a slope of not more than 15 percent.

In a normal stand of timber 50 years old, the average annual increase per acre is as follows: for mixed oaks, 275 board feet; for loblolly pine, 680 board feet or 1.3 cords of pulpwood; for yellow-poplar, 490 board feet; and for Virginia pine, 1.9 cords of pulpwood.

At the same age, a normal stand of mixed oaks yields an average of 13,750 board feet; loblolly pine yields 34,100 board feet; and yellow-poplar yields 17,620 board feet. A fully stocked stand of Virginia pine 30 years old yields about 57 cords of pulpwood per acre.

### Woodland suitability group 2w3

This group is made up of moderately well drained soils of the Woodstown series. These soils have very good potential productivity for loblolly pine, oaks, and yellow-poplar.

In a normal stand of timber 50 years old, the average annual increase per acre for oaks is 275 board feet, and the average yield per acre is about 13,750 board feet. For yellow-poplar, the average annual increase per acre is 490 board feet, and the average yield of yellow-poplar timber per acre is about 24,400 board feet. For loblolly pine, the average annual increase per acre is 680 board feet. The average yield per acre is 34,100 board feet.

### Woodland suitability group 2w4

This group is made up of highly productive soils of the Bibb and Fallsington series and Alluvial land,

TABLE 5.—*Factors affecting*

[Absence of an entry in a column means that information was not available. Beaches (Be), Cut and fill land (Cu), Gravel

| Soil series and map symbols | Woodland suitability group | Limitations | | | |
|---|---|---|---|---|---|
| | | Equipment limitations | Seedling mortality | Competition for | |
| | | | | Conifers | Hardwood |
| Alluvial land: Aa | 1w3 | Moderate: water table; flood hazard. | Slight | Severe | Moderate |
| Alluvial land, wet: Ad | 2w4 | Severe: high water table; flooding. | Severe | Severe | Severe |
| Beltsville: BlA, BlB2, BlB3, BlC2, BlC3 | 3w3 | Moderate: perched water table. | Moderate | Moderate | Slight |
| Bibb: Bm | 2w4 | Severe: high water table; flooding. | Severe | Severe | Severe |
| Bourne: BrB2, BrC3 | 3w3 | Moderate: perched water table. | Moderate | Moderate | Slight |
| Caroline: CaB2, CaC2, CaC3, CaD2, CaD3 | 3w3 | Moderate: seasonal perched water table. | Slight | Moderate | Moderate |
| Chillum: ChA, ChB2, ChC2, ChC3 | 3o2 | Slight | Slight | Moderate to severe. | Slight to moderate. |
| Croom: CrB2, CrC2, CrD2, CrD3 | 4d2 | Slight | Moderate | Moderate | Slight |
| Elkton: Ek | 3w4 | Severe: high water table; plastic subsoil. | Slight | Severe | Severe |
| Evesboro: EvB, EvC | 3s1 | Moderate to severe: slope | Moderate | Moderate | Slight |
| Evesboro-Westphalia complex: EwC2, EwD2, EwE2. | 3s1 | Moderate to severe: slope | Moderate | Moderate | Slight |
| Faceville: FaB | 2o2 | Slight | Slight | Severe | Moderate |
| Fallsington: Fs | 2w4 | Severe: high water table | Severe | Severe | Severe |
| Kempsville: KeC2, KeC3, KeD2, KeD3 | 2o2 | Slight | Slight | Severe | Moderate |
| Keyport: KpA, KpB2, KrA, KrB2, KrC2 | 3w3 | Moderate: seasonal water table; plastic subsoil. | Slight | Moderate | Moderate |
| Klej: Kz | 3w6 | Moderate: seasonal high water table. | Moderate | Moderate | Moderate |

*woodland management*

pits (Gp), and Tidal marsh (Tm) are too variable to rate and are not suited to wood crops. The symbol > means more than]

| Limitations—Continued | | Site index | | | | Preferred species | | |
|---|---|---|---|---|---|---|---|---|
| Erosion hazard | Windthrow hazard | Mixed oaks | Loblolly pine | Yellow-poplar | Virginia pine | In existing stands | In planting | For Christmas trees |
| Slight | Slight | >85 | >95 | >95 | | Yellow-poplar, loblolly pine, red oak. | Loblolly pine, yellow-poplar. | White pine, Scotch pine, Austrian pine, Norway spruce. |
| Slight | Slight | 80–90 | 85–95 | | | Loblolly pine, sweetgum. | Loblolly pine | Scotch pine, white pine. |
| Slight to moderate. | Slight | 65–75 | >75 | | 65–75 | Virginia pine, loblolly pine, red oak. | Virginia pine, loblolly pine, white pine, larch. | Scotch pine, Austrian pine, white pine. |
| Slight | Slight | 80–90 | 85–95 | | | Loblolly pine, sweetgum. | Loblolly pine, sweetgum. | Scotch pine, white pine, Norway spruce. |
| Slight | Slight | 65–75 | >75 | | 65–75 | Virginia pine, loblolly pine, red oak. | Virginia pine, loblolly pine, white pine, larch. | Scotch pine, Austrian pine, white pine. |
| Slight to moderate. | Slight | 65–75 | >75 | | 65–75 | Red oak, Virginia pine, loblolly pine. | Loblolly pine, white pine, larch. | Scotch pine, Austrian pine. |
| Slight | Slight | 65–75 | 75–85 | 75–85 | 65–75 | Loblolly pine, red oak, Virginia pine, yellow-poplar. | White pine, loblolly pine, yellow-poplar. | Scotch pine, Norway spruce, Austrian pine, white pine. |
| Slight | Slight to moderate. | 55–65 | | | 55–65 | Red oak, Virginia pine, red maple. | Virginia pine, loblolly pine. | Scotch pine, Austrian pine, white pine. |
| Slight | Slight | | 75–85 | | | Loblolly pine, sweetgum, red maple. | Loblolly pine, white pine. | Scotch pine, white pine. |
| Slight to moderate. | Slight | 65–75 | 75–85 | | 65–75 | Red oak, Virginia pine, loblolly pine. | Loblolly pine | Scotch pine, white pine. |
| Slight | Slight | 65–75 | 75–85 | | 65–75 | Red oak, Virginia pine, loblolly pine. | Loblolly pine | Scotch pine, white pine. |
| Slight | Slight | 75–85 | 85–95 | 85–95 | 70–80 | Loblolly pine, yellow-poplar, red oak, sweetgum. | Loblolly pine, yellow-poplar. | Scotch pine, white pine, Austrian pine. |
| Slight | Slight | 80–90 | 85–95 | | | Cypress, sweetgum, loblolly pine. | Loblolly pine, cypress. | Scotch pine, white pine, Norway spruce. |
| Slight | Slight | 75–85 | 85–95 | 85–95 | 70–80 | Red oak, yellow-poplar, loblolly pine, sweetgum. | Yellow-poplar, loblolly pine. | Scotch pine, white pine, Austrian pine. |
| Slight to moderate. | Slight | 65–75 | >75 | | 65–75 | Red oak, loblolly pine, Virginia pine. | Loblolly pine, white pine, larch. | Scotch pine, Austrian pine, white pine. |
| Slight | Slight | 65–75 | 75–85 | | 65–75 | Red oak, Virginia pine, sweetgum, loblolly pine, yellow-poplar. | Loblolly pine, Virginia pine, white pine. | Scotch pine, Austrian pine, white pine. |

TABLE 5.–*Factors affecting*

| Soil series and map symbols | Woodland suitability group | Limitations | | | |
|---|---|---|---|---|---|
| | | Equipment limitations | Seedling mortality | Competition for | |
| | | | | Conifers | Hardwood |
| Leonardtown: Le | 3w4 | Severe: high perched water table. | Slight | Severe | Severe |
| Marr: MaB2, MaC2, MaC3 | 3o2 | Slight | Slight | Moderate to severe. | Slight to moderate. |
| Matapeake: MmA, MmB2, MnA, MnB2, MnC3 | 3o2 | Slight | Slight | Moderate to severe. | Slight to moderate. |
| Matapex: MtA, MtB2, MuA, MuB2, MuC2 | 3w3 | Moderate | Slight | Moderate | Moderate |
| Othello: On, Ot | 3w4 | Severe: high water table | Slight | Severe | Severe |
| Rumford: RuB, RuC2 | 3o2 | Slight | Slight | Moderate to severe. | Slight to moderate. |
| Sassafras: SaA, SaB2, SaC2, SaC3, SaD2, SaD3, SfA, SfB2. | 3o2 | Slight | Slight | Moderate to severe. | Slight to moderate. |
| Sassafras-Chillum complex: SmC2, SmC3 | 3o2 | Slight | Slight | Moderate to severe. | Slight to moderate. |
| Westphalia: WeB2, WeC2 | 3o2 | Slight | Slight | Moderate to severe. | Slight to moderate. |
| WeC3 | 3r4 | Slight to moderate: slope | Slight to moderate. | Moderate | Slight |
| Woodstown: WsA, WsB, WsC2 | 2w3 | Moderate | Slight | Severe | Moderate |

wet. Competition from grasses and sedges is severe on these soils.

In a normal stand of timber 50 years old, the average annual increase per acre for oaks is 310 board feet, and the average yield per acre is about 13,750 board feet. For loblolly pine, the average annual increase per acre is about 680 board feet, or 1.3 cords of pulpwood. The average yield of loblolly timber per acre is about 34,100 board feet. For sweetgum, the average increase per acre is about 490 board feet.

Some areas of these soils have good natural stands of yellow-poplar, sweetgum, or red maple, but there are no reliable estimates of yields. Virginia pine is seldom found on these soils.

### Woodland suitability group 3o2

This group is made up of soils that have medium productivity of the Chillum, Marr, Matapeake, Rumford, Sassafras, and Westphalia series and the Sassafras-Chillum complex. These soils have no major limitations for woodland management. They are well drained and have a slope of no more than 15 percent, or

*woodland management*—Continued

| Limitations—Continued | | Site index | | | | Preferred species | | |
|---|---|---|---|---|---|---|---|---|
| Erosion hazard | Windthrow hazard | Mixed oaks | Loblolly pine | Yellow-poplar | Virginia pine | In existing stands | In planting | For Christmas trees |
| Slight | Moderate | --- | 75–85 | --- | --- | Loblolly pine, red maple, sweetgum. | Loblolly pine, white pine. | Scotch pine, Norway spruce. |
| Slight | Slight | 65–75 | 75–85 | 75–85 | 65–75 | Red oak, loblolly pine, Virginia pine, yellow-poplar. | White pine, loblolly pine, yellow-poplar. | Scotch pine, white pine, Austrian pine. |
| Slight | Slight | 65–75 | 75–85 | 85–95 | 65–75 | Red oak, yellow-poplar, loblolly pine, Virginia pine. | Loblolly pine, white pine, yellow-poplar. | Scotch pine, Austrian pine. |
| Slight to moderate. | Slight | 65–75 | >75 | --- | 65–75 | Red oak, loblolly pine, Virginia pine. | White pine, loblolly pine, larch. | Scotch pine, white pine. |
| Slight | Slight | --- | 75–85 | --- | --- | Loblolly pine, red maple, sweetgum. | Loblolly pine, white pine. | Scotch pine, white pine. |
| Slight | Slight | 65–75 | 75–85 | 75–85 | 65–75 | Yellow-poplar, Virginia pine, red oak, loblolly pine. | White pine, yellow-poplar, lobolly pine. | Scotch pine, Austrian pine, white pine. |
| Slight | Slight | 65–75 | 75–85 | 75–85 | 65–75 | Red oak, loblolly pine, Virginia pine, yellow-poplar. | Loblolly pine, white pine, yellow-poplar. | Scotch pine, white pine, Austrian pine. |
| Slight | Slight | 65–75 | 75–85 | 75–85 | 65–75 | Red oak, loblolly pine, Virginia pine, yellow-poplar. | Loblolly pine, white pine, yellow-poplar. | Scotch pine, white pine, Austrian pine. |
| Slight | Slight | 65–75 | 75–85 | 75–85 | 65–75 | Red oak, Virginia pine, yellow-poplar. | Loblolly pine, white pine, yellow-poplar. | Scotch pine, white pine, Austrian pine. |
| Moderate to severe. | Slight | 65–75 | >75 | 75–85 | 65–75 | Red oak, loblolly pine, yellow-poplar, Virginia pine. | Loblolly pine, white pine, yellow-poplar. | Scotch pine, white pine, Austrian pine. |
| Slight | Slight | 75–85 | 85–95 | 85–95 | --- | Loblolly pine, yellow-poplar, sweetgum, red maple. | Loblolly pine, yellow-poplar. | Scotch pine, white pine, Norway spruce. |

12 percent for the more readily erodible Westphalia soils.

In a normal stand of timber 50 years old, the average annual increase per acre is as follows: for mixed oaks, 200 board feet; for loblolly pine, 470 board feet; for yellow-poplar, 350 board feet or one cord of pulpwood; and for Virginia pine, 1.1 cords of pulpwood.

At the same age, the average yield per acre is about as follows: for mixed oaks, 9,750 board feet; for loblolly pine, 23,600 board feet or 50 cords of pulpwood; and for yellow-poplar, 17,620 board feet. At 30 years, a fully stocked stand of Virginia pine yields about 33 cords of pulpwood per acre, and at 50 years it yields about 54 cords.

Some areas of these soils have natural stands of sweetgum, but there are no reliable estimates of yields.

**Woodland suitability group 3r4**

This group is made up of some well drained, easily eroded soils of the Westphalia series. Slopes range from 6 to 12 percent.

In a normal stand of timber 50 years old, the average

annual increase per acre is about as follows: for mixed oaks, 200 board feet; for yellow-poplar, 350 board feet; for loblolly pine, 470 board feet or 1 cord of pulpwood; and for Virginia pine, 1.1 cords of pulpwood.

At the same age, the average yield per acre is about as follows: for mixed oaks, 9,750 board feet; for yellow-poplar, about 17,620 board feet; and for loblolly pine, 23,600 board feet. At 30 years, a fully stocked stand of Virginia pine yields about 33 cords of pulpwood per acre, and at 50 years it yields about 54 cords.

#### Woodland suitability group 3w3

This group is made up of soils of medium productivity of the Beltsville, Bourne, Caroline, Keyport, and Mattapex series.

In a normal stand of timber 50 years old, the average annual increase per acre is about as follows: for mixed oaks, 200 board feet; for loblolly pine, 470 board feet or 1 cord of pulpwood; and for Virginia pine, 1.1 cords of pulpwood.

At the same age, the average yield per acre is about as follows: for mixed oaks, 9,750 board feet; and for loblolly pine, 15,900 board feet or 51 cords of pulpwood. At 30 years, a fully stocked stand of Virginia pine yields about 33 cords of pulpwood per acre, and at 50 years, it yields about 54 cords.

Yellow-poplar is not well suited to most of these soils. Some areas have stands of sweetgum or red maple, but there are no reliable estimates of yields.

#### Woodland suitability group 3w4

This group consists of poorly drained, level to nearly level soils of the Leonardtown, Elkton, and Othello series. Potential productivity is good.

In a normal stand of timber 50 years old, the average annual increase per acre is about as follows: for loblolly pine, 470 board feet or 1 cord of pulpwood, and for sweet gum, 350 board feet. At the same age, the yield of loblolly timber per acre is about 23,600 board feet.

Some of these soils have sweetgum or red maple growing on them, but there are no reliable estimates of yields.

#### Woodland suitability group 3w6

The only soil in this group is in the Klej series. Potential productivity is good. This soil is moderately well drained, and has a slope of no more than about 5 percent.

In a normal stand of timber 50 years old, the average annual increase per acre is about as follows: for mixed oaks, 200 board feet; and for loblolly pine, 470 board feet or 1 cord of pulpwood. At the same age, the average yield per acre for mixed oaks is about 9,750 board feet, and for loblolly pine it is 23,600 board feet.

This soil is suited to white pine, but there is no reliable estimate of yields.

#### Woodland suitability group 3s1

This group is made up of soils of the Evesboro series and the Evesboro-Westphalia complex. Potential productivity is medium. These soils are excessively drained or well drained, and they have a slope that ranges to more than 40 percent.

In a normal stand of timber 50 years old, the average annual increase per acre is about as folows: for mixed oaks, 200 board feet; for loblolly pine, 470 board feet or 1 cord of pulpwood; and for Virginia pine, 1.1 cords of pulpwood.

At the same age, the average yield per acre is about as follows: for mixed oaks, 9,750 board feet; and for loblolly pine, 23,600 board feet or 50 cords of pulpwood. At 30 years, a fully stocked stand of Virginia pine yields about 33 cords of pulpwood per acre, and at 50 years it yields about 54 cords.

#### Woodland suitability group 4d2

This group is made up of soils of the Croom series. Woodland productivity is. poor. These soils have a limited rooting zone over very hard, massive, gravelly subsoil. Roots appear to anchor well into the subsoil, but do not penetrate deeply enough to use most of the subsoil moisture. The soils are well drained, and they have a slope of no more than about 15 percent.

In a normal stand of timber 50 years old, the average annual increase per acre is about as follows: for mixed oaks, 125 board feet; and for Virginia pine, 0.6 cord of pulpwood. At the same age, the yield for mixed oaks is about 6,300 board feet. At 30 years, a fully stocked stand of Virginia pine yields about 19 cords of pulpwood per acre, and at 50 years it yields about 31 cords.

### Use of soils for wildlife habitat

The production of a wildlife species depends largely on the amount and distribution of food, shelter, and water. If any of these elements is missing, inadequate, or inaccessible, the species is absent or scarce. The kinds of wildlife that live in a given area and the number of each kind are closely related to land use, to the resulting kinds and patterns of vegetation, and to the supply and distribution of water. These, in turn, are generally related to the kinds of soils.

