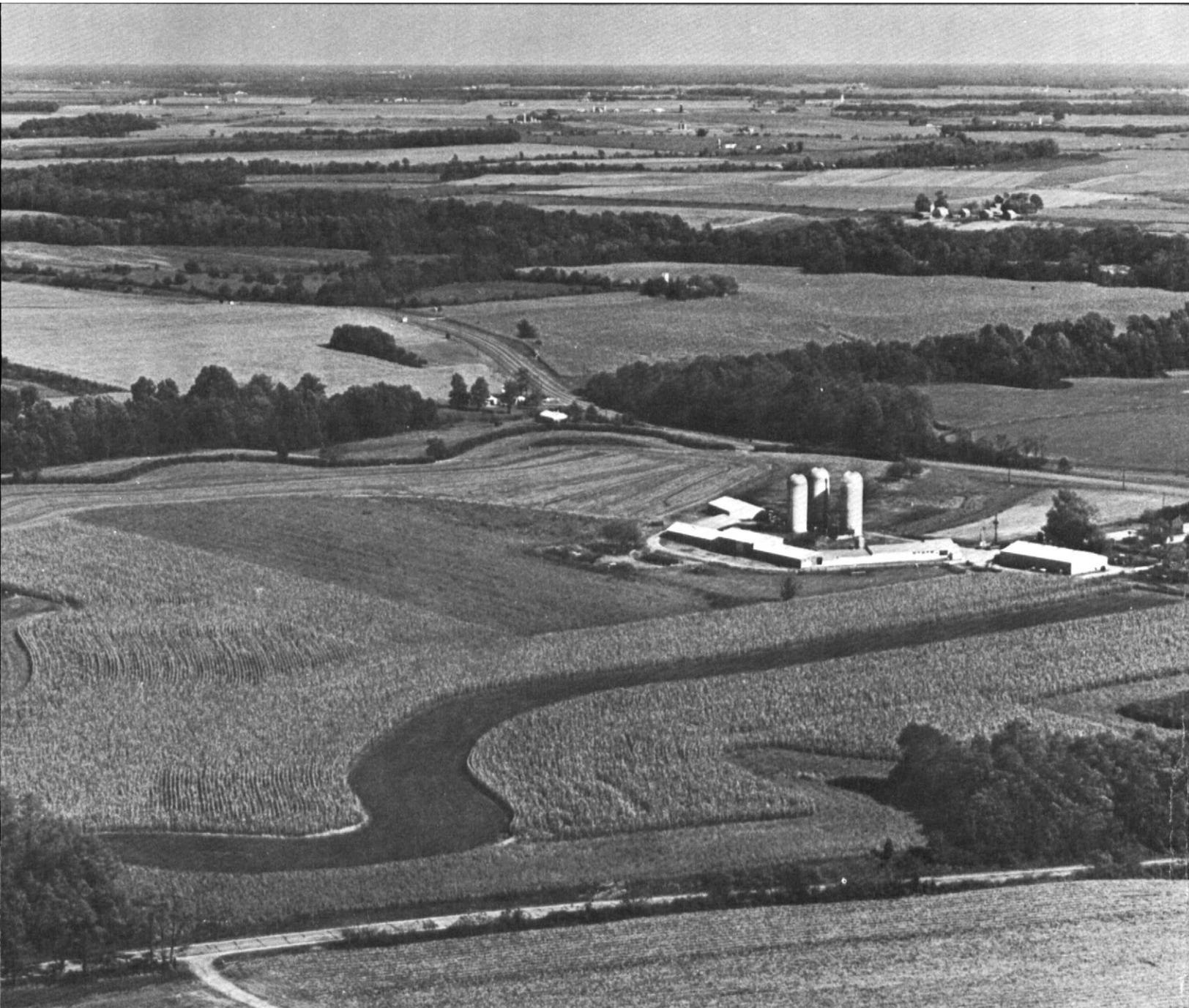




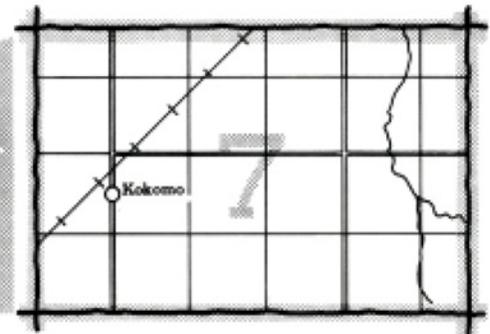
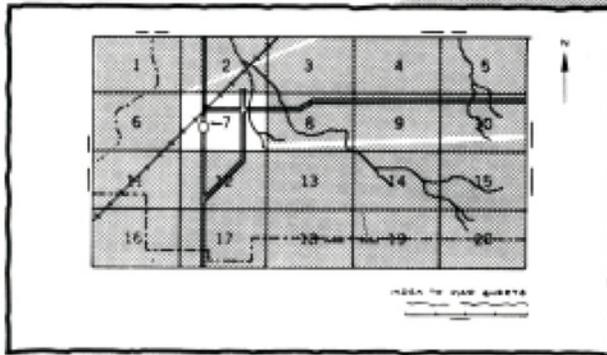
Soil survey of Kent County, Maryland

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



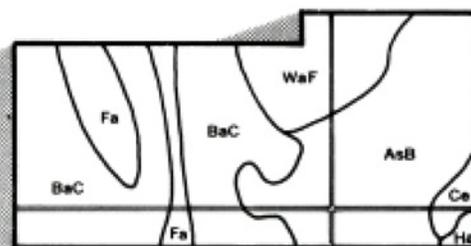
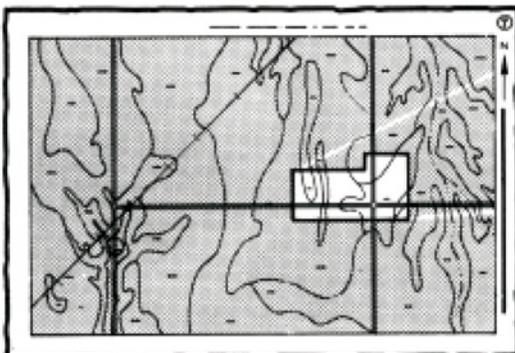
HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets"