Habitat for wildlife normally can be created or improved by planting suitable vegetation, by properly managing the existing plant cover, by fostering the natural establishment of desirable plants, or by using a combination of these measures.

This subsection rates the soils of St. Marys County according to their suitability for seven elements of wildlife habitat and for three general kinds of wildlife habitat. Then it explains the elements and the general kinds of wildlife habitat and explains the ratings.

#### Uses of suitability ratings

The suitability ratings in this subsection can be used as an aid in:

1. Planning the broad use of parks, refuges, nature-study areas, and other developments for wildlife.
2. Selecting the better soils for creating, improving, or maintaining specific kinds of wildlife habitat elements.
3. Determining the relative intensity of management needed for individual habitat elements.
4. Eliminating sites that would be difficult or not practical to manage for specific kinds of wildlife.

5. Determining areas that are suitable for acquisition for use as wildlife habitat.

**Habitat elements**

Each soil is rated in table 6 according to its suitability for various kinds of plants and other elements that make up wildlife habitat. The seven elements considered important are as follows:

*Grain and seed crops.*—These crops include such seed producing annuals as corn, sorghum, wheat, barley, oats, millet, and other plants commonly grown for grain or for seed. The major soil properties that affect this habitat element are effective rooting depth, available water capacity, natural drainage, slope, surface stoniness, hazard of flooding, and texture of the surface layer and subsoil.

*Domestic grasses and legumes.*—This group consists of domestic perennial grasses and herbaceous legumes that are established by planting and furnish wildlife cover and food. Among the plants are bluegrass, fescue, lespedeza, timothy, orchard grass, clover, and alfalfa. The major soil properties that affect this habitat element are effective rooting depth, available water capacity, natural drainage, slope, surface stoniness, hazard of flooding, and texture of the surface layer and subsoil.

*Wild herbaceous plants.*—In this group are native or introduced perennial grasses and weeds that generally are established naturally. They include panicgrass and other native grasses, partridge pea, beggarticks, native lespedeza, and dandelion. They provide food and cover principally to upland forms of wildlife. The major soil properties that affect this habitat element are effective rooting depth, available water capacity, natural drainage, surface stoniness, hazard of flooding or ponding, and texture of the surface layer and subsoil.

*Hardwood trees.*—This element includes nonconiferous trees, shrubs, and woody vines that produce nuts or other fruits, buds, catkins, twigs, or foliage that wildlife eat. They are generally established naturally but may be planted. Among the native kinds are oak, cherry, maple, poplar, apple, dogwood, persimmon, sumac, sassafras, hazel, black walnut, hickory, sweetgum, bayberry, blueberry, huckleberry, grape, and briers. The major soil properties that affect this habitat element are effective rooting depth, available water capacity, and natural drainage.

Also in this group are several varieties of fruiting shrubs that are raised commercially for planting. Autumn-olive, Amur honeysuckle, Tatarian honeysuckle, crabapple, multiflora rose, highbush cranberry, and silky cornel dogwood are some of the shrubs that generally are available and can be planted on soils that are rated well suited. Hardwoods that are not available commercially can commonly be transplanted successfully.

*Coniferous plants.*—This element consists of cone-bearing evergreen trees and shrubs that are used by wildlife primarily as cover, although they also provide browse and seeds or fruit-like cones. Among these are Norway spruce, Virginia pine, loblolly pine, shortleaf pine, pond pine, Scotch pine, redcedar, and Atlantic white cedar. Generally, the plants are established naturally in areas where cover of weeds and sod is thin but they may also be planted. The major soil properties that affect this habitat element are effective rooting depth, available water capacity, and natural drainage.

*Wetland plants.*—Making up this group are wild, herbaceous, annual, and perennial plants that grow on moist to wet sites, exclusive of submerged or floating aquatics. They produce food and cover extensively used mainly by wetland forms of wildlife. They include smartweed, wild millet, bulrush, sedges, barnyard grass, pondweed, duckweed, duck millet, arrow arum, pickerelweed, waterwillow, wetland grasses, wildrice, and cattails. The major soil properties that affect this habitat element are natural drainage, surface stoniness, slope, and texture of the surface layer and subsoil.

*Shallow water areas.*—These are areas of shallow water, generally not exceeding 5 feet in depth, near food and cover for wetland wildlife. They may be natural wet areas, or those created by dams, levees, or water-control devices in marshes or streams. Examples of such developments are wildlife ponds, beaver ponds, muskrat marshes, waterfowl feeding areas, and wildlife watering developments. The major soil properties that affect this habitat element are natural drainage, slope, surface stoniness, and permeability. Natural wet areas that are aquifer fed are rated on the basis of drainage class without regard to permeability. Permeability of the soil is a factor only for those non-aquifer areas that have a potential for development; here water is assumed to be available offsite.

**Classes of wildlife**

Table 6 rates the soils according to their suitability for three general kinds of wildlife habitat in the county—open land, woodland, and wetland wildlife.

*Open land wildlife.*—Examples of open land wildlife are quail, meadowlark, field sparrow, dove, cottontail rabbit, red fox, and woodchuck. These birds and mammals normally make their home in areas of cropland, pasture, meadow, and lawns and in areas overgrown with grasses, herbs, shrubs, and vines.

*Woodland wildlife.*—Among the birds and mammals that prefer woodland are woodcock, thrush, scarlet tanager, gray squirrels, gray fox, red fox, white-tailed deer, and raccoon. They obtain food and cover in stands of hardwoods, coniferous trees, shrubs, or a mixture of these plants.

*Wetland wildlife.*—Ducks, geese, coots, rails, gallinules, herons, shore birds, beaver, and muskrat are familiar examples of birds and mammals that normally make their home in such wet areas as ponds, marshes, and swamps.

Each rating under "Kinds of wildlife" in table 6 is based on the ratings listed for the habitat elements in the first part of the table. For open land wildlife the rating is based on the ratings shown for grain and seed crops, domestic grasses and legumes, wild herbaceous upland plants, and either hardwood woody plants or coniferous woody plants, whichever is most applicable. The rating for woodland wildlife is based on the ratings listed for domestic grasses and legumes, wild herbaceous upland plants, and either hardwood woody plants or coniferous woody plants, whichever is most applicable. For wetland wildlife the rating is

TABLE 6.—*Suitability of the soils for elements*

[Cut and fill land (Cu) and Gravel pits

| Soil series and map symbols | Elements of wildlife habitat | | | |
|---|---|---|---|---|
| | Grain and seed crops | Grasses and legumes | Wild herbaceous upland plants | Hardwood woody plants |
| Alluvial land: Aa | Fair | Good | Good | Good |
| Alluvial land, wet: Ad | Poor | Fair | Fair | Good |
| Beaches: Be | Very poor | Poor | Poor | Very poor |
| Beltsville: | | | | |
| BlA | Fair | Good | Good | Good |
| BlB2, BlB3, BlC2 | Fair | Good | Good | Good |
| BlC3 | Poor | Fair | Fair | Good |
| Bibb: Bm | Poor | Fair | Fair | Good |
| Bourne: | | | | |
| BrB2 | Fair | Good | Good | Good |
| BrC3 | Poor | Fair | Fair | Good |
| Caroline: | | | | |
| CaB2, CaC2, CaD2 | Fair | Good | Good | Good |
| CaC3 | Poor | Fair | Fair | Good |
| CaD3 | Very poor | Poor | Fair | Good |
| Chillum: | | | | |
| ChA, ChB2, ChC2 | Fair | Good | Good | Good |
| ChC3 | Poor | Fair | Good | Good |
| Croom: | | | | |
| CrB2, CrC2, CrD2 | Poor | Fair | Fair | Fair |
| CrD3 | Very poor | Poor | Good | Good |
| Elkton: Ek | Poor | Fair | Fair | Good |
| Evesboro: EvB, EvC | Poor | Poor | Poor | Poor |
| Evesboro-Westphalia complex: | | | | |
| EwC2 | Poor | Poor | Poor | Poor |
| EwD2, EwE2 | Very poor | Very poor | Poor | Poor |
| Faceville: FaB | Fair | Good | Good | Good |
| Fallsington: Fs | Poor | Fair | Fair | Good |
| Kempsville: | | | | |
| KeC2 | Fair | Good | Good | Good |
| KeC3, KeD2 | Poor | Fair | Good | Good |
| KeD3 | Very poor | Poor | Good | Good |
| Keyport: | | | | |
| KpA, KrA | Fair | Good | Good | Good |
| KpB2, KrB2, KrC2 | Poor | Fair | Fair | Good |
| Klej: Kz | Poor | Fair | Fair | Fair |
| Leonardtown: Le | Poor | Fair | Fair | Fair |
| Marr: | | | | |
| MaB2, MaC2 | Fair | Good | Good | Good |
| MaC3 | Poor | Fair | Good | Good |
| Matapeake: | | | | |
| MmA, MnA | Good | Good | Good | Good |
| MmB2, MnB2 | Fair | Good | Good | Good |
| MnC3 | Poor | Fair | Fair | Good |
| Mattapex: | | | | |
| MtA, MuA | Fair | Good | Good | Good |
| MtB2, MuB2, MuC2 | Fair | Good | Good | Good |

*of wildlife habitat and kinds of wildlife*

(Gp) are too variable to be rated]

| Elements of wildlife habitat—Continued | | | | Kinds of wildlife | | |
|---|---|---|---|---|---|---|
| Coniferous woody plants | Wetland food and cover plants | Shallow water developments | Excavated ponds | Open land | Woodland | Wetland |
| Poor | Poor | Poor | Poor | Good | Good | Poor. |
| Fair | Good | Fair | Poor | Fair | Good | Fair. |
| Very poor | Very poor | Very poor | Very poor | Very poor | Very poor | Very poor. |
| Poor | Poor | Poor | Poor | Good | Good | Poor. |
| Poor | Very poor | Very poor | Very poor | Good | Good | Very poor. |
| Poor | Very poor | Very poor | Very poor | Fair | Good | Very poor. |
| Fair | Fair | Fair | Poor | Fair | Good | Fair. |
| Poor | Very poor | Very poor | Very poor | Good | Good | Very poor. |
| Poor | Very poor | Very poor | Very poor | Fair | Good | Very poor. |
| Fair | Very poor | Very poor | Very poor | Good | Good | Very poor. |
| Fair | Very poor | Very poor | Very poor | Fair | Good | Very poor. |
| Fair | Very poor | Very poor | Very poor | Poor | Good | Very poor. |
| Poor | Very poor | Very poor | Very poor | Good | Good | Very poor. |
| Poor | Very poor | Very poor | Very poor | Fair | Fair | Very poor. |
| Fair | Very poor | Very poor | Very poor | Fair | Fair | Very poor. |
| Poor | Very poor | Very poor | Very poor | Poor | Fair | Very poor. |
| Fair | Good | Good | Good | Fair | Good | Good. |
| Good | Very poor | Very poor | Very poor | Poor | Poor | Very poor. |
| Good | Very poor | Very poor | Very poor | Poor | Poor | Very poor. |
| Good | Very poor | Very poor | Very poor | Poor | Poor | Very poor. |
| Poor | Very poor | Very poor | Very poor | Good | Good | Very poor. |
| Fair | Good | Good | Good | Fair | Good | Good. |
| Poor | Very poor | Very poor | Very poor | Good | Good | Very poor. |
| Poor | Very poor | Very poor | Very poor | Fair | Good | Very poor. |
| Fair | Very poor | Very poor | Very poor | Poor | Good | Very poor. |
| Poor | Poor | Poor | Poor | Good | Good | Poor. |
| Fair | Poor | Very poor | Very poor | Fair | Good | Very poor. |
| Poor | Poor | Poor | Good | Fair | Poor | Fair. |
| Fair | Fair | Fair | Fair | Fair | Fair | Fair. |
| Poor | Very poor | Very poor | Very poor | Good | Good | Very poor. |
| Poor | Very poor | Very poor | Very poor | Fair | Fair | Very poor. |
| Poor | Very poor | Very poor | Very poor | Good | Good | Very poor. |
| Poor | Very poor | Very poor | Very poor | Good | Good | Very poor. |
| Poor | Very poor | Very poor | Very poor | Fair | Fair | Very poor. |
| Poor | Poor | Poor | Poor | Good | Good | Poor. |
| Poor | Very poor | Very poor | Very poor | Good | Good | Very poor. |

TABLE 6.—*Suitability of the soils for elements*

| Soil series and map symbols | Elements of wildlife habitat | | | |
|---|---|---|---|---|
| | Grain and seed crops | Grasses and legumes | Wild herbaceous upland plants | Hardwood woody plants |
| Othello: On, Ot | Poor | Fair | Fair | Good |
| Rumford: RuB, RuC2 | Fair | Fair | Fair | Fair |
| Sassafras: | | | | |
| SaA, SfA | Good | Good | Good | Good |
| SaB2, SaC2, SfB2 | Fair | Good | Good | Good |
| SaC3, SaD2 | Poor | Fair | Good | Good |
| SaD3 | Very poor | Poor | Good | Good |
| Sassafras-Chillum complex: | | | | |
| SmC2 | Fair | Good | Good | Good |
| SmC3 | Poor | Fair | Good | Good |
| Tidal marsh: Tm | Very poor | Very poor | Very poor | Very poor |
| Westphalia: | | | | |
| WeB2, WeC2 | Fair | Good | Good | Good |
| WeC3 | Poor | Fair | Good | Good |
| Woodstown: | | | | |
| WsA | Fair | Good | Good | Good |
| WsB, WsC2 | Fair | Good | Good | Good |

based on the ratings shown for wetland food and cover plants and shallow water areas.

On soils rated *Good,* habitat is generally easily created, improved, or maintained. There are few or no soil limitations in habitat management and satisfactory results are well assured.

On soils rated *Fair,* habitat generally can be created, improved or maintained, but the soils have moderate limitations that affect the creation, improvement, or maintenance of the habitat. A moderate intensity of management and fairly frequent attention may be required to assure satisfactory results.

On soils rated *Poor,* habitat can generally be created, improved, or maintained, but there are rather severe soil limitations. Habitat management may be difficult and expensive, and may require intensive effort. Satisfactory results are questionable.

On soils rated *Very Poor,* it is impractical to create, improve, or maintain habitat because of the very severe soil limitations. Unsatisfactory results are probable.

Not considered in the ratings are present land use, the location of a soil in relation to other soils, and the mobility of wildlife.

## Engineering uses of the soils [8]

This section is useful to those who need information about soils used as structural material or as a foundation upon which structures are built. Among those who can benefit from this section are planning commissions, town and city managers, land developers, engineers, contractors, and farmers.

Among properties of soils highly important in engineering are permeability, strength, compaction characteristics, soil drainage condition, shrink-swell potential, grain size, plasticity, and soil reaction. Also important are depth to the water table, depth to bedrock, and soil slope. These properties, in various degrees and combinations, affect construction for small buildings, irrigation systems, ponds and small dams, and systems for disposal of sewage and refuse.

Information in this section of the soil survey can be helpful to those who—

1. Select potential residential, industrial, commercial, and recreational areas.
2. Evaluate alternate routes for roads, highways, pipelines, and underground cables.
3. Seek sources of gravel, sand, or clay.
4. Plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for controlling water and conserving soil.
5. Correlate performance of structures already built with properties of the kinds of soil on which they are built, for the purpose of predicting performance of structures on the same or similar kinds of soil in other locations.
6. Predict the trafficability of soils for cross-country movement of vehicles and construction equipment.
7. Develop preliminary estimates pertinent to construction in a particular area.

[8] RICHARD R. NAGEL, assistant state conservation engineer, Soil Conservation Service, assisted in preparation of this section.

*of wildlife habitat and kinds of wildlife*—Continued

| Elements of wildlife habitat—Continued | | | | | | |
|---|---|---|---|---|---|---|
| Coniferous woody plants | Wetland food and cover plants | Shallow water developments | Excavated ponds | Open land | Woodland | Wetland |
| Fair | Good | Good | Good | Fair | Good | Good. |
| Fair | Very poor | Very poor | Very poor | Fair | Fair | Very poor. |
| Poor | Very poor | Very poor | Very poor | Good | Good | Very poor. |
| Poor | Very poor | Very poor | Very poor | Good | Good | Very poor. |
| Poor | Very poor | Very poor | Very poor | Fair | Fair | Very poor. |
| Poor | Very poor | Very poor | Very poor | Poor | Fair | Very poor. |
| Poor | Very poor | Very poor | Very poor | Good | Good | Very poor. |
| Poor | Very poor | Very poor | Very poor | Fair | Good | Very poor. |
| Very poor | Good | Poor | Very poor | Very poor | Very poor | Fair. |
| Poor | Very poor | Very poor | Very poor | Good | Good | Very poor. |
| Poor | Very poor | Very poor | Very poor | Fair | Good | Very poor. |
| Poor | Poor | Poor | Poor | Good | Good | Poor. |
| Poor | Very poor | Very poor | Very poor | Good | Good | Very poor. |

Most of the information in this section is presented in tables 7, 8, and 9, which show, respectively, several estimated soil properties significant to engineering; interpretations for various engineering uses; and results of engineering laboratory tests on soil samples.

This information, along with the soil map and other parts of this survey, can be used to make interpretations in addition to those given in tables 7 and 8, and it also can be used to make other useful maps.

This information, however, does not eliminate need for further investigations at sites selected for engineering projects, especially those that involve heavy loads or that require excavations to depths greater than those shown in the tables, generally depths greater than 6 feet. Also, inspection of sites, especially the small ones, is needed because many mapped areas of a given soil mapping unit may contain small areas of other kinds of soil that have strongly contrasting properties and different suitabilities or limitations for soil engineering.

Some of the terms used in this soil survey have special meaning to soil scientists that is not known to all engineers. The Glossary defines many of these terms commonly used in soil science.

### Engineering classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified system (*2*) used by the SCS engineers, Department of Defense, and others, and the AASHTO (*1*) system adopted by the American Association of State Highway and Transportation Officials.