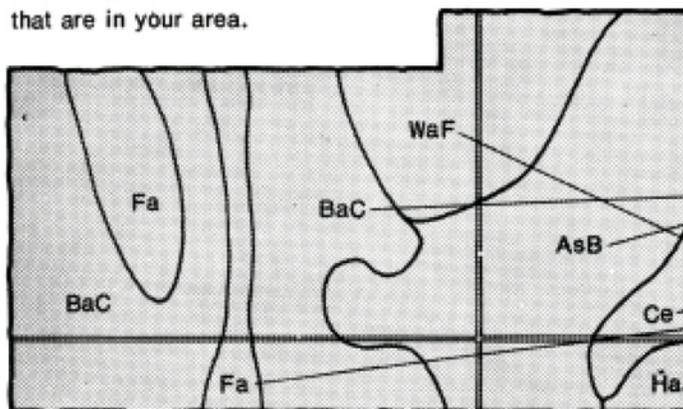


2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



4. List the map unit symbols that are in your area.

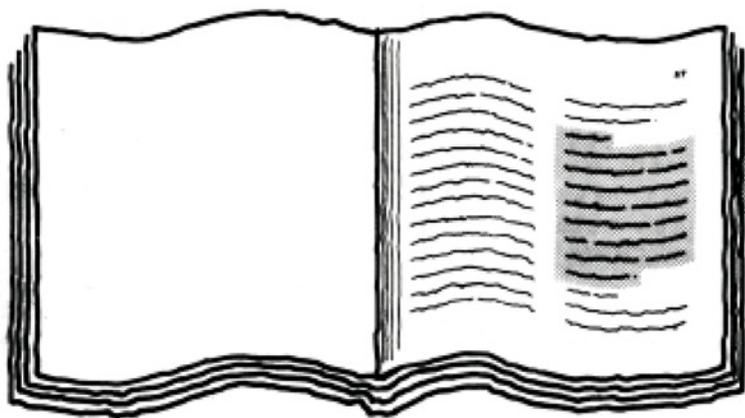


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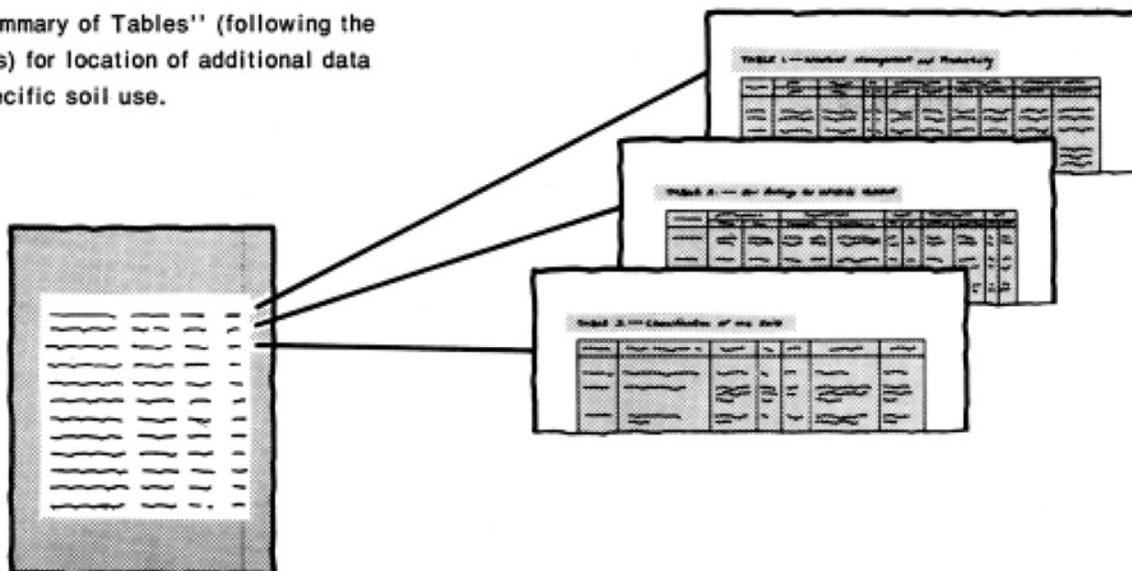
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THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.

A rectangular callout box containing a table of contents. It has two columns of text. The left column lists various soil map units, and the right column lists the corresponding page numbers. The text is small and difficult to read, but the layout is typical of an index.

6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. 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, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was performed in the period 1976-78. Soil names and descriptions were approved in 1979. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1978. This survey was made cooperatively by the Soil Conservation Service and the Maryland Agricultural Experiment Station. The Kent County Commissioners and the Kent Soil Conservation District Board provided partial funding for the survey. This survey is part of the technical assistance furnished to the Kent Soil Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: This dairy farm is in an area of Mattapex-Matapeake-Butlertown silt loams, 0 to 2 percent slopes.

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foreword

This soil survey contains information that can be used in land-planning programs in Kent County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil.