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

The AASHTO system is used to classify soils according to those properties that affect use in highway construction and maintenance. In this system, a soil is placed in one of seven basic groups ranging from A–1 through A–7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A–1 are gravelly soils of high bearing strength, or the best soils for subgrade (foundations). At the other extreme, in group A–7, are clay soils that have low strength when wet and that are the poorest soils for subgrade. 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, A–7–5, and A–7–6. As additional refinement, the 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 or more for the poorest. The AASHTO classification for tested soils, with group index numbers in parentheses, is shown in table 9; the estimated classification, without group index numbers, is given in table 7 for all soils mapped in the survey area.

USDA texture is determined by the relative proportions of sand, silt, and clay in soil material that is less than 2.0 millimeters in diameter. "Sand," "silt,"

TABLE 7.—*Estimated engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. follow carefully the instructions for referring to other series that appear in the first column of this table. Alluvial land (Aa), rate. The symbol > means more

| Soil series and map symbols | Depth to high water table | Depth from surface [1] | Classification | | |
|---|---|---|---|---|---|
| | | | USDA texture | Unified | AASHTO |
| | *Ft* | *In* | | | |
| Beltsville: BlA, BlB2, BlB3, BlC2, BlC3. | 1½–2½ | 0–24 | Silt loam | ML | A–4 |
| | | 24–42 | Loam, silt loam (fragipan) | ML, CL | A–4, A–6 |
| | | 42–73 | Loam, sandy loam, gravelly loam. | SM, ML | A–2, A–4 |
| Bibb: Bm | 0–1 | 0–28 | Silt loam, sandy loam | ML, SM | A–4 |
| | | 28–60 | Sandy loam, sandy clay loam, fine sandy loam, silty clay loam (stratified). | SM, SC, CL | A–2, A–4, A–6 |
| Bourne: BrB2, BrC3 | 1½–2½ | 0–25 | Fine sandy loam, loam | SM, ML | A–2, A–4 |
| | | 25–55 | Fine sandy loam (fragipan) | SM, ML | A–2, A–4 |
| | | 55–60 | Sandy loam, sandy clay loam. | SM, ML, SC | A–2, A–4, A–6 |
| Caroline: CaB2, CaC2, CaC3, CaD2, CaD3. | [3] 5 | 0–7 | Silt loam | ML, CL | A–4, A–6 |
| | | 7–60 | Clay loam, silty clay | CL, ML | A–6, A–7 |
| Chillum: ChA, ChB2, ChC2, ChC3. | 5 | 0–23 | Clay loam, loam, silt loam | ML, CL | A–4, A–6 |
| | | 23–60 | Gravelly loam, gravelly sandy clay loam, gravelly sandy loam. | SM, SC, GM | A–2 |
| Croom: CrB2, CrC2, CrD2, CrD3. | >5 | 0–14 | Gravelly sandy loam | GM, GC, GP–GM | A–1, A–2 |
| | | 14–32 | Very gravelly sandy clay loam, gravelly loam, gravelly clay loam. | GM, GC | A–2, A–4 |
| | | 32–60 | Gravelly sandy loam | GM, GP–GM | A–1, A–2 |
| Elkton: Ek | 0 | 0–13 | Silt loam | ML, CL | A–4, A–6 |
| | | 13–60 | Clay, silty clay, silty clay loam. | MH, CL, CH | A–6, A–7 |
| *Evesboro: EvB, EvC, EwC2, EwD2, EwE2. For Westphalia part of EwC2, EwD2, and EwE2, see Westphalia series. | >5 | 0–60 | Loamy sand, sand | SM, SP–SM | A–1, A–2, A–3 |
| Faceville: FaB | >4 | 0–20 | Silt loam, clay loam | ML, CL | A–4, A–6 |
| | | 20–60 | Clay loam, clay, silty clay | CL, ML | A–6, A–7 |
| Fallsington: Fs | 0 | 0–12 | Sandy loam | SM, SC | A–2, A–4 |
| | | 12–40 | Sandy clay loam, loam, sandy loam. | SM, SC, ML | A–2, A–4 |
| | | 40–72 | Loamy sand, sandy loam | SM, SP–SM | A–2, A–3 |
| Kempsville: KeC2, KeC3, KeD2, KeD3. | >6 | 0–15 | Fine sandy loam | SM, ML, CL | A–4, A–6 |
| | | 15–60 | Clay loam, sandy clay loam, loam. | SC, CL, MH | A–4, A–6, A–7 |
| Keyport: KpA, KpB2, KrA, KrB2, KrC2. | 1½–2½ | 0–14 | Silt loam, fine sandy loam | SM, ML, CL | A–4, A–6 |
| | | 14–56 | Silty clay loam, silty clay, clay. | MH, CL, CH | A–6, A–7 |
| | | 56–60 | Fine sandy clay loam, sandy clay. | SC, CL | A–2, A–6, A–7 |

*properties of soils*

The soils in such mapping units may have different properties and different limitations, and for this reason it is necessary to
Alluvial land, wet (Ad), Beaches (Be), Cut and fill land (Cu), Gravel pits (Gp), and Tidal marsh (Tm) are too variable to
than; the symbol < means less than]

| Percentage passing sieve— | | | | Permeability range [2] | Available water capacity | Reaction (unlimed) | Shrink swell potential |
|---|---|---|---|---|---|---|---|
| No. 4 (4.7 mm) | No. 10 (2.0 mm) | No. 40 (0.42 mm) | No. 200 (0.074 mm) | | | | |
| | | | | *In per hr* | *In per in of soil* | *pH* | |
| 95–100 | 90–100 | 75–100 | 60–90 | 0.60–2.0 | 0.18–0.24 | 4.0–5.0 | Low. |
| 95–100 | 90–100 | 90–100 | 65–95 | <0.20 | 0.10–0.18 | 4.0–5.5 | Low. |
| 75–100 | 65–100 | 55–100 | 25–80 | 0.20–6.0 | 0.08–0.16 | 4.0–5.0 | Low. |
| 95–100 | 90–100 | 80–100 | 40–80 | 0.60–2.0 | 0.10–0.24 | 4.0–5.0 | Low. |
| 50–100 | 45–100 | 40–90 | 25–80 | 0.60–2.0 | 0.10–0.20 | 4.0–5.5 | Low. |
| 75–100 | 55–100 | 50–100 | 25–75 | 0.60–2.0 | 0.10–0.18 | 4.0–5.5 | Low. |
| 75–100 | 65–100 | 60–100 | 25–60 | <0.20 | 0.08–0.18 | 4.0–5.0 | Low. |
| 75–100 | 65–100 | 60–100 | 25–60 | 0.60–2.0 | 0.10–0.18 | 4.0–5.0 | Low. |
| 95–100 | 90–100 | 90–100 | 65–95 | 0.60–2.0 | 0.12–0.24 | 4.0–5.0 | Low to moderate. |
| 95–100 | 95–100 | 90–100 | 70–100 | 0.20–0.60 | 0.11–0.18 | 4.0–5.0 | Low to moderate. |
| 80–100 | 65–100 | 60–100 | 55–90 | 0.60–2.0 | 0.18–0.27 | 4.0–5.0 | Low. |
| 60–95 | 55–90 | 30–60 | 15–35 | 0.20–2.0 | 0.08–0.12 | 4.0–5.5 | Low. |
| 50–70 | 40–60 | 20–40 | 5–35 | 0.60–6.0 | 0.08–0.16 | 4.0–5.0 | Low. |
| 45–80 | 40–70 | 35–65 | 30–50 | 0.20–0.60 | 0.12–0.18 | 4.0–5.0 | Low. |
| 40–70 | 35–60 | 30–50 | 5–20 | 2.0–6.0 | 0.06–0.12 | 4.0–5.5 | Low. |
| 90–100 | 85–100 | 80–100 | 55–100 | 0.20–2.0 | 0.18–0.27 | 4.0–5.0 | Low. |
| 95–100 | 80–100 | 80–100 | 70–100 | <0.20 | 0.18–0.24 | 4.0–5.0 | Moderate. |
| 75–100 | 60–100 | 40–95 | 5–15 | >6.0 | 0.06–0.10 | 4.0–5.0 | Low. |
| 95–100 | 95–100 | 65–95 | 50–70 | 0.60–2.0 | 0.12–0.18 | 4.5–6.0 | Low. |
| 95–100 | 90–100 | 60–95 | 50–80 | 0.60–2.0 | 0.14–0.20 | 4.5–5.5 | Low to moderate. |
| 95–100 | 90–100 | 70–100 | 20–50 | 0.60–6.0 | 0.10–0.20 | 4.0–5.0 | Low. |
| 95–100 | 90–100 | 70–100 | 20–60 | 0.60–2.0 | 0.10–0.18 | 4.0–5.0 | Low. |
| 90–100 | 70–100 | 50–100 | 5–30 | >2.0 | 0.06–0.12 | 4.0–5.0 | Low. |
| 80–100 | 80–100 | 75–100 | 45–75 | 0.60–6.0 | 0.12–0.24 | 4.5–5.5 | Low. |
| 85–100 | 85–100 | 65–100 | 40–80 | 0.60–2.0 | 0.14–0.24 | 4.5–5.5 | Low to moderate. |
| 95–100 | 90–100 | 70–100 | 40–100 | 0.20–2.0 | 0.12–0.24 | 4.0–5.0 | Low to moderate. |
| 85–100 | 75–100 | 70–100 | 65–100 | <0.20 | 0.12–0.24 | 4.0–5.0 | Moderate. |
| 95–100 | 95–100 | 75–100 | 30–60 | 0.20–2.0 | 0.14–0.24 | 4.0–5.0 | Low. |

TABLE 7.—*Estimated engineering*

| Soil series and map symbols | Depth to high water table | Depth from surface [1] | Classification | | |
|---|---|---|---|---|---|
| | | | USDA texture | Unified | AASHTO |
| | *Ft* | *In* | | | |
| Klej: Kz | 1–2½ | 0–30 | Loamy sand, fine sand | SM, SP–SM | A–2, A–3 |
| | | 30–60 | Sand | SP, SP–SM | A–3 |
| Leonardtown: Le | 0–1 | 0–21 | Silt loam, silty clay loam | ML, CL | A–4, A–6 |
| | | 21–45 | Silt loam, silty clay loam (fragipan). | ML, CL | A–4, A–6 |
| | | 45–60 | Silty clay | CL, CH | A–7 |
| Marr: MaB2, MaC2, MaC3 | >4 | 0–18 | Fine sandy loam | SM, ML | A–4 |
| | | 18–38 | Sandy loam, fine sandy clay loam. | SC, CL | A–4, A–6 |
| | | 38–60 | Loamy fine sand, fine sandy loam. | SM, ML | A–2, A–4 |
| Matapeake: MmA, MmB2, MnA, MnB2, MnC3. | >4 | 0–18 | Fine sandy loam, silt loam | ML, CL | A–4, A–6 |
| | | 18–30 | Silty clay loam, silt loam | ML, CL | A–4, A–6, A–7 |
| | | 30–60 | Sandy clay loam, sandy loam, loamy sand. | SM, SC, CL | A–2, A–4, A–6 |
| Mattapex: MtA, MtB2, MuA, MuB2, MuC2. | 1½–2½ | 0–16 | Silt loam, fine sandy loam | ML, CL | A–4 |
| | | 16–28 | Silt loam, silty clay loam | ML, CL | A–4, A–6 |
| | | 28–60 | Fine sandy loam | SM, ML | A–2, A–4 |
| Othello: On, Ot | 0 | 0–13 | Silt loam, fine sandy loam | ML, CL | A–4, A–6 |
| | | 13–26 | Silt loam, silty clay loam | ML, CL | A–4, A–6 |
| | | 26–60 | Fine sandy loam, loamy sand | SM, SC | A–2, A–4 |
| Rumford: RuB, RuC2 | >4 | 0–8 | Loamy sand | SM | A–2 |
| | | 8–32 | Sandy loam, sandy clay loam. | SM, SC | A–2, A–4 |
| | | 32–60 | Loamy sand to sandy loam | SM, SP–SM | A–2, A–4 |
| *Sassafras: SaA, SaB2, SaC2, SaC3, SaD2, SaD3, SfA, SfB2, SmC2, SmC3. For Chillum part of SmC2 and SmC3, see Chillum series. | 4 | 0–9 | Sandy loam, loam | SM, ML | A–2, A–4 |
| | | 9–40 | Sandy clay loam, loam, sandy loam. | SM, SC, ML, CL | A–2, A–4, A–6 |
| | | 40–70 | Loamy sand to sandy loam | SM, SP–SM | A–2, A–4 |
| Westphalia: WeB2, WeC2, WeC3 | >5 | 0–16 | Fine sandy loam | SM, ML, SC | A–2, A–4 |
| | | 16–26 | Heavy fine sandy loam | SM, SC | A–2, A–4, A–6 |
| | | 26–60 | Loamy fine sand, fine sand | SP–SM, SM, ML | A–2, A–3, A–4 |
| Woodstown: WsA, WsB, WsC2 | 1½–2½ | 0–15 | Sandy loam, loam | SM, ML | A–2, A–4 |
| | | 15–36 | Sandy clay loam, fine sandy loam, sandy loam. | SM, SC, ML, CL | A–2, A–4, A–6 |
| | | 36–60 | Loamy sand to sandy loam | SM, SP–SM | A–2, A–3, A–4 |

[1] Depths given are for the representative profile (see descriptions of the soils.) For any given layer, the figures are estimates of the range of the series within the county.

[2] Permeability classes are: <0.20, slow or very slow; 0.20–0.60, moderately slow; 0.60–2.0, moderate; 2.0–6.0, moderately

"clay," and some of the other terms used in the USDA textural classification are defined in the Glossary.

### Estimated engineering properties

Several estimated soil properties significant in engineering are given in table 7. These estimates are made for typical soil profiles, by layers sufficiently different to have different significance for soil engineering. The estimates are based on field observations made in the course of mapping, on test data for these and similar soils, and on experience with the same kinds of soil in other counties. Following are explanations of some of the columns in table 7.

*Depth to seasonal high water table* is the distance from the surface of the soil to the highest level that ground water reaches in the soil in most years.

*Soil texture* is described in the standard terms used by the Department of Agriculture. These terms take into account relative percentages of sand, silt, and clay in soil material that is less than 2 millimeters in

*properties of soils*—Continued

| Percentage passing sieve— | | | | Permeability range [2] | Available water capacity | Reaction (unlimed) | Shrink swell potential |
|---|---|---|---|---|---|---|---|
| No. 4 (4.7 mm) | No. 10 (2.0 mm) | No. 40 (0.42 mm) | No. 200 (0.074 mm) | | | | |
| | | | | *In per hr* | *In per in of soil* | *pH* | |
| 95–100 | 95–100 | 50–80 | 5–15 | >6.0 | 0.06–0.08 | 4.0–6.5 | Low. |
| 45–100 | 95–100 | 50–80 | 5–15 | >6.0 | 0.06–0.08 | 4.0–6.5 | Low. |
| 95–100 | 95–100 | 95–100 | 90–100 | 0.20–0.60 | 0.18–0.24 | 4.0–5.0 | Low. |
| 95–100 | 95–100 | 80–100 | 80–100 | <0.20 | 0.18–0.24 | 4.0–5.0 | Low. |
| 90–100 | 85–100 | 70–95 | 50–85 | 0.20–0.60 | 0.12–0.24 | 4.0–5.0 | Moderate. |
| 95–100 | 95–100 | 70–95 | 40–65 | 2.0–6.0 | 0.14–0.20 | 4.5–5.0 | Low. |
| 95–100 | 95–100 | 75–90 | 35–80 | 0.60–2.0 | 0.16–0.24 | 4.5–5.0 | Low. |
| 95–100 | 95–100 | 50–95 | 15–65 | 2.0–6.3 | 0.10–0.16 | 4.0–5.0 | Low. |
| 95–100 | 95–100 | 80–100 | 55–90 | 0.60–2.0 | 0.14–0.24 | 4.5–7.3 | Low. |
| 95–100 | 95–100 | 80–100 | 65–90 | 0.60–2.0 | 0.18–0.24 | 4.5–6.0 | Low. |
| 95–100 | 80–100 | 60–100 | 15–60 | 0.60–6.0 | 0.06–0.20 | 4.5–6.0 | Low. |
| 95–100 | 95–100 | 80–100 | 55–90 | 0.20–2.0 | 0.14–0.24 | 4.0–5.5 | Low. |
| 95–100 | 95–100 | 80–100 | 60–100 | 0.20–0.60 | 0.18–0.24 | 4.5–5.5 | Low. |
| 95–100 | 90–100 | 75–100 | 30–80 | 0.60–2.0 | 0.12–0.18 | 4.0–5.0 | Low. |
| 95–100 | 95–100 | 90–100 | 60–100 | 0.60–2.0 | 0.16–0.27 | 4.0–5.0 | Low. |
| 95–100 | 95–100 | 90–100 | 60–100 | 0.20–0.60 | 0.12–0.24 | 4.0–5.0 | Low. |
| 85–100 | 80–100 | 50–100 | 15–40 | 0.60–6.0 | 0.06–0.12 | 4.0–5.0 | Low. |
| 90–100 | 80–100 | 55–80 | 15–30 | >6.0 | 0.06–0.12 | 4.5–5.0 | Low. |
| 90–100 | 80–100 | 60–85 | 25–50 | 2.0–6.0 | 0.12–0.18 | 4.5–5.0 | Low. |
| 90–100 | 80–100 | 50–80 | 10–40 | >6.0 | 0.06–0.12 | 4.5–5.0 | Low. |
| 80–100 | 80–100 | 60–100 | 15–60 | 0.60–6.0 | 0.12–0.20 | 4.0–5.5 | Low. |
| 75–100 | 55–100 | 50–100 | 25–75 | 0.60–2.0 | 0.12–0.24 | 4.0–5.5 | Low. |
| 90–100 | 60–100 | 50–80 | 10–40 | 0.60–6.0 | 0.06–0.12 | 4.0–5.0 | Low. |
| 90–100 | 85–100 | 70–100 | 20–70 | 0.60–2.0 | 0.12–0.24 | 4.0–5.0 | Low. |
| 80–100 | 70–100 | 50–100 | 30–50 | 0.60–6.0 | 0.12–0.24 | 4.0–5.0 | Low. |
| 80–100 | 70–100 | 50–100 | 5–60 | 0.60–6.0 | 0.08–0.16 | 4.0–5.0 | Low. |
| 90–100 | 90–100 | 45–100 | 15–60 | 0.60–6.0 | 0.08–0.14 | 4.0–5.5 | Low. |
| 95–100 | 90–100 | 70–100 | 25–75 | 0.60–2.0 | 0.10–0.24 | 4.0–6.0 | Low. |
| 95–100 | 80–100 | 50–100 | 5–50 | 0.60–6.0 | 0.04–0.14 | 4.0–5.5 | Low. |

rapid; >6.0, rapid or very rapid.

[3] In places a perched water table is in areas of gently sloping soil for a few weeks late in winter and early in spring.

diameter. "Loam," for example, is soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the soil contains gravel or other particles coarser than sand, an appropriate modifier is added, as for example, "gravelly loamy sand." "Sand," "silt," "clay," and some of the other terms used in USDA textural classification are defined in the Glossary of this soil survey.

In the columns *Percentage passing sieve* the figures represent ranges in the percentage of the soil, by weight, that is finer than the 4 specified diameters given in the subheadings. They show that at the coarser extreme, one soil material may be 80 percent coarser than 2 millimeters in diameter, and is therefore highly gravelly. At the finer extreme, some layers of some soils are 100 percent finer than 0.074 millimeters in diameter, and are therefore composed entirely of clay, silt, and the very finest of sand.

No depth to bedrock is shown in table 7. All the soils of the county are underlain by unconsolidated

TABLE 8.—*Engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. follow carefully the instructions for referring to other series that appear in the first column of this table. Alluvial land (Aa),

| Soil series and map symbols | Suitability as source of— | | | Soil features affecting— | | |
|---|---|---|---|---|---|---|
| | Topsoil | Sand and gravel | Road fill | Highway and road location | Ponds | |
| | | | | | Reservoir areas | Embankments |
| Beltsville: BlA, BlB2, BlB3, BlC2, BlC3. | Fair to a depth of 10 inches. | Locally fair for gravel in substratum; silty; unsuitable for sand. | Poor to fair: A–6, A–4, A–2. | Perched water table at a depth of 1½ to 2½ feet; high potential frost action; seepage problem in cuts; cuts and fills needed. | Slow seepage in subsoil; variable seepage in substratum. | Fair stability and compaction; poor to fair resistance to piping. |
| Bibb: Bm | Fair to a depth of 2 feet. | Locally fair for gravel in substratum; silty; unsuitable for sand. | Poor to fair: A–6, A–4, A–2. | Seasonal water table at a depth of 0 to 1 foot; high potential frost action; flood hazard. | Seasonal water table at a depth of 0 to 1 foot; moderate seepage; flood hazard. | Poor to fair stability; fair compaction; poor resistance to piping. |
| Bourne: BrB2, BrC3 | Fair to a depth of 10 inches. | Unsuitable | Fair: A–2, A–4, A–6. | Perched water table at a depth of 1½ to 2½ feet; high potential frost action; seepage problems in cuts; cuts and fills needed. | Slow seepage | Good stability, compaction, and resistance to piping. |
| Caroline: CaB2, CaC2, CaC3, CaD2, CaD3. | Fair to a depth of 8 inches. | Unsuitable | Poor: 4–6, A–4, A–7. | High potential frost action; cuts and fills needed. | Moderately slow seepage. | Poor to fair stability and compaction; poor resistance to piping. |
| Chillum: ChA, ChB2, ChC2, ChC3. | Good to a depth of 2 feet. | Locally fair in substratum. | Fair: A–4, A–6 above 28 inches; good (A–2) below a depth of 28 inches. | Moderate: potential frost action; cuts and fills needed. | Moderate: seepage. | Fair stability, compaction, and resistance to piping to a depth of 28 inches. Good below a depth of 28 inches. |
| Croom: CrB2, CrC2, CrD2, CrD3. | Poor: gravelly. | Good for gravel; poor to unsuitable for sand. | Good: A–1, A–2, A–4. | Cuts and fills needed. | Moderate seepage in subsoil to high seepage in substratum; gravelly. | Good stability, compaction, and resistance to piping. |
| Elkton: Ek | Fair to a depth of 10 inches. | Unsuitable | Poor: A–7, A–6, A–4, A–2. | Seasonal water table at a depth of 0 to 1 foot; high potential frost action; plastic materials. | Seasonal water table at a depth of 0 to 1 foot; slow seepage. | Poor stability and compaction; moderate compressibility; good resistance to piping. |

*interpretations of soils*

The soils in such mapping units may have different properties and different limitations, and for this reason it is necessary to
Alluvial land, wet (Ad), Beaches (Be), Cut and fill land (Cu), Gravel pits (Gp), and Tidal marsh (Tm) are too variable to rate]

| Soil features affecting—Continued | | | | | |
|---|---|---|---|---|---|
| Drainage | Sprinkler irrigation | Terraces or diversions | Sodded waterways | Winter grading | Shallow excavations |
| Perched water table; slow subsoil permeability. | Drainage needed; moderate available water capacity; moderate intake; slow subsoil permeability. | Fair stability; highly erodible; perched water table and seepage in cuts. | Perched water table and seepage; moderate available water capacity; highly erodible. | Poor trafficability; perched water table at a depth of 1½ to 2½ feet. | Perched water table seepage plane at a depth of 1½ to 2½ feet. |
| Seasonal water table at a depth of 0 to 1 foot; moderate permeability; flood hazard. | Drainage needed; high available water capacity; moderate intake and permeability; flood hazard. | Not needed; nearly level. | Not needed; nearly level. | Poor trafficability; seasonal water table at a depth of 0 to 1 foot; flood hazard. | Seasonal water table at a depth of 0 to 1 foot; trenches subject to slumping; flood hazard. |
| Perched water table; slow subsoil permeability. | Drainage needed; low to moderate available water capacity; moderate intake; slow subsoil permeability. | Good stability; highly erodible; perched water table and seepage in cuts. | Perched water table and seepage; low to moderate available water capacity; highly erodible. | Fair trafficability; perched water table at a depth of 1½ to 2½ feet. | Perched water table seepage plane at a depth of 1½ to 2½ feet. |
| Moderately slow permeability. | High available water capacity; moderately slow intake and permeability. | Poor to fair stability; highly erodible; seepage in cuts. | High available water capacity; highly erodible. | Fair trafficability | Clayey material. |
| Not needed: well drained. | Moderate intake; moderate to moderately slow permeability; moderate available water capacity. | Fair stability; moderately erodible. | Moderate available water capacity; moderately erodible. | Fair trafficability | Only fair stability above a depth of 28 inches. |
| Not needed: well drained. | Moderate intake; moderately slow permeability; low to moderate available water capacity. | Good stability; moderately erodible. | Slow to moderate available water capacity; moderately erodible. | Good trafficability | No special problems. |
| Seasonal water table at a depth of 0 to 1 foot; slow permeability. | Drainage needed; high available water capacity; slow intake and permeability. | Not needed; nearly level. | Not needed; nearly level. | Very poor trafficability; plastic; seasonal water table at a depth of 0 to 1 foot. | Seasonal water table at a depth of 0 to 1 foot; poor stability; plastic materials. |

TABLE 8.—*Engineering interpretations*

| Soil series and map symbols | Suitability as source of— | | | Soil features affecting— | | |
|---|---|---|---|---|---|---|
| | Topsoil | Sand and gravel | Road fill | Highway and road location | Ponds | |
| | | | | | Reservoir areas | Embankments |
| *Evesboro: EvB, EvC, EwC2, EwD2, EwE2. For Westphalia part of EwC2, EwD2 and EwE2, see Westphalia series. | Poor: sandy; droughty. | Good for sand; fair for gravel. | Good with binder: A–1, A–2, A–3, A–4. | Loose; subject to blowing; cuts and fills needed; difficult to vegetate. | Excessive seepage. | Fair stability and compaction; porous; poor resistance to piping. |
| Faceville: FaB | Good to a depth of 16 inches. | Unsuitable | Fair to good: A–4, A–6, A–2. | Moderate potential frost action; cuts and fills needed. | Moderate seepage. | Good stability, compaction, and resistance to piping. |
| Fallsington: Fs | Fair to a depth of 10 inches. | Fair below a depth of 28 inches. | Good to fair: A–2, A–3, A–4. | Seasonal water table at surface; high potential frost action; local ponding. | Seasonal water table at surface; moderate seepage to high seepage in substratum. | Fair stability; good compaction; fair resistance to piping. |
| Kempsville: KeC2, KeC3, KeD2, KeD3. | Good to a depth of 9 inches. | Unsuitable | Good to fair; A–2, A–4, A–6, A–7. | Moderate potential frost action; cuts and fills needed. | Moderate seepage. | Good stability, compaction, and resistance to piping. |
| Keyport: KpA, KpB2, KrA, KrB2, KrC2. | Fair to a depth of 10 inches. | Unsuitable | Poor: A–7, A–6, A–4, A–2. | Seasonal water table at a depth of 1½ to 2½ feet; high potential frost action; plastic material; cuts and fills. | Seasonal water table at a depth of 1½ to 2½ feet; very slow seepage. | Poor to fair stability and compaction; moderate compressibility; good resistance to piping. |
| Klej: Kz | Poor | Fair for sand; unsuited for gravel. | Fair | Seasonal high water table at a depth of 1 to 2½ feet; fair stability; moderate frost action. | High seepage | Fair stability; medium maximum density. |
| Leonardtown: Le | Poor to fair to a depth of 10 inches. | Unsuitable | Poor to fair: A–6, A–4, A–7. | Perched water table at surface; high potential frost action; seepage problems in cuts. | Perched water table at surface; very slow seepage in subsoil, variable seepage in substratum. | Poor to fair stability, compaction, and resistance to piping. |
| Marr: MaB2, MaC2, MaC3. | Good to a depth of 16 inches. | Unsuitable | Fair to good: A–4, A–6, A–2. | Moderate potential frost action. | Moderate seepage to high seepage substratum. | Fair to good stability and compaction; good resistance to piping in subsoil, poor in substratum. |

*of soils*—Continued

| Soil features affecting—Continued | | | | | |
|---|---|---|---|---|---|
| Drainage | Sprinkler irrigation | Terraces or diversions | Sodded waterways | Winter grading | Shallow excavations |
| Not needed; excessively drained. | Rapid intake and permeability; low available water capacity. | Loose: subject to blowing; low fertility; droughty. | Low available water capacity; low fertility. | No special problems. | Loose: trenches subject to caving. |
| Not needed; well drained. | Moderate intake; moderate permeability; high available water capacity. | Moderately erodible. | Moderately erodible. | Fair trafficability; some plastic materials. | No special problems. |
| Seasonal water table at surface; moderate permeability; flowage in substratum. | Drainage needed; moderate intake, permeability, and available water capacity. | Not needed; nearly level. | Not needed; nearly level. | Poor trafficability; seasonal water table at surface. | Seasonal water table at surface; trenches subject to caving; flowage in substratum. |
| Not needed; well drained. | Moderate intake and permeability; high available water capacity. | No special problems. | No special problems. | Good trafficability | No special problems. |
| Seasonal water table at a depth of 1½ to 2½ feet; slow permeability. | Drainage needed; moderate to slow intake; slow permeability; high available water capacity. | Poor to fair stability; highly erodible; plastic materials difficult to vegetate. | High available water capacity; highly erodible; plastic materials difficult to vegetate. | Poor trafficability; seasonal water table at a depth of 1½ to 2½ feet; plastic materials. | Seasonal water table at a depth of 1½ to 2½ feet; poor to fair stability; plastic materials. |
| Rapid permeability; ditches will cave; moderately well drained; seasonal high water table. | Low to moderate available water holding capacity; moderately rapid infiltration; moderately well drained. | Not needed, nearly level; short slopes. | Seasonal high water table; low to moderate water holding capacity. | Fair to good trafficability; seasonal high water table. | Seasonal high water table at a depth of 1 to 2½ feet; trenches subject to caving. |
| Perched water table; slow subsoil permeability. | Drainage needed; moderately slow intake; slow permeability; moderate available water capacity; limited rooting depth. | Perched water table at surface; highly erodible; seepage above fragipan. | Perched water table at surface; highly erodible; seepage above fragipan. | Poor trafficability; perched water table at surface. | Perched water table at surface; poor to fair stability; seepage above fragipan. |
| Not needed, well drained. | Moderate intake and permeability; high available water capacity. | Moderately erodible. | Moderately erodible. | Good trafficability | No special problems. |

TABLE 8.—*Engineering interpretations*

| Soil series and map symbols | Suitability as source of— | | | Soil features affecting— | | |
|---|---|---|---|---|---|---|
| | Topsoil | Sand and gravel | Road fill | Highway and road location | Ponds | |
| | | | | | Reservoir areas | Embankments |
| Matapeake: MmA, MmB2, MnA, MnB2, MnC3. | Good to a depth of 14 inches. | Locally fair for sand in substratum. | Fair: A–4, A–6, (rarely A–7), to A–2 in substratum. | Moderate potential frost action; cuts and fills needed. | Moderate seepage to high seepage in substratum. | Fair stability, compaction, and resistance to piping. |
| Mattapex: MtA, MtB2, MuA, MuB2, MuC2. | Good to a depth of 12 inches. | Unsuitable to locally fair in substratum. | Fair: A–2, A–4, A–6; good: A–2 in substratum. | Seasonal water table at a depth of 1½ to 2½ feet; high potential frost action. | Seasonal water table at a depth of 1½ to 2½ feet; moderate to moderately slow seepage to high seepage in substratum. | Fair stability and compaction; poor to fair resistance to piping. |
| Othello: On, Ot | Fair to a depth of 12 inches. | Locally fair for sand in substratum. Unsuitable for gravel. | Fair: A–4, A–6, A–2. | Seasonal water table at surface; high potential frost action. | Seasonal water table at surface; moderately slow seepage to rapid seepage in substratum. | Fair stability, compaction, and resistance to piping. |
| Rumford: RuB, RuC2 | Fair to poor in gravelly phases. | Locally fair for sand and gravel. | Good to fair: A–2, A–4. | Cuts and fills needed. | Rapid seepage. | Fair stability; good compaction; poor resistance to piping. |
| *Sassafras: SaA, SaB2, SaC2, SaC3, SaD2, SaD3, SfA, SfB2, SmC2, SmC3. For Chillum part of SmC2 and SmC3, see Chillum series. | Good to a depth of 12 inches. | Locally fair in substratum. | Good: A–2, A–4, A–6. | Cuts and fills needed. | Moderate seepage in subsoil to rapid seepage in substratum. | Good stability and compaction; fair resistance to piping. |
| Westphalia: WeB2, WeC2, WeC3. | Good to a depth of 2 feet. | Poor to fair for sand; unsuitable for gravel. | Good to fair: A–2, A–3, A–4. | Cuts and fills needed. | Moderate seepage in subsoil to rapid seepage in substratum. | Fair stability and compaction; poor resistance to piping; highly erodible. |
| Woodstown: WsA, WsB, WsC2. | Good to a depth of 15 inches. | Locally fair for sand; unsuitable for gravel. | Good to fair: A–2, A–3, A–4, A–6. | Seasonal water table at a depth of 1½ to 2½ feet; high potential frost action. | Seasonal water table at a depth of 1½ to 2½ feet; moderate seepage to high seepage in substratum. | Good stability and compaction; fair resistance to piping. |

*of soils*—Continued

| Soil features affecting—Continued | | | | | |
|---|---|---|---|---|---|
| Drainage | Sprinkler irrigation | Terraces or diversions | Sodded waterways | Winter grading | Shallow excavations |
| Not needed, well drained. | Moderate intake; moderate permeability; high available water capacity. | Fair stability; moderately erodible. | Moderately erodible. | Fair trafficability | No special problems. |
| Seasonal water table at a depth of 1½ to 2½ feet; moderately slow permeability. | Drainage needed; moderate intake; moderately slow permeability; high available water capacity. | Fair stability; moderately erodible. | Moderately erodible. | Poor trafficability; seasonal water table at a depth of 1½ to 2½ feet. | Seasonal water table at a depth of 1½ to 2½ feet. |
| Seasonal water table at surface; moderately slow permeability. | Drainage needed; moderate intake; moderately slow permeability; high available water capacity. | Not needed, nearly level. | Not needed, nearly level. | Poor trafficability; seasonal water table at surface. | Seasonal water table at surface; caving in substratum. |
| Not needed; somewhat excessively drained. | Moderately rapid to rapid intake; low permeability; moderate to low available water capacity. | Fair stability; moderate to low available water capacity. | Moderate to low water holding capacity. | Good trafficability | Fair stability; substratum tends to cave locally. |
| Not needed, well drained. | Moderate to moderately rapid intake; moderate permeability; moderate to high available water capacity. | No special problems. | No special problems. | Good trafficability | Substratum tends to cave locally. |
| Not needed, well drained. | Moderate intake; moderate to moderately rapid permeability; moderate to high available water capacity. | No special problems. | No special problems. | Good trafficability | Fair stability; substratum tends to cave. |
| Seasonal water table at a depth of 1½ to 2½ feet; moderate permeability. | Drainage needed; moderate intake, permeability, and available water capacity. | No special problems. | No special problems. | Fair trafficability; seasonal water table at a depth of 1½ to 2½ feet. | Seasonal water table at a depth of 1½ to 2½ feet; substratum tends to cave. |

TABLE 9.—*Engineering*

[Tests made by Soil Consultants, Incorporated, in accordance with standard procedures of

| Soil name and location | SCS report no. | Depth | Mechanical analysis [1] | | | |
|---|---|---|---|---|---|---|
| | | | Percentage passing sieve— | | | |
| | | | No. 4 (4.7 mm.) | No. 10 (2.0 mm.) | No. 40 (.42 mm.) | No. 200 (.074 mm.) |
| | | *In* | | | | |
| Bourne fine sandy loam: | 72MD–19–1–2 | 9–19 | ---------- | 100 | 98 | 42 |
| North of Bethel Church Road, ¾ mile | 72MD–19–1–5 | 39–55 | ---------- | 100 | 99 | 58 |
| northeast of Budds Creek. (Modal) | 72MD–19–1–6 | 55–65 | ---------- | 100 | 99 | 35 |
| Croom gravelly sandy loam: East of | 72MD–19–15–3 | 10–28 | [4] 46 | 36 | 27 | 21 |
| Rt. 244, 2½ miles southeast of | 72MD–19–15–4 | 28–70 | [5] 57 | 45 | 26 | 11 |
| Leonardtown. (Siltier than modal) | | | | | | |
| Elkton silt loam: Southside of Sugar | 72MD–19–3–4 | 13–22 | [6] 99 | 99 | 98 | 90 |
| Hole Road, 1¼ miles east of Bushwood. | 72MD–19–3–5 | 22–48 | [6] 99 | 98 | 96 | 84 |
| (Modal) | | | | | | |
| Faceville silt loam: Northwest of Rt. | 72MD–19–2–3 | 20–26 | ---------- | 100 | 94 | 68 |
| 242, 1 mile northeast of Bushwood. | 72MD–19–2–4 | 26–37 | ---------- | 99 | 90 | 56 |
| (Modal) | | | | | | |

[1] Mechanical analysis according to the AASHTO Designation T 88. Results by this procedure frequently may differ somewhat from the results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all 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 is excluded from calculations of grain-sized fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soil.

sediment of great thickness, so depth to bedrock has no significance.