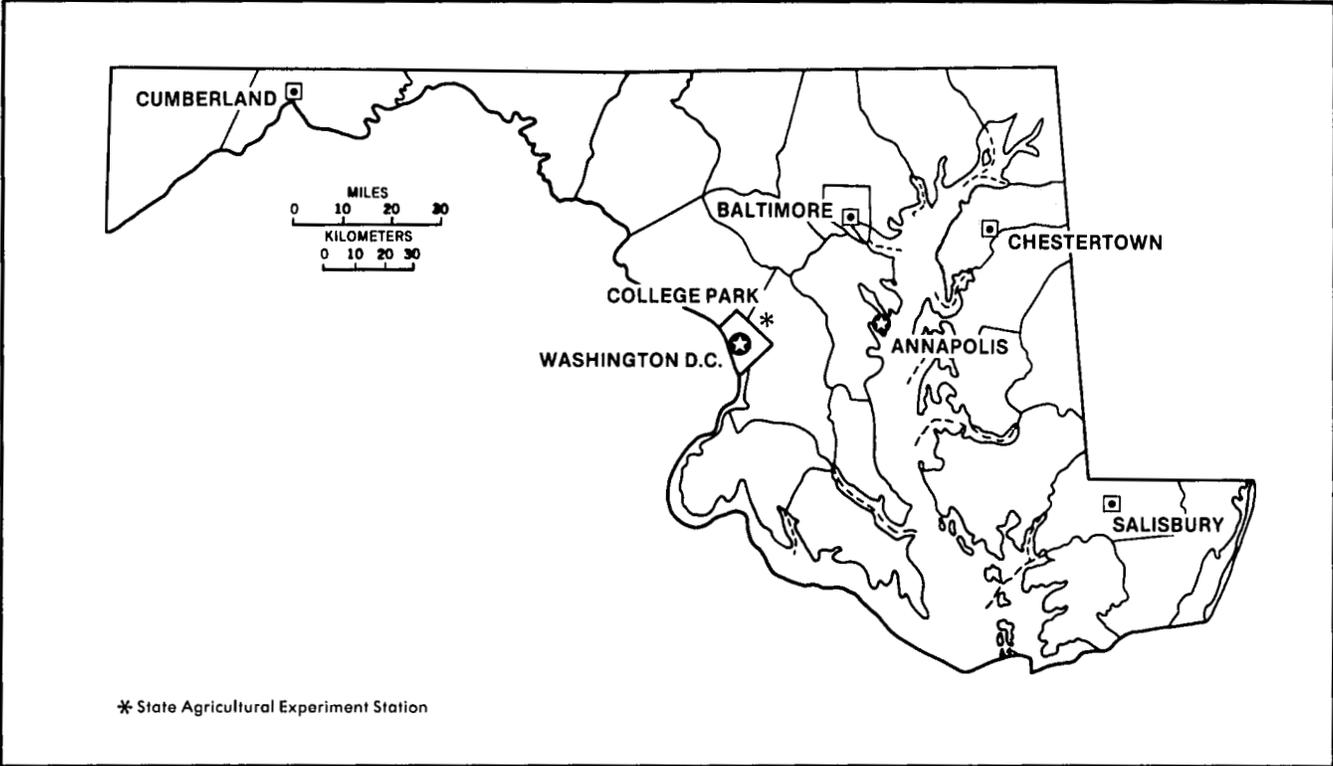
This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.



Gerald R. Calhoun
State Conservationist
Soil Conservation Service



Location of Kent County in Maryland.

soil survey of Kent County, Maryland

By Edgar A. White Jr., Soil Conservation Service

Fieldwork by Edgar A. White Jr., Richard L. Hall, Robert L. Shields, and James Brewer, Soil Conservation Service, and Robert G. Darmody, University of Maryland

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

KENT COUNTY is in the northern part of Maryland's Eastern Shore. The county has a total land area of 179,840 acres, or 281 square miles, and has 17,280 acres of water within its boundaries. The county is a crescent-shaped peninsula bordered by water on all but its eastern side. Chestertown, the county seat and largest town, is on the Chester River about equidistant from the eastern and western borders of the county. According to the 1970 census, the population of Kent County was 16,146, a 4.3 percent increase from 1960.

Farming is the main land use in Kent County; the county ranks first in the state in percentage of land area used for farming. The sources of farm income are mainly field crops and dairy products but include livestock, poultry, vegetables, fruits and nuts, forest products, and horticultural products. Retail and wholesale trade, small manufacturers, service industries, commercial fishing and other water-related industries, tourism, and recreation are the main nonfarm sources of employment.

The main highway in the county is U.S. Route 301. It runs north-south across the east end of the county, extending from Wilmington, Delaware, to across the Chesapeake Bay Bridge. The other major roads in the county are U.S. Route 213 and Md. Routes 20 and 291. A single-track railroad spur runs from Delaware into the county and terminates at Chestertown. A rail branch at Massey runs to Centreville in Queen Annes County. Two airports are in the county. One is just north of Chestertown on Md. Route 213, and the other is near Fairlee Creek.

This survey serves as an updated version to a soil survey of Kent County that was published in 1930 and to a publication entitled "Physical Land Conditions in Kent Soil Conservation District, Maryland," which was published in 1945 (5, 6). The maps in this survey also show the soils in greater detail than was shown in the two earlier publications.

general nature of the survey area

This section provides information about the climate of the survey area, the relief, physiography, and drainage, and the natural resources and water supplies.

climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Chestertown, Maryland, in the period 1951 to 1977. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 35 degrees F, and the average daily minimum temperature is 27 degrees. The lowest temperature on record, which occurred at Chestertown on January 17, 1977, is -3 degrees. In summer the average temperature is 75 degrees, and the average daily maximum temperature is

85 degrees. The highest recorded temperature, which occurred at Chestertown on July 22, 1957, is 103 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 44 inches. Of this, 23 inches, or about 50 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 19 inches. The heaviest 1-day rainfall during the period of record was 6.28 inches at Chestertown on June 22, 1972. Thunderstorms occur on about 28 days each year, and most occur in summer.

Average seasonal snowfall is 19 inches. The greatest snow depth at any one time during the period of record was 17 inches. On an average of 8 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 50 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 60 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the west. Average windspeed is highest, 11 miles per hour, in spring.

relief, physiography, and drainage

Although the county has some rolling or hilly areas, especially in the northern and northwestern parts, the relief of the survey area is mainly slight. The highest elevation in Kent County, at Stillpond Neck, is just over 100 feet above sea level. The lowest parts of the county are the tidal marshes which are at or just above sea level.

The majority of the county is between elevations of 60 and 80 feet and consists of a nearly level or undulating plain that is dissected in places by ravinelike drainageways. The southern and western parts of the county consist of a lower, more recent terrace or plain that is mainly between elevations of 20 and 40 feet. This area is more nearly level than the higher terrace and uplands and is not as deeply dissected.

Kent County is entirely within the Atlantic Coastal Plain in three physiographic regions. These regions, ranging from youngest to oldest, are: (1) alluvial deposits on flood plains and tidal marshes; (2) the Talbot plain, which is at an elevation from just above sea level to about 45 feet above sea level; and (3) the Wicomico plain, which is at an elevation of 45 to more than 100 feet above sea level.

The most recent deposits, or Holocene sediments, are on flood plains, in tidal marshes and bogs, and on

beaches. They are at such a low elevation that they are sometimes inundated by water during periods of heavy rainfall or high tides. This water leaves the sediment in which the alluvial soils are formed. Many of the marshes and some of the flood plains were formerly embayments to the larger creeks and rivers or the Chesapeake Bay. In time, the embayments have been so filled with soil washed from adjoining uplands and by the accumulation of plant material that they have been converted into flood plains, marshes, or bogs.

The Talbot plain borders the larger streams and extends along the shores of the Chesapeake Bay. It has a characteristic low relief and general plainlike topography. It is made up of broad, level areas dissected by widely spaced tidal creeks that have a few short nontidal branches. Most of the soils range from moderately well drained to poorly drained. Some poorly drained soils are mainly on the inland or central parts of the necks of land on this plain.