*Permeability* is that quality of a soil that enables it to transmit water or air. It is estimated on basis of those soil characteristics observed in the field, particularly structure and texture. The estimates in table 7 do not take into account lateral seepage or such transient soil features as plowpans and surface crusts.

*Available water capacity* is the ability of soils to hold water for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point of most crop plants.

*Reaction* is the degree of acidity or alkalinity of a soil, expressed in pH values. The pH value and terms used to describe soil reaction are explained in the Glossary.

*Shrink swell potential* is the relative change in volume of soil material to be expected as moisture content changes, that is, the extent to which the soil shrinks as it dries out or swells as it gets wet. Extent of shrinking and swelling is influenced by the amount and kind of clay in the soil. Shrinking and swelling of soils causes much damage to building foundations, roads, and other structures. A *high* shrink swell potential indicates a hazard to maintenance of structures built in, on, or with material having this rating.

### Engineering interpretations of soils

The engineering interpretations in table 8 are based on the estimated properties of soils shown in table 7, on test data for soils in this survey area and others nearby or adjoining, and on the experience of engineers and soil scientists with the soils of St. Marys County. In table 8, ratings are used to summarize limitation or suitability of the soils for topsoil, sand and gravel, road fill, highway and road location, pond reservoir areas, embankments (and dikes), drainage of cropland, sprinkler irrigation, terraces and diversions, waterway layouts, winter grading, and shallow excavations.

*Topsoil* is used for topdressing an area where vegetation is to be established and maintained. Suitability is affected mainly by ease of working and spreading the soil material, as for preparing a seedbed; natural fertility of the material, or the response of plants when fertilizer is applied; and absence of substances toxic to plants. Texture of the soil material and its content of stone fragments are characteristics that affect suitability, but also considered in the ratings is damage that will result at the area from which topsoil is taken.

*Sand and gravel* are used in great quantities in many kinds of construction. The ratings in table 8 provide guidance about where to look for probable sources. A soil rated as a good or fair source of sand or gravel generally has a layer at least 3 feet thick, the top of which is within a depth of 6 feet. The ratings do not take into account thickness of overburden, location of the water table, or other factors that affect mining of the materials and neither do they indicate quality of the deposit.

*test data*

the American Association of State Highway and Transportation Officials (AASHTO)]

| Mechanical analysis [1]—Continued | | | | Liquid limit | Plasticity index | Classification | |
|---|---|---|---|---|---|---|---|
| Percentage smaller than— | | | | | | AASHTO | Unified [2] |
| 0.05 mm. | 0.02 mm. | 0.005 mm. | 0.002 mm. | | | | |
| 41 | 33 | 19 | 12 | [3]NP | NP | A–4 (1) | SM |
| 51 | 30 | 22 | 16 | NP | NP | A–4 (5) | ML |
| 34 | 34 | 33 | 31 | 32 | 10 | A–2–4 (0) | SM–SC |
| 15 | 14 | 11 | 9 | 33 | 16 | A–2–6 (0) | GC |
| 9 | 8 | 8 | 7 | 30 | 13 | A–2–6 (0) | SC |
| 89 | 82 | 69 | 55 | 49 | 21 | A–7–6 (14) | ML–CL |
| 83 | 79 | 68 | 54 | 48 | 20 | A–7–6 (14) | ML–CL |
| 67 | 64 | 58 | 50 | 42 | 18 | A–7–6 (10) | ML–CL |
| 54 | 54 | 53 | 46 | 39 | 15 | A–6 (6) | ML–CL |

[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 are to be given a borderline classification.
[3] NP means nonplastic.
[4] 100 percent of this sample passed the 2 inch sieve.
[5] 100 percent of this sample passed the 1½ inch sieve.
[6] 100 percent of this sample passed the ⅜ inch sieve.

*Road fill* is soil material used in embankments for roads. The suitability ratings reflect the predicted performance of soil after it has been placed in an embankment that has been properly compacted and provided with adequate drainage, and the relative ease of excavating the material at borrow areas.

Soil properties that most affect *highway and road location* are load supporting capacity and stability of the subgrade and the workability and quantity of cut and fill material available. The AASHTO and Unified classifications of the soil material and also the shrink-swell potential indicate traffic supporting capacity. Wetness and flooding affect stability of the material. Slope, content of stones and rocks, and wetness affect ease of excavation and amount of cut and fill needed to reach an even grade.

*Pond reservoir areas* hold water behind a dam or embankment. Soils suitable for pond reservoir areas have low seepage, which is related to their permeability and depth to permeable material. Dug-out ponds are dependent mainly on the height of the water table, so seepage into and out of the pond is important.

*Embankments and dikes* require soil material resistant to seepage and piping and of favorable stability, shrink-swell potential, shear strength, and compactibility. Presence of stones or organic material in a soil are among factors that are unfavorable.

*Drainage* of cropland and pasture is affected by such soil properties as permeability, texture, and structure; depth to fragipan, or other layers that influence rate of water movement; depth to the water table; slope, stability in ditchbanks; susceptibility to stream overflow; and availability of outlets for drainage.

*Irrigation* of a soil is affected by such features as slope; susceptibility to stream overflow, water erosion, soil texture; content of stones; depth of root zone; rate of water intake at the surface; permeability of soil layers below the surface layer and in fragipans or other layers that restrict movement of water; amount of water held available to plants; and need for drainage or depth to water table.

*Terraces and diversions* are embankments, or ridges, constructed across the slope to intercept runoff and seepage so that it soaks into the soil or flows slowly to a prepared outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to unfavorable material; presence of stones; permeability; and resistance to water erosion and soil slipping. A soil suitable for these structures provides outlets for runoff and is not difficult to vegetate.

*Sodded waterways* are affected by such soil properties as texture, depth, and erodibility of the soil material; presence of stones; and the steepness of slopes. Other factors affecting waterways are seepage, natural soil drainage, available water capacity, susceptibility to siltation, and the ease of establishing and maintaining vegetation.

*Winter grading* is affected chiefly by soil features that are relevant to moving, mixing, and compacting soil in road building when temperatures are below freezing.

*Shallow excavations* for pipelines, sewer lines, phone and power transmission lines, basements, open ditches, and cemeteries are those that generally require digging or trenching to a depth of less than 6 feet. Desirable soil properties are good workability, moderate resistance to sloughing, gentle slopes, and freedom from flooding or a high water table.

**Engineering test data**

Listed in table 9 are the results of tests made on certain soils of St. Marys County to determine their properties. Also given are the specific locations of each soil sample, the depth at which the sampling was done and the results of the subsequent tests. In addition it classifies the soil material of each sample according to the AASHTO and Unified systems (*1*, *2*). These classifications are based on data obtained by mechanical analyses and by tests made to determine the liquid and plastic limits.

The tests for the liquid limit and the plastic limit measure the effect of water on consistency of the soil material. As the moisture content of a clayey soil increases from a dry state, the material changes from a semisolid to a plastic state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The *plastic limit* is the moisture content at which the material changes from a semisolid to a plastic state. *Liquid limit* is the moisture content at which a soil passes from a plastic to a liquid state. The *plasticity index* is the numerical difference between liquid limit and plastic limit. It indicates the range of moisture content within which the soil material is in a plastic condition. Some loamy and sandy soils are nonplastic; that is, they do not become plastic at any moisture content.

## Town and country planning

St. Marys County is mainly a rural area. The population, however, is increasing, and along with this population expansion is an increase in nonfarm uses of the land. Accompanying this change is a growing demand for information about soil conditions that affect the new land uses.

This section of the soil survey provides information on the properties of soils and their effect on selected nonfarm uses of land. It helps community planners, developers, and individual land owners to determine the most suitable use for a particular area. Other useful information can be found on the soil maps and in other parts of the survey, particularly the section "Descriptions of the soils" and the section "Engineering uses of the soils." Although the soil maps and tables serve as a guide and can eliminate some sites from further consideration, they do not supplant direct detailed onsite investigations when a development is being planned. Not considered in this section are location in relation to established business centers or transportation lines and other economic factors that are important and often determine the ultimate use of an area.

Table 10 gives limitations of the soils of the county for selected nonfarm uses. In this table, the soils are given ratings of slight, moderate, or severe, according to the degree that the soil is limited for the specific use. These ratings are based on the degree of the greatest limitations, but more than one kind of limitation can be listed. For example, a soil can have a moderate limitation for sewage lagoons because of permeability, but a steeper soil of the same series can have a severe limitation because of slope.

A rating of *slight* means soil properties are generally favorable for the rated use, or in other words, limitations that are minor and easily overcome.

A rating of *moderate* means that some soil properties are unfavorable but can be overcome or modified by special planning and design.

A rating of *severe* means that soil properties are so unfavorable and so difficult to correct or overcome that major soil reclamation, special designs, or intensive maintenance are required.

Listed in the following paragraphs are the main properties that limit the soils of St. Marys County for the uses shown in table 10.

*Filter fields for sewage disposal.*—Depth to seasonally high water table; permeability; natural drainage; slope; and the hazard of flooding.

*Lagoons for sewage disposal.*—Permeability; slope; and the hazard of flooding.

*Homesites, three stories or less.*—Depth to water table; natural drainage; stability of the subsoil and substratum; slope; and the hazard of flooding.

*Streets and parking lots.*—Depth to water table; natural drainage; stability; slope; and the hazard of flooding.

*Home gardens.*—Depth to water table; natural drainage; texture of surface soil; available water holding capacity; natural fertility; slope; the degree of erosion; and the hazard of flooding.

## Use of soils for recreational development

Knowledge of soils is necessary in planning, developing, and maintaining areas used for recreation. In table 11 the soils of St. Marys County are rated according to limitations that affect their suitability for camp areas, playgrounds, picnic areas, and paths and trails.

In table 11 the soils are rated as having slight, moderate, or severe limitations for the specified uses. For all of these ratings, it is assumed that a good cover of vegetation can be established and maintained. A limitation of *slight* means that soil properties are generally favorable and limitations are so minor that they easily can be overcome. A *moderate* limitation can be overcome or modified by planning, by design, or by special maintenance. A *severe* limitation means that costly soil reclamation, special design, intense maintenance, or a combination of these is required.

*Playgrounds* are areas used intensively for baseball, football, badminton, and similar organized games. Soils suitable for this use need to withstand intensive foot traffic. The best soils have a nearly level surface free of coarse fragments and rock outcrops, good drainage, freedom from flooding during periods of heavy use, and a surface that is firm after rains but not dusty when dry. If grading and leveling are required, depth to rock is important.

*Camp areas* are used intensively for tents and small camp trailers and the accompanying activities of outdoor living. Little preparation of the site is required, other than shaping and leveling for tent and parking

TABLE 10.—*Limitations of soils for town and country planning*

[Alluvial land (Aa), Cut and fill land (Cu), and Gravel pits (Gp) are too variable for interpretation or are not used for the purpose listed]

| Soil series and map symbols | Sewage disposal | | Homesites (three stories or less) | | Streets and parking lots | Home gardens |
|---|---|---|---|---|---|---|
| | Filter fields | Lagoons | With basements | Without basements | | |
| Alluvial land, wet: Ad | Severe: high water table; flood hazard.[1] | Severe: flood hazard.[1] | Severe: high water table; flood hazard. | Severe: high water table; flood hazard. | Severe: high water table; flood hazard. | Severe: high water table; flood hazard. |
| Beaches: Be | Severe: high water table; flooding.[1] | Severe: too rapidly permeable; tidal flooding.[1] | Severe: loose sand; tidal high water table; flooding. | Severe: loose sand; tidal flooding. | Severe: loose sand; tidal high water table; flooding. | Severe: tidal flooding; extremely low fertility and available water capacity. |
| Beltsville: | | | | | | |
| BlA | Severe: slow permeability; seasonally perched water table. | Slight | Moderate: seasonally perched water table. | Slight | Moderate: seasonally perched water table. | Moderate: seasonally perched water table. |
| BlB2, BlB3 | Severe: slow permeability; seasonally perched water table. | Moderate: slope. | Moderate: seasonally perched water table. | Slight | Moderate: seasonally perched water table; slope. | Moderate: slope; seasonally perched water table. |
| BlC2, BlC3 | Severe: slow permeability; seasonally perched water table. | Severe: slope | Moderate: seasonally perched water table. | Slight | Severe: seasonally perched water table; slope. | Severe: slope; unit BlC3 severely eroded. |
| Bibb: Bm | Severe: high water table; flood hazard.[1] | Severe: flood hazard.[1] | Severe: high water table; flood hazard. | Severe: high water table; flood hazard. | Severe: high water table; flood hazard. | Severe: high water table; flood hazard. |
| Bourne: | | | | | | |
| BrB2 | Severe: slow permeability; seasonally perched water table. | Moderate: slope. | Moderate: seasonally perched water table. | Slight | Moderate: seasonally perched water table; slope. | Moderate: slope; seasonally perched water table. |
| BrC3 | Severe: slow permeability; seasonally perched water table. | Severe: slope | Moderate: seasonally perched water table. | Slight | Severe: slope | Severe: slope; severely eroded. |
| Caroline: | | | | | | |
| CaB2 | Severe: moderately slow permeability. | Slight | Slight | Slight | Moderate: slope. | Moderate: slope. |
| CaC2, CaC3 | Severe: moderately slow permeability. | Severe: slope | Slight | Slight | Severe: slope | Severe: slope; unit CaC3 severely eroded. |
| CaD2, CaD3 | Severe: moderately slow permeability. | Severe: slope | Moderate: slope. | Moderate: slope. | Severe: slope | Severe: slope; unit CaD3 severely eroded. |
| Chillum: | | | | | | |
| ChA | Slight to moderate: moderate to moderately slow permeability. | Slight to moderate: moderate to moderately slow permeability. | Slight | Slight | Slight | Slight. |

TABLE 10.—*Limitations of soils for town and country planning*—Continued

| Soil series and map symbols | Sewage disposal | | Homesites (three stories or less) | | Streets and parking lots | Home gardens |
|---|---|---|---|---|---|---|
| | Filter fields | Lagoons | With basements | Without basements | | |
| ChB2 | Slight to moderate: moderate to moderately slow permeability. | Moderate: moderate to moderately slow permeability; slope. | Slight | Slight | Moderate: slope. | Moderate: slope: |
| ChC2, ChC3 | Slight to moderate: moderate to moderately slow permeability. | Severe: slope; moderate to moderately slow permeability. | Slight to moderate: slope. | Slight to moderate: slope. | Severe: slope | Severe: slope. |
| Croom: | | | | | | |
| CrB2 | Severe: moderately slow permeability. | Moderate to severe: slope. | Slight | Slight | Moderate to severe: slope. | Moderate: slope; limited rooting depth. |
| CrC2 | Severe: moderately slow permeability. | Severe: slope | Slight | Slight | Severe: slope | Severe: slope. |
| CrD2, CrD3 | Severe: slope | Severe: slope | Moderate: slope. | Moderate: slope. | Severe: slope | Severe: slope; unit CrD3 severely eroded. |
| Elkton: Ek | Severe: high water table; poor natural drainage; slow permeability. | Slight | Severe: high water table; poor natural drainage. | Severe: high water table; poor natural drainage. | Severe: high water table; poor natural drainage. | Severe: high water table; poor natural drainage. |
| Evesboro: | | | | | | |
| EvB | Slight[1] | Severe: too rapidly permeable.[1] | Slight | Slight | Slight to moderate: slope. | Severe: low available moisture capacity and fertility. |
| EvC | Moderate: slope.[1] | Severe: too rapidly permeable.[1] | Moderate: slope. | Moderate: slope. | Severe: slope | Severe: low available moisture capacity and fertility; slope. |
| Evesboro-Westphalia complex: | | | | | | |
| EwC2 | Slight to moderate: slope.[1] | Severe: slope; rapid permeability in Evesboro soil. | Slight to moderate: slope. | Slight to moderate: slope. | Severe: slope | Severe: slope; low available water capacity in Evesboro soil. |
| EwD2, EwE2 | Moderate to severe: slope. | Severe: slope; too rapidly permeable in Evesboro soil. | Moderate to severe: slope. | Moderate to severe: slope. | Severe: slope | Severe: slope. |
| Faceville: FaB | Slight | Moderate: moderate permeability; slope. | Slight | Slight | Moderate: slope. | Moderate: slope. |

TABLE 10.—*Limitations of soils for town and country planning*—Continued

| Soil series and map symbols | Sewage Disposal | | Homesites (three stories or less) | | Streets and parking lots | Home gardens |
|---|---|---|---|---|---|---|
| | Filter fields | Lagoons | With basements | Without basements | | |
| Fallsington: Fs | Severe: high water table; poor natural drainage. | Moderate: moderate permeability. | Severe: high water table; poor natural drainage. | Severe: high water table; poor natural drainage. | Severe: high water table; poor natural drainage. | Severe: high water table; poor natural drainage. |
| Kempsville: | | | | | | |
| KeC2, KeC3 | Slight | Severe: slope; moderate permeability. | Slight | Slight | Severe: slope | Severe: slope; unit KeC3 severely eroded. |
| KeD2, KeD3 | Moderate: slope. | Severe: slope; moderate permeability. | Moderate: slope. | Moderate: slope. | Severe: slope | Severe: slope; unit KeD3 severely eroded. |
| Keyport: | | | | | | |
| KpA, KrA | Severe: slow permeability; moderately high water table. | Slight | Moderate: moderately high water table. | Slight | Moderate: moderately high water table. | Moderate: moderately high water table. |
| KpB2, KrB2 | Severe: slow permeability; moderately high water table. | Moderate: slope. | Moderate: moderately high water table. | Slight | Moderate: moderately high water table; slope. | Moderate: slope; moderately high water table. |
| KrC2 | Severe: slow permeability; moderately high water table. | Severe: slope | Moderate: moderately high water table; slope. | Slight | Severe: slope | Severe: slope; severely eroded. |
| Klej: Kz | Moderate: moderately high seasonal water table. | Severe: rapid permeability.[1] | Moderate: moderately high seasonal water table. | Slight | Moderate: moderately high seasonal water table. | Severe: low available moisture capacity; impeded drainage. |
| Leonardtown: Le | Severe: high water table; poor natural drainage; slow permeability. | Slight | Severe: high water table; poor natural drainage. | Severe: high water table; poor natural drainage. | Severe: high water table; poor natural drainage. | Severe: high water table; poor natural drainage. |
| Marr: | | | | | | |
| MaB2 | Slight | Moderate: moderate permeability; slope. | Slight | Slight | Moderate: slope. | Moderate: slope. |
| MaC2, MaC3 | Slight to moderate: slope. | Severe: slope | Slight to moderate: slope. | Slight to moderate: slope. | Severe: slope | Severe: slope; unit MaC3 severely eroded. |
| Matapeake: | | | | | | |
| MmA, MnA | Slight to moderate: moderate permeability. | Moderate: moderate permeability. | Slight | Slight | Slight | Slight. |

TABLE 10.—*Limitations of soils for town and country planning*—Continued

| Soil series and map symbols | Sewage disposal | | Homesites (three stories or less) | | Streets and parking lots | Home gardens |
|---|---|---|---|---|---|---|
| | Filter fields | Lagoons | With basements | Without basements | | |
| MmB2, MnB2 | Slight to moderate: moderate permeability. | Moderate: moderate permeability; slope. | Slight | Slight | Moderate: slope. | Moderate: slope. |
| MnC3 | Slight to moderate: moderate permeability. | Severe: slope; moderate permeability. | Slight | Slight | Severe: slope | Severe: slope; unit MnC3 severely eroded. |
| Mattapex: | | | | | | |
| MtA, MuA | Severe: moderately slow permeability; moderately high water table. | Slight | Moderate: moderately high water table. | Slight | Moderate: moderately high water table. | Moderate: moderately high water table. |
| MtB2, MuB2 | Severe: moderately slow permeability; moderately high water table. | Moderate: slope. | Moderate: moderately high water table. | Slight | Moderate: moderately high water table; slope. | Moderate: slope; moderately high water table. |
| MuC2 | Severe: moderately slow permeability; moderately high water table. | Severe: slope | Moderate: moderately high water table; slope. | Slight to moderate: slope. | Severe: slope | Severe: slope; in part severely eroded. |
| Othello: On, Ot | Severe: high water table; poor natural drainage; moderately slow permeability. | Slight | Severe: high water table; poor natural drainage. | Severe: high water table; poor natural drainage. | Severe: high water table; poor natural drainage. | Severe: high water table; poor natural drainage. |
| Rumford: | | | | | | |
| RuB | Slight | Severe: rapidly permeable. | Slight | Slight | Slight to moderate: slope. | Moderate: moderately droughty. |
| RuC2 | Slight | Severe: rapidly permeable; slope. | Slight | Slight | Severe: slope | Severe: slope. |
| Sassafras: | | | | | | |
| SaA, SfA | Slight | Moderate: moderate permeability. | Slight | Slight | Slight | Slight. |
| SaB2, SfB2 | Slight | Moderate: moderate permeability; slope. | Slight | Slight | Moderate: slope. | Moderate: slope. |
| SaC2, SaC3 | Slight | Severe: slope; moderate permeability. | Slight | Slight | Severe: slope | Severe: slope; unit SaC3 severely eroded. |
| SaD2, SaD3 | Moderate: slope. | Severe: slope; moderate permeability. | Moderate: slope. | Moderate: slope. | Severe: slope | Severe: slope; unit SaD3 severely eroded. |

TABLE 10.—*Limitations of soils for town and country planning*—Continued

| Soil series and map symbols | Sewage disposal | | Homesites (three stories or less) | | Streets and parking lots | Home gardens |
|---|---|---|---|---|---|---|
| | Filter fields | Lagoons | With basements | Without basements | | |
| Sassafras-Chillum complex: SmC2, SmC3. | Slight to moderate: moderate to moderately slow permeability. | Severe: slope-- | Slight to moderate: slope. | Slight to moderate: slope. | Severe: slope-- | Severe: slope; unit SmC3 severely eroded. |
| Tidal marsh: Tm | Severe: tidal high water table.[1] | Severe: tidal high water table; instability.[1] | Severe: tidal high water table; instability. | Severe: tidal high water table; instability. | Severe: tidal high water table; instability. | Severe: tidal high water table; salinity. |
| Westphalia: | | | | | | |
| WeB2 | Slight | Moderate to severe: moderate to moderately rapid permeability; slope. | Slight | Slight | Moderate: slope. | Moderate: slope. |
| WeC2, WeC3 | Slight to moderate: slope. | Severe: slope-- | Slight to moderate: slope. | Slight to moderate: slope. | Severe: slope-- | Severe: slope; unit WeC3 severely eroded. |
| Woodstown: | | | | | | |
| WsA | Moderate: moderately high water table. | Moderate: moderate permeability. | Moderate: moderately high water table. | Slight | Moderate: moderately high water table. | Moderate: moderately high water table. |
| WsB | Moderate: moderately high water table. | Moderate: moderate permeability; slope. | Moderate: moderately high water table. | Slight | Moderate: moderately high water table; slope. | Moderate: slope; moderately high water table. |
| WsC2 | Moderate: moderately high water table. | Severe: slope; moderate permeability. | Moderate: moderately high water table. | Slight | Severe: slope-- | Severe: slope. |

[1] Strong possibility of polluting nearby springs, wells, ponds, streams, or other surface or underground water resources.

areas. Camp areas are subject to heavy foot traffic and limited vehicular traffic. The best soils have mild slopes, good drainage, a surface free of rocks and coarse fragments, freedom from flooding during periods of heavy use, and a surface that is firm after rains but not dusty when dry.

*Picnic areas* are attractive natural or landscaped tracts used mainly for preparing meals and eating outdoors. These areas are subject to heavy foot traffic. Most of the vehicular traffic, however, is confined to access roads. The best soils are firm when wet but not dusty when dry, are free of flooding during the season of use, and do not have slopes or stoniness that greatly increases cost of leveling sites or of building access roads.

*Paths and trails* are used for local and cross country travel by foot or horseback. Design and layout should require little or no cutting and filling. The best soils are at least moderately well drained, are firm when wet but not dusty when dry, are flooded not more than once during the season of use, have slopes of less than 15 percent, and have few or no rocks or stones on the surface.

Service buildings are needed for use with some recreational facilities. Inasmuch as these buildings generally are not large and do not have basements, the limitations of the soils for this purpose are approximately the same as those for homesites without basements (table 10).

## Genesis, morphology, and classification of soils

### Genesis and morphology

Soil is the product of several processes acting simultaneously upon the earth's surface. Using an analogy, soil is the "rust" or "weathering rind" on the earth's skin. The morphological characteristics of the soil

[9] By DRS. F. P. MILLER and J. E. FOSS, Department of Agronomy, University of Maryland.

TABLE 11.—*Degree and kind of limitations for specified recreational uses*

[Alluvial land (Aa), Cut and fill land (Cu), Gravel Pits (Gp), and Tidal marsh (Tm) are not rated because they are too variable or are not used for the purposes listed]

| Soil series and map symbols | Playgrounds | Camp areas | Picnic areas | Paths and trails |
|---|---|---|---|---|
| Alluvial land, wet: Ad | Severe: mostly poor natural drainage; flood hazard. | Severe: mostly poor natural drainage; flood hazard. | Severe: mostly poor natural drainage; flood hazard. | Severe: mostly poor natural drainage; flood hazard. |
| Beaches: Be | Severe: loose sand; subject to blowing. | Severe: loose sand; subject to blowing. | Severe: loose sand; subject to blowing. | Severe: loose sand. |
| Beltsville: | | | | |
| BlA | Moderate: moderately high seasonally perched water table;[1] slow permeability. | Moderate: moderately high seasonally perched water table;[1] slow permeability. | Moderate: moderately high seasonally perched water table;[1] slow permeability. | Slight. |
| B1B2, B1B3 | Moderate: moderately high seasonally perched water table;[1] slow permeability; slope. | Moderate: moderately high seasonally perched water table;[1] slow permeability. | Moderate: moderately high seasonally perched water table;[1] slow permeability. | Slight. |
| B1C2, B1C3 | Severe: slope; moderately high seasonally perched water table. | Moderate: moderately high seasonally perched water table;[1] slow permeability. | Moderate: moderately high water table. | Slight. |
| Bibb: Bm | Severe: poor natural drainage; high water table; flood hazard. | Severe: poor natural drainage; high water table; flood hazard. | Severe: poor natural drainage; high water table; flood hazard. | Severe: poor natural drainage; high water table; flood hazard. |
| Bourne: | | | | |
| BrB2 | Moderate: moderately high seasonally perched water table;[1] slow permeability; slope. | Moderate: moderately high seasonally perched water table;[1] slow permeability. | Moderate: moderately high seasonally perched water table. | Slight. |
| BrC3 | Severe: slope; moderately high seasonally perched water table. | Moderate: moderately high seasonally perched water table;[1] slow permeability; sticky surface. | Moderate: moderately high seasonally perched water table; sticky surface. | Moderate: sticky surface. |
| Caroline: | | | | |
| CaB2 | Moderate: moderately slow permeability; slope. | Moderate: moderately slow permeability. | Moderate: moderately slow permeability. | Slight. |
| CaC2 | Severe: slope; moderately slow permeability. | Moderate: moderately slow permeability. | Moderate: moderately slow permeability. | Slight. |
| CaC3 | Severe: slope; moderately slow permeability. | Moderate: moderately slow permeability; sticky surface. | Moderate: sticky surface; moderately slow permeability. | Moderate: sticky surface. |
| CaD2 | Severe: slope; moderately slow permeability. | Moderate: moderately slow permeability; slope. | Moderate: slope | Slight. |
| CaD3 | Severe: slope; moderately slow permeability. | Moderate: moderately slow permeability; sticky surface; slope. | Moderate: sticky surface; slope. | Moderate: sticky surface. |
| Chillum: | | | | |
| ChA | Slight | Slight | Slight | Slight. |
| ChB2 | Moderate: slope | Slight | Slight | Slight. |
| ChC2, ChC3 | Severe: slope | Slight to moderate: slope. | Slight to moderate: slope. | Slight. |

TABLE 11.—*Degree and kind of limitations for specified recreational uses*—Continued

| Soil series and map symbols | Playgrounds | Camp areas | Picnic areas | Paths and trails |
|---|---|---|---|---|
| Croom: | | | | |
| CrB2 | Severe: coarse fragments on surface. | Moderate: coarse fragments on surface; moderately slow permeability. | Moderate: coarse fragments on surface. | Moderate: coarse fragments on surface. |
| CrC2 | Severe: coarse fragments on surface; slope. | Moderate: coarse fragments on surface; moderately slow permeability. | Moderate: coarse fragments on surface; slope. | Moderate: coarse fragments on surface. |
| CrD2, CrD3 | Severe: slope; coarse fragments on surface. | Severe: slope; coarse fragments on surface. | Severe: slope; coarse fragments on surface. | Moderate: coarse fragments on surface. |
| Elkton: Ek | Severe: poor natural drainage; high water table; slow permeability. | Severe: poor natural drainage; high water table; slow permeability. | Severe: poor natural drainage; high water table. | Severe: poor natural drainage; high water table. |
| Evesboro: | | | | |
| EvB | Severe: loamy sand, subject to blowing. | Moderate: loamy sand surface layer. | Moderate: loamy sand surface layer. | Moderate: loamy sand surface layer. |
| EvC | Severe: loamy sand, subject to blowing; slope. | Moderate: loamy sand surface layer; slope. | Moderate: loamy sand surface layer; slope. | Moderate: loamy sand surface layer; slope. |
| Evesboro-Westphalia complex: | | | | |
| EwC2 | Severe: slope; loose loamy sand in Evesboro soil. | Moderate: slope; loose loamy sand in Evesboro soil. | Moderate: slope; loose loamy sand in Evesboro soil. | Slight to moderate: loose loamy sand in Evesboro soil. |
| EwD2 | Severe: slope; loose loamy sand in Evesboro soil. | Severe: slope; loose loamy sand in Evesboro soil. | Severe: slope; loose loamy sand in Evesboro soil. | Moderate to severe: loose loamy sand in Evesboro soil; slope. |
| EwE2 | Severe: slope; loose loamy sand in Evesboro soil. | Severe: slope; loose loamy sand in Evesboro soil. | Severe: slope; loose loamy sand in Evesboro soil. | Moderate to severe: loose loamy sand in Evesboro soil; slope. |
| Faceville: FaB | Moderate: slope | Slight | Slight | Slight. |
| Fallsington: Fs | Severe: poor natural drainage; high water table. | Severe: poor natural drainage; high water table. | Severe: poor natural drainage; high water table. | Severe: poor natural drainage; high water table. |
| Kempsville: | | | | |
| KeC2 | Severe: slope | Slight | Slight | Slight. |
| KeD2 | Severe: slope | Moderate: slope | Moderate: slope | Slight. |
| KeC3 | Severe: slope | Moderate: sticky surface. | Moderate: sticky surface. | Moderate: sticky surface. |
| KeD3 | Severe: slope | Moderate: sticky surface; slope. | Moderate: sticky surface; slope. | Moderate: sticky surface. |
| Keyport: | | | | |
| KpA, KrA | Moderate: moderately high water table;[1] slow permeability. | Moderate: moderately high water table;[1] slow permeability. | Moderate: moderately high water table. | Slight. |
| KpB2, KrB2 | Moderate: moderately high water table;[1] slow permeability; slope. | Moderate: moderately high water table; slow permeability. | Moderate: moderately high water table. | Slight. |
| KrC2 | Severe: slope; moderately high water table; slow permeability. | Moderate: moderately high water table; slow permeability. | Moderate: moderately high water table. | Slight. |

TABLE 11.—*Degree and kind of limitations for specified recreational uses*—Continued

| Soil series and map symbols | Playgrounds | Camp areas | Picnic areas | Paths and trails |
|---|---|---|---|---|
| Klej: Kz | Moderate: high water table; deep loose loamy sand. | Moderate: high water table; deep loose loamy sand. | Moderate: deep loose loamy sand. | Moderate: deep loose loamy sand. |
| Leonardtown: Le | Severe: poor natural drainage; high water table; slow permeability. | Severe: poor natural drainage; high water table; slow permeability. | Severe: poor natural drainage; high water table. | Severe: poor natural drainage; high water table. |
| Marr: | | | | |
| MaB2 | Moderate: slope | Slight | Slight | Slight. |
| MaC2, MaC3 | Severe: slope | Slight to moderate: slope. | Slight to moderate: slope. | Slight. |
| Matapeake: | | | | |
| MmA, MnA | Slight | Slight | Slight | Slight. |
| MmB2, MnB2 | Moderate: slope | Slight | Slight | Slight. |
| MnC3 | Severe: slope | Slight | Slight | Slight. |
| Mattapex: | | | | |
| MtA, MuA | Moderate: moderately high water table; moderately slow permeability. | Moderate: moderately high water table; moderately slow permeability. | Moderate: moderately high water table. | Slight. |
| MtB2, MuB2 | Moderate: moderately high water table; moderately slow permeability; slope. | Moderate: moderately high water table; moderately slow permeability. | Moderate: moderately high water table. | Slight. |
| MuC2 | Severe: slope | Moderate: moderately high water table; moderately slow permeability. | Moderate: moderately high water table. | Slight. |
| Othello: On, Ot | Severe: poor natural drainage; high water table. | Severe: poor natural drainage; high water table. | Severe: poor natural drainage; high water table. | Severe: poor natural drainage; high water table. |
| Rumford: | | | | |
| RuB | Moderate: loamy sand surface layer; slope. | Moderate: loamy sand surface layer. | Moderate: loamy sand surface layer. | Moderate: loamy sand surface layer. |
| RuC2 | Severe: slope | Moderate: loamy sand surface layer. | Moderate: loamy sand surface layer. | Moderate: loamy sand surface layer. |
| Sassafras: | | | | |
| SaA, SfA | Slight | Slight | Slight | Slight. |
| SaB2, SfB2 | Moderate: slope | Slight | Slight | Slight. |
| SaC2, SaC3 | Severe: slope | Slight | Slight | Slight. |
| SaD2, SaD3 | Severe: slope | Moderate: slope | Moderate: slope | Slight. |
| Sassafras-Chillum complex: SmC2, SmC3. | Severe: slope | Slight to moderate: slope. | Slight to moderate: slope. | Slight. |
| Westphalia: | | | | |
| WeB2 | Moderate: slope | Slight | Slight | Slight. |
| WeC2, WeC3 | Severe: slope | Slight to moderate: slope. | Slight to moderate: slope. | Slight. |
| Woodstown: | | | | |
| WsA | Moderate: moderately high water table. | Moderate: moderately high water table. | Moderate: moderately high water table. | Slight. |

TABLE 11.—*Degree and kind of limitations for specified recreational uses*—Continued

| Soil series and map symbols | Playgrounds | Camp areas | Picnic areas | Paths and trails |
|---|---|---|---|---|
| WsB | Moderate: moderately high water table; slope. | Moderate: moderately high water table. | Moderate: moderately high water table. | Slight. |
| WsC2 | Severe: slope | Moderate: moderately high water table. | Moderate: moderately high water table. | Slight. |

[1] While soils of the Beltsville, Bourne, and Keyport series are slowly permeable, they are generally dry enough for long periods during the seasons of most use, so they are rated as only moderately limited for playgrounds and camp areas because of permeability.

series mapped in St. Marys County have developed through a unique set of processes acting upon geologic materials. Simonson (*5*) outlined four basic changes in the soil system during pedogenesis (soil formation). These changes are the result of additions, removals, transfers, and transformations. For example, organic matter, fertilizer, dust and other materials are added to soils, while soluble salts and basic ions released in the weathering of certain minerals are removed to varying degrees. Clay particles and iron are transferred within the soil profile. Soil minerals such as feldspars and mica are transformed to clay minerals.