The Wicomico plain is separated from the lower Talbot terrace by an abrupt rise, or escarpment, that is especially noticeable near Melitota, Sandy Bottom, just south of Langford, and along Md. Route 291 between Chestertown and Chesterville Forest. This escarpment was at one time the shore of the Chesapeake Bay and Chester River. This plain is well dissected by deep ravines and stream valleys in the northern and northwestern parts of the county. The uplands are broad and nearly level. In the central and eastern parts of the county, this plain is not as closely or deeply dissected and the uplands are very broad and nearly level.

The drainage of Kent County is to the north into the Sassafras River, south into the Chester River, and west into the Chesapeake Bay. All of the streams are relatively short. Most streams, except near their sources, are of sufficient age to have wide flood plains and meandering channels (fig. 1).

In general, the surface drainage of the county is good. Most of the drainage is directly into streams by overland flow. Some water moves to streams more slowly by underground flow. Underground drainage is through the coarse textured sediments which underlie most of the soils of the county. A few areas of the county, however, have little or no surface drainage and slow subsurface drainage. The largest of these areas are near Golts, west of Massey along U.S. Route 301, and in the area between Tolchester and McCleans Corner. The county also contains scattered local depressions and pot holes, called "whale wallows," that lack drainage outlets and where all drainage is provided by underground flow. These are most common in the eastern part but are scattered throughout the county.

natural resources

Kent County has the highest percentage of prime farmland in the State: 102,251 acres, or about 57 percent of the county, is classified as prime farmland. The soils in these areas are well drained or moderately



Figure 1.—The confluence of the SassafRAS River, Island Creek, and Woodland Creek.

well drained and are level or gently sloping. The county has 268 miles of tidal shoreline and numerous streams and ponds. The Chester and SassafRAS Rivers are navigable by small craft almost to the Delaware line.

The range from deep open water to tidal marshes to productive upland soils provides habitat for a variety and abundance of wildlife. Canadian geese spend winter in the fields and ponds. Ducks, gamebirds, and other birds and deer, fox, rabbits, and squirrels frequently use the fields and woodlands for food and cover. The waters provide habitat for a large number of fish, crabs, oysters, and turtles.

Woodland covers about 43,500 acres, or 24 percent, of the county, and most of the wooded areas are privately owned. About half the forested areas are oak-hickory types; the rest are oak-gum, yellow pines, oak-pines, or elm-ash-red maple.

The Pleistocene formations of the county contain some clay beds that produce material for the manufacture of brick and tile. The county has beds of sand used locally for building purposes and gravel for

road building. The Monmouth and Aquia formations contain considerable glauconite, or greensand, which was at one time used as a source of low-grade potassium fertilizer.

water supplies

The layers of sediments underlying Kent County contain an abundance of water for wells. These layers dip to the southeast and thus are generally deeper in the eastern part of the county and shallower in the northwestern part.

Water-bearing sands are in the Patapsco and Raritan formations. The top of the formation is just about at sea level in the northwestern part of the county, 350 feet below sea level near Chestertown, and 700 feet below sea level near Millington. The high content of acids and iron in the water, however, limits the use of this aquifer. The Magothy formation, another extensive water-bearing formation, is near sea level in the northwest, 250 feet below sea level at Chestertown, and 500 feet below sea

level at Millington. Its water also is acidic in places and has a high iron content.

The Aquia Greensand is a major aquifer on the Eastern Shore of Maryland. The water is generally of good quality and in many localities is usable with little or no treatment. However, local treatment for iron removal is sometimes necessary. In recent years this aquifer has become a source of water for supplemental irrigation on the Eastern Shore. Yields range up to 1,300 gallons per minute. The recharge area runs from Rock Hall to Galena and is covered by younger sediments. At Chestertown the top of the Aquia is approximately at sea level.

The Pliocene and Pleistocene deposits in the county contain water that sometimes needs iron removal and deacidification. The range in depth of these deposits is from 50 feet below sea level to 50 feet above sea level.

how this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the

profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General soil map units" and "Detailed soil map units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, woodland managers, engineers, planners, developers and builders, home buyers, and others.

general soil map units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each association on the general soil map is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in others but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

soil descriptions

1. Matapeake-Sassafras association

Nearly level to strongly sloping, well drained soils formed in silty and loamy materials

This association consists of nearly level uplands, rolling uplands, and side slopes (fig. 2). It is dissected by widely spaced streams. Most of the association is in three strips: One strip is between Millington and Sassafras along Md. Routes 313 and 299; the second is between Crumpton in Queen Annes County and an area just west of Galena; the third, and most dissected, strip is an area west of Chestertown to just south of Still Pond.

This association makes up about 20 percent of the county. The association is about 60 percent Matapeake soils, 30 percent Sassafras soils, and 10 percent minor soils.

The Matapeake soils are on nearly level or undulating uplands and moderately sloping side slopes. They have a surface layer of silt loam, a subsoil of silt loam and loam, and a moderately coarse textured substratum.

The Sassafras soils are on undulating uplands and side slopes. They have a surface layer of sandy loam, a subsoil of sandy loam to sandy clay loam, and a coarse textured substratum.

The Butlertown soils are the dominant minor soils in the association. They are moderately well drained and

have a firm layer that inhibits the root growth and the movement of water. In some seasons the soil above the firm layers is saturated with water. The other minor soils are poorly drained Othello and Fallsington soils; moderately well drained Mattapex, luka, and Woodstown soils; and poorly drained Bibb soils.

Almost all of this association is suitable and used for farming. Only the strongly sloping areas adjacent to streams and flood plains are wooded. The soils in this association are well suited to corn, soybeans, small grains, hay, and pasture. The nearly level to gently sloping areas are classified as prime farmland and have few limitations for cultivated crops. The Matapeake and Sassafras soils have few limitations for woodland and are generally suitable for nonfarm use in all but the strongly sloping areas.

2. Mattapex-Matapeake-Butlertown association

Dominantly nearly level to moderately sloping, moderately well drained and well drained soils formed in silty materials

This association is mainly on broad uplands and on some moderately sloping areas dissected by draws or gullies. Most areas are in the central to western parts of the county, and most are at an elevation of 60 to 80 feet above sea level.

This association makes up about 19 percent of the county. The association is about 45 percent Mattapex soils, 25 percent Matapeake soils, 15 percent Butlertown soils, and 15 percent minor soils.

The Mattapex soils are moderately well drained and are on broad, nearly level to moderately sloping uplands and in small depressions. They have a surface layer of silt loam, a subsoil of silt loam that is mottled in the lower part, and a moderately coarse textured substratum.

The Matapeake soils are well drained. They are on broad, nearly level to moderately sloping uplands. They have a surface layer of silt loam, a subsoil of silt loam and loam, and a moderately coarse textured substratum.

The Butlertown soils are moderately well drained. They are on broad and nearly level uplands and slightly depressed or gently undulating uplands. They have a subsoil of silt loam. The lower part of the subsoil is a very firm layer that inhibits root growth and water movement. In some seasons the soil above the firm layer is saturated with water.



Figure 2.—An area of prime farmland in the Matapeake-Sassafras association.

The minor soils in this association are well drained Sassafras and Colts Neck soils on side slopes and undulating uplands, poorly drained Othello soils in areas where water is sometimes ponded, and poorly drained Bibb soils on flood plains.

Almost all of this association is classified as prime farmland and is used for farming. Corn and soybeans are the commonly grown crops. Small grains, hay, and sweet corn are also grown. The soils are well suited to woodland, but few areas are wooded. A seasonal high water table in some areas is the main limitation of the association for nonfarm use.

3. Sassafras-Galestown-Fort Mott association

Nearly level to steep, well drained and somewhat excessively drained soils formed in sandy and loamy materials

This association consists of small areas of level to rolling uplands, side slopes, and terraces bordering some of the larger streams and creeks in the county. Areas of this association are along Andover and Cypress Branches near Millington, along the Chester River, along Morgan Creek, and near Still Pond Creek.

This association makes up about 4 percent of the county. The association is about 45 percent Sassafras soils, 28 percent Galestown soils, 15 percent Fort Mott soils, and 12 percent minor soils.

The Sassafras soils are well drained. They are on nearly level to undulating uplands and side slopes. They have a surface layer of loam and sandy loam, a subsoil of sandy clay loam, and a moderately coarse textured substratum.

The Galestown soils are somewhat excessively drained. They are on nearly level terraces, sandy knolls,

and strongly sloping to steep side slopes. They have a surface layer of loamy sand, a subsoil of loamy sand, and a sandy substratum.

The Fort Mott soils are well drained. They are on nearly level to moderately sloping uplands and stream terraces. They have a surface layer of loamy sand, a subsoil of sandy loam, and a sandy substratum.

The dominant minor soils in this association are moderately well drained Woodstown soils in depressions and nearly level areas, poorly drained Fallsington soils along drainageways and in closed depressions, and poorly drained Bibb soils on flood plains.

This association is about half wooded and half cleared. The cleared areas are used for general farm crops and truck crops. The soils warm quickly in spring and are well suited to early-season truck crops. The soils dry quickly during periods of low rainfall, however, and are droughty and susceptible to wind erosion. Ground-water pollution is a hazard in some areas of this association that are used for septic tank absorption fields.

4. Sassafras-Bibb-Colts Neck association

Dominantly moderately sloping to steep, well drained soils formed in loamy materials; nearly level, poorly drained alluvial soils

This association consists of well dissected sloping areas and short valley side slopes along streams and creeks. The soils are along the Sassafras River and its tributaries and are on side slopes and narrow flood plains along Morgan Creek and most other creeks in the central part of the county that drain into the Chester River.

This association makes up about 18 percent of the county. It is about 46 percent Sassafras soils, 19 percent Bibb soils, 17 percent Colts Neck soils, and 18 percent minor soils.

The Sassafras soils are well drained. They are on dissected side slopes. They have a surface layer of loam and sandy loam, a subsoil of sandy clay loam, and a coarse textured substratum.

The Bibb soils are poorly drained. They are on narrow flood plains between Sassafras and Colts Neck soils. They have a surface layer of dark grayish brown silt loam, a subsurface layer of silt loam, and a substratum of silt loam to loamy sand.

The Colts Neck soils are well drained. They are on dissected side slopes. They have a surface layer of loam, a subsoil of loam, and a moderately coarse textured substratum.

The dominant minor soils are Bibb Variant and luka soils. The Bibb Variant soils are downstream from the Bibb soils and formed in alluvial sediments deposited by streams and tidal action in low, level backwater areas. The luka soils are deep and moderately well drained. They formed in alluvial sediments washed into the headwaters of this association. The other soils in this

association are well drained Matapeake soils and moderately well drained Mattapex and Butlertown soils on the shoulders of side slopes.

Most of this association is in woodland. In most areas that are farmed, the nearly level areas are used for cultivated crops such as corn and soybeans and the side slopes are in pasture or a small grain-soybean rotation. Slope, a high water table, and flooding on the Bibb soils limit this association for woodland management and are the main limitations for nonfarm use.

5. Woodstown-Fallsington-Sassafras association

Nearly level to strongly sloping, poorly drained to well drained soils formed in loamy materials

This association consists of undulating uplands, closed depressions, and broad flat areas. It is in a broad, largely wooded area in the eastern part of the county near the Delaware state line. A large part of the association is in the Millington Wildlife Management area. Many small, shallow streams and a few large, deeper streams dissect the association. The uplands are made up of hummocky knolls and poorly drained potholes. Slopes are mainly 0 to 5 percent, but some near the larger streams are steeper.

This association makes up about 6 percent of the county. The association is about 45 percent Woodstown soils, 28 percent Fallsington soils, 10 percent Sassafras soils, and 17 percent minor soils.

The Woodstown soils are moderately well drained. They mainly are on nearly level to sloping uplands but are hummocky in places. They have a surface layer of loam or sandy loam, a subsoil of loam or heavy sandy loam that is mottled in the lower part, and a sandy substratum.

The Fallsington soils are poorly drained. They are in small, closed depressions or large, flat areas. They have a surface layer of sandy loam or loam, a subsoil of mottled sandy clay loam, and a mottled, coarse textured substratum.

The Sassafras soils are well drained. They are on the more sloping areas of the association and in nearly level to strongly sloping areas adjacent to streams. They have a surface layer of sandy loam or loam, a subsoil of sandy clay loam, and a sandy substratum.