The intensity and magnitude of changes are determined by five factors of soil formation. These soil-forming factors—parent material, climate, living organisms, relief, and time—are important in determining the nature and properties of soils. They do not act independently but overlap, and each factor modifies the effects of the other. Climate and living organisms are the active forces in soil formation. Their effect on the parent material is modified by topography and time. Each of these soil-forming factors, as it applies to the distribution and morphology of soils in St. Marys County, is discussed in the following paragraphs.

**Parent material**

Soils inherit some of their characteristics from the parent material. The various types of geologic sediment are altered by physical and chemical processes. The unconsolidated residue that results from this action is the parent material from which soils form by weathering and subsequent modification by the other factors of soil formation.

Parent material provides the mineral skeleton of the soils and influences the texture and mineralogy of the resulting soil profile. Studies by Fanning (*3*) have shown that most soils of the Coastal Plain are fairly uniform in clay mineralogy. The clay fraction of the soil contains about equal amounts of the minerals chlorite, mica, and kaolinite or intergradient chlorite. This reflects the importance of parent material in clay mineralogy. Soils that formed in Coastal Plain sediment containing mostly quartz and kaolinite clay will most likely contain a predominance of these minerals. Likewise, soils formed from sandy or gravelly sediment will probably retain this characteristic throughout their genesis. Soils that formed from clayey sediment tend to be fine textured. These inherited characteristics, however, are frequently modified and sometimes masked by the influence of other factors.

The parent material of all soils in St. Marys County is unconsolidated sediment of the Coastal Plain. The texture of this material varies greatly, and the geologic age ranges from early Cretaceous to Holocene (Recent). The older sediment is dominantly sandy or gravelly. Croom, Evesboro, Marr, Sassafras, Westphalia, and Woodstown soils commonly formed in this sediment. Where the older sediment has a silty deposit over it, Beltsville, Chillum, and Leonardtown soils, and some of the Matapeake, Mattapex, and Othello soils, formed.

In places soils that formed in old sediment are very deeply developed, commonly to depths of 10 to 15 feet. These are called paleosols and are best represented by soils of the Caroline series.

In later sediment of various textures, mostly on old alluvial terraces above major streams, the soils are chiefly of the Elkton, Fallsington, Keyport, Faceville, Klej, and Kempsville series. Some of the Matapeake, Mattapex, and Othello soils are also on these terraces.

The parent material of the youngest soils in the county consists of recent alluvium transported by streams and deposited on flood plains. These soils are of the Bibb series, Alluvial land, and Alluvial land, wet.

**Climate**

Climate strongly influences the weathering process and the vegetation which in turn further modifies the soil forming process. Under the humid climate typical of the mid-Atlantic region, the soils of St. Marys County reflect the impact of the weathering process as shown by the well developed soil profiles. Climatic data for the county are recorded in the section "General nature of the county."

Rainfall influences soil formation through erosion, solution losses caused by leaching, and chemical reaction (where water is a necessary component). The effects of erosion are particularly noticeable on soils that have steep slopes. Many of these soils are thin and have weakly developed profiles, in contrast to their more level counterparts in areas where geological erosion is in equilibrium with the soil-forming processes. Accelerated erosion resulting from man's influence also contributes to the loss of horizons at the surface in soils on sloping landscapes.

Many constituents are removed from the soils by leaching. For example, the soluble salts and basic ions ($Ca^{++}$, $Mg^{++}$, $K^{+}$, and $Na^{+}$) released in weathering of certain minerals are removed in varying degrees. Water percolating through soils may remove, in the course of year via solution, several tons of minerals per square mile. As a result of this leaching, the soils of St. Marys County are naturally acid to extremely acid. The exchange sites on clay and organic matter are dominated by hydrogen or aluminum ions rather than by basic ions. Variations in percentage of bases on the exchange sites are dependent on the amount of basic elements in the parent material, the duration and intensity of weathering, or on possible additions of basic ions. The low content of bases in the parent materials of soils of St. Marys accounts for much of the natural acidity in these soils. The addition of lime or limestone during farming operations has decreased the acidity of some soils, particularly in the Ap horison, or plow layer.

One of the results of weathering is the formation of an argillic (Bt) subsoil horizon in many soils. The weathering of coarser mineral particles to clay and movement of the clay downward from the surface horizons account for the formation of the Bt horizon. Increased clay content of the Bt horizon and evidence of movement of clay is indicated by the thin coatings or clay films on the surfaces of the natural soil structural units (peds) and the presence of similar coatings or films in pores and old root channels. This Bt horizon influences many properties of soils including drainage, aeration, available water capacity, shrink swell potential, and permeability.

The Bt or argillic horizon is very weakly expressed in some soils. It is very strongly expressed in other soils, such as those of the Keyport and Faceville series. Bibb, Evesboro, and Klej soils do not have a Bt horizon. This is the result of the parent material containing practically no clay (Evesboro and Klej soils) or the soil being too immature to have developed a Bt horizon (Bibb soils and Alluvial land). In the latter example, the soil-forming factor "time" has not expressed itself.

Translocation of iron from the A horizon to the B horizon occurs in many soils. In St. Marys County this is most evident in the Faceville soils, which have a brown A horizon from which iron has been removed and a red B horizon in which iron has accumulated and oxidized.

St. Marys County is at a latitude a little south of the midpoint between the North Pole and the Equator. The degree of soil expression, therefore, is intermediate between that which would be normal for polar and equatorial climatic conditions. The soils are more deeply weathered and thickly formed than in polar regions, yet they are not so highly weathered and deep as most soils in tropical latitudes where climate commonly completely masks the influence of different parent materials. This comparison emphasizes the active role that climate plays in soil formation.

In St. Marys County, soil properties related to parent material are evident enough to serve as a useful criterion in distinguishing soil series, but climatic factors modify this evidence in a number of ways: Precipitation in excess of evapotranspiration results in leaching and translocation; wetting and drying results in expansion and contraction, which subsequently forms soil structure; and the continuous process of mineral weathering eventually produces a soil in dynamic equilibrium with its environment. The soils in St. Marys County are thus directly related to the climate in which they formed and in which they exist today.

**Plant and animal life**

One of the features that distinguishes soil from its parent material (purely mineral) is the organic constituent of living plants and animals and their decayed or decaying remains. When climate begins to act on parent material, soil begins to form. Plant and animal life soon follow and hasten the weathering process. The resulting soil is a product of these inorganic and living factors as modified by climate, relief, and time.

Early in the formation of soil such primitive forms of life as bacteria, fungi, and other simple living organisms influence the weathering process. As time progresses these simple life forms are supplemented through the development of a more complex system of plant and animal life. In St. Marys County a stage was reached where trees were the dominant vegetation, and worms, insects, and more advanced types of animal life inhabited the soil. Before this climax vegetation was cleared, the soils of St. Marys County had a cover consisting mainly of deciduous hardwood trees and some conifers. At present the cover consists largely of second-growth oaks and some poplar, hickory, maple, ash, elm, birch, and sycamore. Conifers, especially Virginia pine, are now more common than before.

Although vegetation is the most common type of living organism, many other life forms greatly influence soil formation. Besides man, these are the microorganisms, earthworms, larvae, insects, burrowing rodents, and other forms of life. All of these are important in the cycle of decay and regeneration of vegetation. They also play a role in nutrient and gas cycles. The continuing cycle produces large amounts of nutrients and organic matter. Nutrients absorbed by plants are eventually returned to the soil through leaf fall and the final decomposition of the entire plant itself. In the process organic matter is produced and incorporated into the upper layers of the soil by earthworms, rodents, and decaying roots. Other processes, including windthrow of trees and various activities of man, also hasten decomposition.

Wright[10] found that the Ap horizon of the Coastal Plain soils of Maryland is on an average about 1.6 percent organic matter. The content of organic matter in the B horizon of these soils is less than 0.4 percent.

Clearing, cultivation, acceleration of erosion, introduction of new plants, addition of lime and fertilizers, improving natural drainage, and grading or otherwise changing the land form are several of the ways in which man has modified the environment. This may initiate the formation of new soil characteristics and,

[10] WRIGHT, W. R., Contributions of Clay and Organic Matter to the Cation-exchange Capacity of Maryland Soils, University of Maryland, M. D. Thesis, 1969.

in turn, produce a shift in equilibrium of soils with their environment. Such a shift will be a very slow process in most cases. Soils that have been cultivated for centuries in Europe, however, are easily distinguished in morphology and other properties from their virgin associates. This emphasizes the concept that man must be considered significant in the soil-forming processes.

### Relief

The shape of the landscape, as well as its elevation, orientation, and gradient influences soil formation. Even in places where parent materials are uniform, soils formed on steeper gradients generally are thinner and not so well expressed as soils formed on more nearly level parts of the landscape. Also, the more level the area the more likely it is to have poor natural drainage and a high water table. This condition is strongly reflected in the profiles of some soils of St. Marys County.

The Coastal Plain consists of nearly horizontal beds of loose sediment. These have eroded through geologic time, leaving some very old sediment exposed at rather higher elevations. At some of the higher elevations there have been later depositions of silty material (presumably loessial). In these positions there is little local relief, and consequently, drainage patterns are poorly developed. Extensive areas of Beltsville soils are in these interfluvial landscape positions.

In contrast to these older uplands are the level to gently sloping or moderately sloping alluvial or late marine terraces that border the major rivers. On these terraces the soils are presumably younger than those on the higher uplands. Many of these soils have well developed profiles.

Relief influences the drainage condition of soils. Poorly drained soils occupy positions in the landscape that are flat or concave. Moderately well drained and somewhat poorly drained soils are in nearly level to moderately sloping landscape positions. Well-drained soils are generally in areas where slopes are steeper, but they also occupy nearly level landscape positions where natural drainage and permeability are rapid enough to prevent long periods of saturation.

### Time

The degree of profile expression results not only from the intensity of the soil-forming processes but also from the duration of these processes. For this reason the degree of soil development or the expression of a particular soil property is not necessarily related to the age of the underlying rock or the geomorphic surface.

For example, the Evesboro soils are on some of the oldest sediment and land surfaces in the county, but their typical profile is not well developed. This is because the parent material is almost entirely quartz sand that is highly resistant to weathering. The profiles of many "younger" soils are fairly well developed, because the parent material was more susceptible to weathering over a shorter period. Examples of soils that have well developed profiles, yet are no older or younger than Evesboro soils, are the very silty Matapeake, Mattapex, and Othello soils.

A few soils of the county show only weak profile development. These soils are in the Bibb series. Their parent materials, which are on flood plains, have not been in place long enough for profiles to be significantly differentiated and expressed. Some features associated with wetness or natural drainage, however, can be observed. The Caroline and Faceville soils, on the other hand, have very well developed profiles. This indicates that their landscapes have been rather stable and have been exposed to soil-forming processes for a considerable length of time.

### Interrelationships of soils

In table 12 relationships in position, parent material, and drainage of soils in St. Marys County are shown by soil series. Most of the soils are on uplands and terraces, but some are on flood plains, in depressions, and on foot slopes.

*Soils of the uplands and terraces.*—The soils on uplands and on terraces formed in the same kind of parent material. The topographic position does not, in itself, affect the classification of soils. For example, soils of the Sassafras, Evesboro, and some other series formed on alluvial terraces and also in older sediment on uplands.

The soils on uplands formed in Pleistocene sediment or sediment older than those of the terraces. The soils on terraces formed mainly in Pleistocene sediment, though in some places the sediment may have been deposited during the Pliocene epoch on what are now terraces.

*Soils of flood plains.*—These soils developed in recent alluvium and, in most areas, are periodically or frequently covered by fresh material. Soils on flood plains are occasionally or frequently covered by floodwater that deposits fresh material.

In places the material is of uniform texture and generally consists of fine sand or silt. Elsewhere it is made up of interstratified or otherwise mixed materials, chiefly sand, silt, and even gravel. Little horizon development is evident in these areas of deposit, because the soil material has not been in place long enough.

## Classification of soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The narrow categories of classification, such as those used in detailed soil surveys, allow us to organize and apply knowledge about soils in managing farms, fields, and woodlands; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas such as countries and continents.

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Because this system is under continual study, readers interested in developments of the current sys-

TABLE 12.—*Soil series relationships in terms of position, parent material, and drainage*

| Parent material | Soils of uplands and terraces | | | |
|---|---|---|---|---|
| | Excessively or somewhat excessively drained | Well drained | Moderately well drained | Poorly drained |
| Sands and loamy sands | Evesboro (excessively drained). | | Klej | |
| Sands containing moderate clay and silt | | Sassafras, Kemps-ville. | Woodstown | Fallsington. |
| Sands with little clay and silt | Rumford (somewhat excessively drained). | | | |
| Fine sand, silts, and silty clays over sands | | Matapeake | Mattapex | Othello. |
| Miocene fine sand with little clay and silt | | Westphalia, Marr | | |
| Silts, sands over gravelly sediment | | Croom, Chillum | Beltsville, Bourne | Leonardtown. |
| Clays and silts | | Caroline | | |
| Silts and clays | | Faceville | Keyport | Elkton. |
| | Soils of flood plains, foot slopes, and depressions | | | |
| Alluvium derived from Coastal Plain sediment | | | Alluvial land | Bibb, Alluvial land, wet. |

tem should search the latest literature available (*6, 7, 9*).

The current system of classification has six categories. Beginning with 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. In table 13, the soil series of St. Marys County are placed in three categories of the current system (*9*). Classes of the current system are briefly defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The properties used to differentiate among soil orders are those that tend to give broad climatic groupings of soils. The two exceptions to this are the Entisols and Histosols, which occur in many different climates. Each order is named with a word of three or four syllables ending in *sol* (Ent-i-sol).

SUBORDER. Each order is subdivided into suborders that are based primarily on those soil characteristics that seem to produce classes with the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders are mainly those that reflect either the presence or absence of water-logging, or soil differences resulting from the climate or vegetation. The names of suborders have two syllables. The last syllable indicates the order. An example is *Aquent* (*Aqu,* meaning water or wet, and *ent,* from Entisol).

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 have accumulated; those that have pans that interfere with growth of roots, movement of water, or both; and thick, dark-colored surface horizons. The features used are the self-mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), dark red and dark brown colors associated with basic rocks, and the like. The names of great groups have three or four syllables and are made by adding a prefix to the name of the suborder. An example is Haplaquents (*Hapl,* meaning simple horizons, *aqu* for wetness or water, and *ent,* from Entisols).

SUBGROUP. Great groups are subdivided into subgroups, one representing the central (typic) segment of the group, and others called intergrades that have properties of the 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 of 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 Haplaquents (a typical Haplaquent).