The dominant minor soils are poorly drained Othello and Elkton soils on broad flats, in small depressions, and along drainageways; somewhat excessively drained, sandy Galestown soils on side slopes and knolls; moderately well drained, clayey Keyport soils on side slopes near streams; and small areas of Fort Mott and Bibb soils.

This association is about half farmed and half wooded. The common crops are corn, soybeans, and small grains. The wooded areas are generally unmanaged. Drainage is the main need of farmed areas of Woodstown and Fallsington soils, but some areas of the association are droughty during long dry periods. The

Sassafras soils have few limitations for nonfarm use, but the Woodstown and Fallsington soils are limited by a seasonal high water table.

Some of the wooded areas provide wildlife habitat for deer, wood ducks, black ducks, and mallards.

6. Mattapex-Othello association

Nearly level to moderately sloping, moderately well drained and poorly drained soils formed in silty materials

This association mainly consists of broad, nearly level uplands and terraces and some moderately sloping side slopes. Most of this association is on the lower Talbot terrace at an elevation of 45 feet above sea level or less. The upland areas are between Chesterville Forest and Lambson Station and along U.S. Route 301 in the eastern part of the county.

This association makes up about 20 percent of the county. The association is about 55 percent Mattapex soils, 25 percent Othello soils, and 20 percent minor soils.

The Mattapex soils are moderately well drained. They are on nearly level or undulating uplands. They have a surface layer of silt loam, a subsoil of silt loam that is mottled in the lower part, and a moderately coarse textured substratum.

The Othello soils are poorly drained. They are on broad, nearly level flats and in depressions. They have a surface layer of silt loam, a subsoil of silt loam, and a moderately coarse textured substratum.

The dominant minor soils are moderately well drained Butlertown soils and poorly drained Elkton and Fallsington soils in depressions and broad, level areas. The Elkton soils generally are well inland, and the Fallsington soils are closer to creeks. The other minor soils are moderately well drained, moderately coarse textured Woodstown soils and well drained, loamy Sassafras soils, both of which are sloping, and areas of Woodstown, Sassafras, and Fallsington soils on Eastern Neck Island.

This association is mostly used for cultivated crops. Some of the poorly drained or moderately sloping areas are in woodland. The soils are well suited to cultivated crops and trees. Poor drainage and a high water table are the main limitations of the association for nonfarm use.

7. Elkton-Keyport-Mattapex Variant association

Dominantly nearly level to moderately sloping, moderately well drained and poorly drained soils formed in clayey and silty materials

This association mainly consists of broad, nearly level areas and some slopes and depressions. Most of this association is on the Talbot terrace in the western and southern parts of the county where the elevation is less than 45 feet above sea level. The association is dissected by streams and wide creeks in a few places.

This association makes up about 11 percent of the county. It is about 28 percent Elkton soils, 26 percent Keyport soils, 23 percent Mattapex Variant soils, and 23 percent minor soils.

The Elkton soils are poorly drained. They are on broad flats and in low-lying areas and small depressions. They have a surface layer of silt loam, a subsoil of silty clay loam and silty clay, and a substratum that is gray clay in the upper part and sandy loam in the lower part.

The Keyport soils are moderately well drained. They are on nearly level to moderately sloping uplands and side slopes. They have a surface layer of silt loam, a subsoil of mottled silty clay loam and silty clay, and a substratum of silty clay.

The Mattapex Variant soils are moderately well drained. They are on broad, nearly level areas and gentle side slopes. They have a surface layer of silt loam, a subsoil of silt loam that is mottled in the lower part, and a clayey substratum.

The dominant minor soils are moderately well drained Mattapex, Butlertown, and Woodstown soils. The other minor soils are poorly drained Othello and Fallsington soils in depressions and well drained Matapeake soils on uplands.

This association is about half wooded and half farmed. The wooded areas are made up mostly of Elkton soils and of Mattapex soils too steep to be farmed. Providing drainage is the main farming management concern. A seasonal high water table limits the planting and harvesting of woodland and is a major limitation for nonfarm uses. Slow permeability and high shrink-swell and frost-action potentials further limit the soils for nonfarm use.

8. Westbrook-Kingsland-Ipswich association

Level, very poorly drained marsh soils formed in organic and mineral materials

This association consists of the tidal marshes along the Chesapeake Bay, Chester River, and Sassafras River and along the lower reaches of their tributaries. The soils are dominantly level, but slopes range from 0 to 2 percent.

This association makes up about 2 percent of the survey area. The association is about 48 percent Westbrook soils, 11 percent Kingsland soils, 11 percent Ipswich soils, and 30 percent minor soils.

The Westbrook soils are in tidal marshes that border Eastern Neck and other peninsulas and islands in the southwestern part of the county. The marshes are inundated daily by brackish water. The soils consist of organic material to a depth of about 43 inches and fine sandy clay loam at a depth of more than 43 inches.

The Kingsland soils are in marshes that are cut off from saltwater by barrier beaches. The soils consist of mainly organic material more than 50 inches thick.

The Ipswich soils are along the Chester River east of Chestertown. They consist of organic material more than 60 inches thick.

The Axis soils are the most extensive of the minor soils. They are deep and very poorly drained. They are on low, level estuary meanders and at the mouth of small streams. Some marshes, especially those containing Westbrook soils, have small spots of poorly drained, wooded Fallsington soils on hummocks.

Most of this association is in tidal grasses and shrubs. Tidal inundation, extreme wetness, and low strength make the association generally unsuitable for most uses other than as wildlife habitat or for recreation.

detailed soil map units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and management of the soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, *Galestown loamy sand, 0 to 5 percent slopes*, is one of several phases in the *Galestown series*.

Some map units are made up of two or more major soils. These map units are called soil complexes or undifferentiated groups.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. *Butlertown-Mattapex silt loams, 0 to 2 percent slopes*, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. *Colts Neck and Sassafras soils, 15 to 40 percent slopes*, is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. *Pits, gravel and sand*, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

soil descriptions

Ax—Axis mucky silt loam. This soil is level and very poorly drained. It is in tidal marshes and at the mouths of freshwater streams (fig. 3). Brackish tidal water continuously inundates the tidal marshes and periodically inundates the areas at the mouths of streams. The areas are generally long and narrow or conform to the shape of the adjacent stream and range from 2 to 70 acres.

Typically, this soil has a surface layer of very dark gray mucky silt loam about 20 inches thick. The substratum is dark greenish gray mucky silt loam and silt loam to a depth of more than 60 inches.

Included with this soil in mapping are areas of a soil throughout the unit that has a sulfidic organic layer up to 40 inches thick on the surface. Also included are small areas of Bibb Variant and Bibb soils upstream or adjacent to uplands that are not inundated. Some areas have narrow natural levees adjacent to streams and some barrier beaches. Included areas make up about 25 percent of the unit.

The permeability of this Axis soil is moderate. Available water capacity is high. The water table fluctuates with the tides but is always within 12 inches of the surface. Water is ponded on some areas during low tide. This soil has a high organic matter content, very low strength, and very low bearing capacity. Salinity is low.



Figure 3.—An area of Axis mucky silt loam near the mouth of Morgan Creek.

The soil is extremely acid when dry but is naturally slightly acid to neutral.

Low strength, the high water table, and the hazard of flooding make this soil generally unsuitable for most uses other than as wetland wildlife habitat or for some types of recreational activity.

The capability subclass is VIIIw.

Be—Beaches. This unit consists of sandy, gravelly, or cobbly areas that are between open water and uplands, escarpments, and tidal marshes. Most of the areas consist of loose sand that supports little or no vegetation, but a few areas near tidal marshes and on the inland side of the barrier beaches support some trees, shrubs, and grasses. This unit is generally unsuitable for most uses other than as wildlife habitat or for some types of recreation.

The capability subclass is VIIIs.

Bs—Bibb silt loam. This soil is level to nearly level and is poorly drained. It is on long, narrow flood plains that are bordered by gently sloping to steep uplands. The areas of the soil range from a few acres to more than 100 acres. The flood plains mainly range from about 50 to 800 feet in width.

Typically, this soil has a surface layer of dark grayish brown silt loam 2 inches thick over a subsurface layer of dark gray, mottled silt loam 7 inches thick. The substratum extends to a depth of 60 inches or more. It is gray and light gray, mottled silt loam in the upper part and light gray, mottled sandy loam and loamy sand in the lower part.

Included with this soil in mapping are a few areas of very poorly drained soils that have a water table near the surface for long periods in fall, winter, and spring. Also

included are areas of Elkton and Othello soils mostly on flood plains in the southwestern part of the county that have about 15 inches of recently deposited alluvium. Some areas of Bibb Variant silt loam are in this unit in the northern part of the county. Some areas in the eastern part of the county are similar to this Bibb soil but have more sand. Included areas make up about 10 percent of the unit.

The permeability of this Bibb soil is moderate. Available water capacity is high, and surface runoff is slow. A seasonal high water table is at a depth of 6 to 18 inches from December to April in most years. This soil is frequently flooded, especially in winter and early spring. Reaction of the soil is strongly acid or very strongly acid throughout.

Most areas of this soil are wooded. A small acreage is used for pasture.

Poor drainage, flooding, and the narrow shape of the areas make this soil generally unsuitable for most field crops grown in the county. The soil, however, is suited to improved pasture. The major pasture management concerns are providing drainage, mainly by tile or open ditches, to increase the grazing period; using water-tolerant plant species; and restricting grazing where the soil is wet. Drainage outlets are not available in some areas near tidal streams.

This soil is well suited to woodland. The potential productivity for water-tolerant trees is high.

The high water table and hazard of flooding are the major limitations of the soil for community development, especially for septic tank absorption fields. A frost-action potential limits the soil as a site for local roads and streets. The soil is generally suitable for wetland wildlife habitat.

The capability subclass is Vw.

Bt—Bibb Variant silt loam. This soil is level and very poorly drained. It is in estuarine tidal marshes at the mouths of freshwater streams and on flood plains. The areas of the soil are generally long and narrow, are bordered by sloping uplands, and range from about 2 to 40 acres.

Typically, this soil has a surface layer of very dark brown mucky silt loam about 6 inches thick. The substratum extends to a depth of 60 inches or more. The upper part of the substratum is very dark grayish brown mucky silt loam; the middle part is very dark grayish brown, moderately decomposed organic matter mixed with silt; and the lower part is dark olive gray and black mucky silt loam.

Included with this soil in mapping are small areas of Bibb silt loam and some natural levees immediately adjacent to streams. In some places the surface layer is organic material less than 10 inches thick. Included areas make up as much as 15 percent of the unit.

This Bibb Variant soil has moderately slow permeability. Available water capacity is high. The water table is between the surface and a depth of 18 inches,

depending on the tides. Water is often ponded on the surface (fig. 4). Some areas are subject to daily tidal flooding, and some others are flooded only during abnormally high tides. The soil has very low strength and very low bearing capacity. Salinity is low. The soil is slightly acid or neutral.

The flooding, high water table, and very low strength and bearing capacity make the soil generally unsuitable for most uses other than as wetland wildlife.

The capability subclass is VIIw.

BuA—Butlertown-Mattapex silt loams, 0 to 2 percent slopes. This unit consists of level to nearly level, moderately well drained soils on uplands throughout the county. The areas of this unit range from about 5 to 100 acres and are irregularly shaped. They are about 45 percent Butlertown silt loam, 40 percent Mattapex silt loam, and 15 percent other soils. The Butlertown and Mattapex soils are in such an intricate pattern that it was not practical to map them separately.

Typically, the Butlertown soil has a surface layer of dark brown silt loam about 10 inches thick. The subsoil is about 45 inches thick. It is friable, brownish yellow and yellowish brown, mottled heavy silt loam in the upper part and very firm, mottled, yellowish brown silt loam in



Figure 4.—An extremely wet area of Bibb Variant silt loam.

the lower part. The substratum is stratified pale brown loam, silt loam, and sandy loam to a depth of 75 inches.

Typically, the Mattapex soil has a surface layer of dark yellowish brown silt loam about 11 inches thick. The subsoil is mottled, yellowish brown and light yellowish brown silt loam 24 inches thick. The substratum is strong brown sandy loam to a depth of 60 inches.

Included with these soils in mapping are slightly eroded areas of Butlertown soils where the firm part of the subsoil is at a depth of less than 30 inches. Also included are spots of poorly drained Othello soils that range from about 1 to 4 acres and areas of soils that have a substratum of yellowish red sandy clay loam.