FAMILY. Soil families are separated within a subgroup primarily on the basis of properties important to the growth of plants or on the behavior of soils

TABLE 13.—*Soil series classified according to the current system*

| Series | Family | Subgroup | Order |
|---|---|---|---|
| Alluvial land | | Udifluvents | Entisols. |
| Alluvial land, wet | | Fluvaquents | Entisols. |
| Beltsville | Fine-loamy, mixed, mesic | Typic Fragiudults | Ultisols. |
| Bibb | Coarse-loamy, siliceous, acid, thermic. | Typic Fluvaquents | Entisols. |
| Bourne | Fine-loamy, mixed, thermic | Typic Fragiudults | Ultisols. |
| Caroline | Clayey, mixed, thermic | Typic Paleudults | Ultisols. |
| Chillum | Fine-silty, mixed, mesic | Typic Hapludults | Ultisols. |
| Croom | Loamy-skeletal, mixed, mesic | Typic Hapludults | Ultisols. |
| Cut and fill land | | Typic Udorthents | Entisols. |
| Elkton | Clayey, mixed, mesic | Typic Ochraquults | Ultisols. |
| Evesboro | Mesic, coated | Typic Quartzipsamments | Entisols. |
| Faceville | Clayey, kaolinitic, thermic | Typic Paleudults | Ultisols. |
| Fallsington | Fine-loamy, siliceous, mesic | Typic Ochraquults | Ultisols. |
| Kempsville | Fine-loamy, siliceous, thermic | Typic Hapludults | Ultisols. |
| Keyport | Clayey, mixed, mesic | Aquic Hapludults | Ultisols. |
| Klej [1] | Mesic, coated | Aquic Quartzipsamments | Entisols. |
| Leonardtown | Fine-silty, mixed, mesic | Typic Fragiaquults | Ultisols. |
| Marr | Fine-loamy, siliceous, mesic | Typic Hapludults | Ultisols. |
| Matapeake | Fine-silty, mixed, mesic | Typic Hapludults | Ultisols. |
| Mattapex | Fine-silty, mixed, mesic | Aquic Hapludults | Ultisols. |
| Othello | Fine-silty, mixed, mesic | Typic Ochraquults | Ultisols. |
| Rumford | Coarse-loamy, siliceous, thermic | Typic Hapludults | Ultisols. |
| Sassafras | Fine-loamy, siliceous, mesic | Typic Hapludults | Ultisols. |
| Tidal marsh | | Hydraquents and Sulfaquents | Entisols. |
| Westphalia | Coarse-loamy, siliceous, mesic | Ochreptic Hapludults | Ultisols. |
| Woodstown | Fine-loamy, siliceous, mesic | Aquic Hapludults | Ultisols. |

[1] Taxadjuncts—Klej series—taxadjunct is dominantly medium and slightly acid in lower part of the B horizon and C horizon rather than very strongly or extremely acid throughout as is defined for the Klej series.

when used for engineering. Among the properties considered are texture, mineralogy, reactions, soil temperature, permeability, thickness of horizons, and consistence. A family name consists of a series of adjectives preceding the subgroup name. The adjectives are the class names for texture, mineralogy, and so on, that are used as family differentiae (table 13). An example is the coarse-loamy, siliceous, acid, thermic family of Typic Haplaquents.

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.

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## Glossary

**Acidity.** See "Reaction, soil."

**Aeration, soil.** The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

**Alluvium.** Material, such as sand, silt, or clay, deposited on land by streams.

**Available water capacity** (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

| | *Inches* |
|---|---|
| Very low | 0 to 3 |
| Low | 3 to 6 |
| Moderate | 6 to 9 |
| High | More than 9 |

**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.

**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; little affected by moistening.

**Cover crop.** A close-growing crop grown primarily to improve and 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, built to protect downslope areas by diverting runoff from its natural course.

**Drainage class** (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, 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 classes of natural soil drainage are recognized:

*Excessively drained.*—Water is removed from the soil very rapidy. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

*Somewhat excessively drained.*—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

*Well drained.*—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

*Moderately well drained.*—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

*Somewhat poorly drained.*—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

*Poorly drained.*—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

*Very poorly drained.*—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

**Erosion.** The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

*Erosion* (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

*Erosion* (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

**Flood plain.** A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

**Foot slope.** The inclined surface at the base of a hill.

**Fragipan.** A loamy, brittle subsurface horizon low in porosity and content of organic mater and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

**Genesis, soil.** The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

**Gravelly soil material.** Material from 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

**Hardpan.** A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

**Horizon, soil.** A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

*O horizon.*—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

*A horizon.*—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

*A2 horizon.*—A mineral horizon, maily a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

*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 a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

*C horizon.*—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

*R layer.*—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

**Internal soil drainage.** The downward movement of water through the soil profile. The rate of movement is determined by the texture, structure, and other characteristics of the soil profile and underlying layers, and by height of the water table, either permanent or perched. Relative terms for expressing internal drainage are *none, very slow, slow, medium, rapid and very rapid.*

**International ⅛ rule.** A mathematical formula used to determine the board feet of lumber that can be cut out of a log using a ⅛ saw curve.

**Leaching.** The removal of soluble material from soil or other material by percolating water.

**Loam.** Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

**Marine deposit.** Material deposited in the waters of oceans and seas and exposed by the elevation of the land or the lowering of the water level.

**Morphology, soil.** The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

**Mottling, soil.** Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded 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 of the diameter along the greatest dimension. Fine indicates less than 5 millimeters (about 0.2 inch); medium, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and coarse, more than 15 millimeters (about 0.6 inch).

**Munsell notation.** A designation of color by degrees of the three single variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

**Nutrient, plant.** Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

**Parent material.** The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

**Permeability.** The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are very slow (less than 0.06 inch), slow (0.06 to 0.20 inch), moderately slow (0.2 to 0.6 inch), moderate (0.6 to 2.0 inches), moderately rapid (2.0 to 6.0 inches), rapid (6.0 to 20 inches), and very rapid (more than 20 inches).

**pH value.** (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

**Poorly graded.** Refers to soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

**Productivity** (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

**Profile, soil.** A vertical section of the soil extending through all its horizons and 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 described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

| | pH | | pH |
|---|---|---|---|
| Extremely acid | Below 4.5 | Neutral | 6.6 to 7.3 |
| Very strongly acid | 4.5 to 5.0 | Mildly alkaline | 7.4 to 7.8 |
| Strongly acid | 5.1 to 5.5 | Moderately alkaline | 7.9 to 8.4 |
| Medium acid | 5.6 to 6.0 | Strongly alkaline | 8.5 to 9.0 |
| Slightly acid | 6.1 to 6.5 | Very strongly alkaline | 9.1 and higher |

**Relief.** The elevations or inequalities of a land surface, considered collectively.

**Runoff.** The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called groundwater runoff or seepage flow from ground water.

**Sand.** As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

**Silt.** As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

**Soil.** A natural, three-dimensional body at the earth's surface that is capable of supporting plants and 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 C horizon, in which the processes of soil formation are active. The solum in mature soil consists of 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 characteristics of the soil are largely confined to the solum.

**Structure, soil.** The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

**Subsoil.** Technically, the B horizon; roughly, the part of the solum below plow depth.

**Substratum.** The part of the soil below the solum.

**Surface soil.** The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

**Terrace.** An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

**Terrace** (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second botom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

**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, silt loam, 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."

**Topography.** See "Relief."

**Topsoil** (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

**Upland** (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

**Water table.** The upper limit of the soil or underlying rock material that is wholly saturated with water.

*Water table, apparent.* A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

*Water table, artesian.* A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

*Water table, perched.* A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

**Well-graded soil.** A soil or soil material consisting of particles that are well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

**Wilting point** (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

## GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. The capability classification system is described on pages 43 to 45. In referring to a woodland group, read the introduction to the section it is in for general information about its management.

| Map symbol | Mapping unit | Described on page | Capability unit | Woodland suitability group | |
|---|---|---|---|---|---|
| | | | Symbol | Symbol | Page |
| Aa | Alluvial land | 11 | IIw-7 | 1w3 | 53 |
| Ad | Alluvial land, wet | 11 | VIw-1 | 2w4 | 53 |
| Be | Beaches | 13 | VIIIs-2 | --- | -- |
| BlA | Beltsville silt loam, 0 to 2 percent slopes | 14 | IIw-8 | 3w3 | 58 |
| BlB2 | Beltsville silt loam, 2 to 5 percent slopes, moderately eroded | 15 | IIe-13 | 3w3 | 58 |
| BlB3 | Beltsville silt loam, 2 to 5 percent slopes, severely eroded | 15 | IIIe-13 | 3w3 | 58 |
| BlC2 | Beltsville silt loam, 5 to 10 percent slopes, moderately eroded | 15 | IIIe-13 | 3w3 | 58 |
| BlC3 | Beltsville silt loam, 5 to 10 percent slopes, severely eroded | 15 | IVe-9 | 3w3 | 58 |
| Bm | Bibb silt loam | 16 | IIIw-7 | 2w4 | 53 |
| BrB2 | Bourne fine sandy loam, 2 to 5 percent slopes, moderately eroded | 17 | IIe-36 | 3w3 | 58 |
| BrC3 | Bourne fine sandy loam, 5 to 10 percent slopes, severely eroded | 17 | IVe-7 | 3w3 | 58 |
| CaB2 | Caroline silt loam, 2 to 5 percent slopes, moderately eroded | 18 | IIe-13 | 3w3 | 58 |
| CaC2 | Caroline silt loam, 5 to 10 percent slopes, moderately eroded | 18 | IIIe-13 | 3w3 | 58 |
| CaC3 | Caroline silt loam, 5 to 10 percent slopes, severely eroded | 19 | IVe-9 | 3w3 | 58 |
| CaD2 | Caroline silt loam, 10 to 15 percent slopes, moderately eroded | 19 | IVe-9 | 3w3 | 58 |
| CaD3 | Caroline silt loam, 10 to 15 percent slopes, severely eroded | 19 | VIe-2 | 3w3 | 58 |
| ChA | Chillum loam, 0 to 2 percent slopes | 20 | IIs-7 | 3o2 | 56 |
| ChB2 | Chillum loam, 2 to 6 percent slopes, moderately eroded | 20 | IIs-7 | 3o2 | 56 |
| ChC2 | Chillum loam, 6 to 12 percent slopes, moderately eroded | 21 | IIIe-7 | 3o2 | 56 |
| ChC3 | Chillum loam, 6 to 12 percent slopes, severely eroded | 21 | IVe-7 | 3o2 | 56 |
| CrB2 | Croom gravelly sandy loam, 2 to 5 percent slopes, moderately eroded | 22 | IIs-7 | 4d2 | 58 |
| CrC2 | Croom gravelly sandy loam, 5 to 10 percent slopes, moderately eroded | 22 | IIIe-9 | 4d2 | 58 |
| CrD2 | Croom gravelly sandy loam, 10 to 15 percent slopes, moderately eroded | 22 | IVe-9 | 4d2 | 58 |
| CrD3 | Croom gravelly sandy loam, 10 to 15 percent slopes, severely eroded | 22 | VIe-2 | 4d2 | 58 |
| Cu | Cut and fill land | 22 | ------- | --- | -- |
| Ek | Elkton silt loam | 23 | IIIw-9 | 3w4 | 58 |
| EvB | Evesboro loamy sand, 0 to 8 percent slopes | 24 | IVs-1 | 3s1 | 58 |
| EvC | Evesboro loamy sand, 8 to 15 percent slopes | 24 | VIIs-1 | 3s1 | 58 |
| EwC2 | Evesboro-Westphalia complex, 6 to 12 percent slopes, moderately eroded | 24 | IVs-1 | 3s1 | 58 |
| EwD2 | Evesboro-Westphalia complex, 12 to 20 percent slopes, moderately eroded | 24 | IVs-1 | 3s1 | 58 |
| EwE2 | Evesboro-Westphalia complex, 20 to 45 percent slopes, moderately eroded | 24 | VIIs-1 | 3s1 | 58 |
| FaB | Faceville silt loam, 0 to 5 percent slopes | 25 | IIe-4 | 2o2 | 53 |
| Fs | Fallsington sandy loam | 26 | IIIw-6 | 2w4 | 53 |
| Gp | Gravel pits | 26 | VIIIs-4 | --- | -- |

GUIDE TO MAPPING UNITS--Continued

| Map symbol | Mapping unit | Described on page | Capability unit | Woodland suitability group | |
|---|---|---|---|---|---|
| | | | Symbol | Symbol | Page |
| KeC2 | Kempsville fine sandy loam, 5 to 10 percent slopes, moderately eroded | 27 | IIIe-5 | 2o2 | 53 |
| KeC3 | Kempsville fine sandy loam, 5 to 10 percent slopes, severely eroded | 27 | IVe-5 | 2o2 | 53 |
| KeD2 | Kempsville fine sandy loam, 10 to 15 percent slopes, moderately eroded | 27 | IVe-5 | 2o2 | 53 |
| KeD3 | Kempsville fine sandy loam, 10 to 15 percent slopes, severely eroded | 28 | VIe-2 | 2o2 | 53 |
| KpA | Keyport fine sandy loam, 0 to 2 percent slopes | 28 | IIw-9 | 3w3 | 58 |
| KpB2 | Keyport fine sandy loam, 2 to 5 percent slopes, moderately eroded | 29 | IIe-36 | 3w3 | 58 |
| KrA | Keyport silt loam, 0 to 2 percent slopes | 29 | IIw-8 | 3w3 | 58 |
| KrB2 | Keyport silt loam, 2 to 5 percent slopes, moderately eroded | 29 | IIe-13 | 3w3 | 58 |
| KrC2 | Keyport silt loam, 5 to 10 percent slopes, moderately eroded | 29 | IIIe-13 | 3w3 | 58 |
| | Kitchen Middens | 29 | ------- | --- | -- |
| Kz | Klej loamy sand, 0 to 5 percent slopes | 30 | IIIw-10 | 3w6 | 58 |
| Le | Leonardtown silt loam | 31 | IVw-3 | 3w4 | 58 |
| MaB2 | Marr fine sandy loam, 2 to 6 percent slopes, moderately eroded | 32 | IIe-4 | 3o2 | 56 |
| MaC2 | Marr fine sandy loam, 6 to 12 percent slopes, moderately eroded | 32 | IIIe-5 | 3o2 | 56 |
| MaC3 | Marr fine sandy loam, 6 to 12 percent slopes, severely eroded | 32 | IVe-5 | 3o2 | 56 |
| MmA | Matapeake fine sandy loam, 0 to 2 percent slopes | 33 | I-5 | 3o2 | 56 |
| MmB2 | Matapeake fine sandy loam, 2 to 5 percent slopes, moderately eroded | 33 | IIe-5 | 3o2 | 56 |
| MnA | Matapeake silt loam, 0 to 2 percent slopes | 33 | I-4 | 3o2 | 56 |
| MnB2 | Matapeake silt loam, 2 to 5 percent slopes, moderately eroded | 34 | IIe-5 | 3o2 | 56 |
| MnC3 | Matapeake silt loam, 5 to 10 percent slopes, severely eroded | 34 | IVe-3 | 3o2 | 56 |
| MtA | Mattapex fine sandy loam, 0 to 2 percent slopes | 35 | IIw-5 | 3w3 | 58 |
| MtB2 | Mattapex fine sandy loam, 2 to 5 percent slopes, moderately eroded | 35 | IIe-36 | 3w3 | 58 |
| MuA | Mattapex silt loam, 0 to 2 percent slopes | 35 | IIw-1 | 3w3 | 58 |
| MuB2 | Mattapex silt loam, 2 to 5 percent slopes, moderately eroded | 35 | IIe-16 | 3w3 | 58 |
| MuC2 | Mattapex silt loam, 5 to 10 percent slopes, moderately eroded | 35 | IIIe-16 | 3w3 | 58 |
| On | Othello fine sandy loam | 36 | IIIw-6 | 3w4 | 58 |
| Ot | Othello silt loam | 36 | IIIw-7 | 3w4 | 58 |
| RuB | Rumford loamy sand, 0 to 5 percent slopes | 37 | IIs-4 | 3o2 | 56 |
| RuC2 | Rumford loamy sand, 5 to 10 percent slopes, moderately eroded | 37 | IIIe-33 | 3o2 | 56 |
| SaA | Sassafras sandy loam, 0 to 2 percent slopes | 38 | I-5 | 3o2 | 56 |
| SaB2 | Sassafras sandy loam, 2 to 5 percent slopes, moderately eroded | 38 | IIe-5 | 3o2 | 56 |
| SaC2 | Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded | 39 | IIIe-5 | 3o2 | 56 |
| SaC3 | Sassafras sandy loam, 5 to 10 percent slopes, severely eroded | 39 | IVe-5 | 3o2 | 56 |
| SaD2 | Sassafras sandy loam, 10 to 15 percent slopes, moderately eroded | 39 | IVe-5 | 3o2 | 56 |
| SaD3 | Sassafras sandy loam, 10 to 15 percent slopes, severely eroded | 39 | VIe-2 | 3o2 | 56 |
| SfA | Sassafras loam, 0 to 2 percent slopes | 39 | I-4 | 3o2 | 56 |
| SfB2 | Sassafras loam, 2 to 5 percent slopes, moderately eroded | 39 | IIe-4 | 3o2 | 56 |

| Map symbol | Mapping unit | Described on page | Capability unit | Woodland suitability group | |
|---|---|---|---|---|---|
| | | | Symbol | Symbol | Page |
| SmC2 | Sassafras-Chillum complex, 6 to 12 percent slopes, moderately eroded | 40 | IIIe-4 | 3o2 | 56 |
| SmC3 | Sassafras-Chillum complex, 6 to 12 percent slopes, severely eroded | 40 | IVe-5 | 3o2 | 56 |
| Tm | Tidal marsh | 40 | VIIIw-1 | --- | -- |
| WeB2 | Westphalia fine sandy loam, 2 to 6 percent slopes, moderately eroded | 41 | IIe-5 | 3o2 | 56 |
| WeC2 | Westphalia fine sandy loam, 6 to 12 percent slopes, moderately eroded | 41 | IIIe-5 | 3o2 | 56 |
| WeC3 | Westphalia fine sandy loam, 6 to 12 percent slopes, severely eroded | 41 | IVe-5 | 3r4 | 57 |
| WsA | Woodstown sandy loam, 0 to 2 percent slopes | 42 | IIw-5 | 2w3 | 53 |
| WsB | Woodstown sandy loam, 2 to 5 percent slopes | 42 | IIe-16 | 2w3 | 53 |
| WsC2 | Woodstown sandy loam, 5 to 10 percent slopes, moderately eroded | 42 | IIIe-36 | 2w3 | 53 |

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