This Mattapex soil has moderately slow permeability. The Butlertown soil has moderate permeability above the firm part of the subsoil and slow permeability in the firm part. Available water capacity of both soils is high. In tilled areas surface runoff is medium. The Butlertown soil has a seasonal high water table perched at a depth of 2 to 4 feet. The Mattapex soil has a seasonal high water table at a depth of 1.5 to 2.5 feet. Both soils are strongly acid to extremely acid in unlimed areas.

Most of the acreage of this unit is farmed. A small acreage is used for woodland.

This unit is classified as prime farmland and is well suited to corn, soybeans, small grains, and grasses and legumes for hay and pasture. The soils respond well to additions of fertilizer and lime. There is little hazard of water erosion, but wind erosion is a hazard in unprotected areas. Stubble mulch or cover crops will protect the soils from wind erosion and will add organic matter to the soils. Drainage by tile or open-ditch is sometimes needed in a few low-lying areas.

The unit is well suited to trees. Potential productivity is high for the Butlertown soil and moderately high for the Mattapex soil. The use of logging equipment is restricted during wet seasons.

The high water table limits this unit as a site for homes with basements and, along with the moderately slow and slow permeability, is a limitation for septic tank absorption fields. Low strength and a frost-action potential also limit the soils as a building site.

The capability subclass is llw.

BuB2—Butlertown-Mattapex silt loams, 2 to 5 percent slopes, moderately eroded. This unit consists of gently sloping, moderately well drained soils on uplands throughout the county. The areas of this unit range from about 2 to 50 acres and are irregularly shaped. They are about 40 percent Butlertown silt loam, 40 percent Mattapex silt loam, and 20 percent other soils. The Butlertown and Mattapex soils are in such an intricate pattern that it was not practical to map them separately.

Typically, the Butlertown soil has a surface layer of dark brown silt loam about 8 inches thick. The subsoil is about 40 inches thick. It is brownish yellow heavy silt loam in the upper part and very firm, mottled, yellowish

brown silt loam in the lower part. The substratum is pale brown stratified loam, silt loam, and sandy loam to a depth of 75 inches.

Typically, the Mattapex soil has a surface layer of dark yellowish brown silt loam 8 inches thick. The subsoil is mottled, yellowish brown and light yellowish brown silt loam 24 inches thick. The substratum is mottled, strong brown sandy loam to a depth of 60 inches.

Included with these soils in mapping are areas of well drained Matapeake silt loam. Also included are areas of a somewhat poorly drained soil that is similar to the Butlertown soil in this unit but that has mottles and a firm layer nearer to the surface. This unit has a few small areas of severely eroded Butlertown and Mattapex soils and a few spots of sandy Sassafras soils.

This Mattapex soil has moderately slow permeability. The Butlertown soil has moderate permeability above the firm part of the subsoil and slow permeability in the firm part. Available water capacity of both soils is high. Surface runoff in tilled areas is medium, and the hazard of erosion is moderate. The root zone in the Butlertown soil is restricted by the firm part of the subsoil, which is at a depth of 30 to 38 inches. The Butlertown soil has a seasonal high water table perched at a depth of 2 to 4 feet. The Mattapex soil has a seasonal high water table at a depth of 1.5 to 2.5 feet. Both soils are strongly acid to extremely acid in unlimed areas.

Most areas of this unit are farmed. A small acreage is wooded.

This unit is classified as prime farmland and is well suited to farming. The soils respond well to additions of fertilizer and organic matter. The use of stubble mulch or cover crops helps to protect the soils from sheet erosion and soil blowing in winter. Keeping the soils in pasture or hay is also an effective method of controlling erosion. Maintaining sod in drainageways helps to control gully erosion. Drainage by tile or open-ditch is sometimes needed in seepage spots or low-lying areas.

This unit is suited to trees. Potential productivity is moderately high for the Mattapex soil and high for the Butlertown soil. The use of equipment is limited during wet seasons.

The high water table limits this unit as a site for homes with basements and, along with the moderately slow and slow permeability, is a limitation for septic tank absorption fields. Low strength and a frost-action potential also limit the soils as a building site.

The capability subclass is lle.

BuC2—Butlertown-Mattapex silt loams, 5 to 10 percent slopes, moderately eroded. This unit consists of moderately sloping, moderately well drained soils on side slopes throughout the county. The areas of the unit range from 2 to 30 acres and mainly are irregularly shaped; the larger areas are long and narrow. The areas are about 40 percent Butlertown silt loam, 35 percent Mattapex silt loam, and 25 percent other soils. The

Butlertown and Mattapex soils are so intermingled that it was not practical to map them separately.

Typically, the Butlertown soil has a surface layer of dark brown silt loam 8 inches thick. The subsoil is about 40 inches thick. It is brownish yellow heavy silt loam in the upper part; mottled, yellowish brown silt loam in the middle part; and mottled, firm and slightly brittle, yellowish brown silt loam in the lower part. The substratum is pale brown stratified loam, silt loam, and sandy loam to a depth of 75 inches.

Typically, the Mattapex soil has a surface layer of dark yellowish brown silt loam 8 inches thick. The subsoil is mottled, yellowish brown and light yellowish brown silt loam 24 inches thick. The substratum is mottled, yellowish brown sandy loam to a depth of 60 inches.

Included with these soils in mapping are a few areas of soils similar to the Butlertown soil in this unit but in which the firm part of the subsoil is closer to the surface; in some spots the firm part is at a depth of 24 inches. Also included are spots of Matapeake silt loam and a few small, narrow areas of poorly drained Othello soils.

This Mattapex soil has moderately slow permeability. The Butlertown soil has moderate permeability above the firm part of the subsoil and slow permeability in the firm part. Available water capacity of both soils is high. Surface runoff in tilled areas is medium. The hazard of erosion is severe. The root zone in the Butlertown soil is restricted by the firm part of the subsoil, which is at a depth of 30 to 38 inches. The Butlertown soil has a seasonal high water table perched at a depth of 2 to 4 feet. The Mattapex soil has a seasonal high water table at a depth of 1.5 to 2.5 feet. Both soils are strongly to extremely acid in unlimed areas.

The soils of this unit are used for farming and woodland. The high water table and the erosion hazard limit the unit for cultivated crops and make it better suited to close-growing crops, small grains, or grasses and legumes for hay or pasture. Minimum tillage, stripcropping, contour cropping, and no-till farming help to control erosion in cultivated areas. Maintaining sod in drainageways helps prevent gully formation.

This unit is well suited to trees. Potential productivity is moderately high for the Mattapex soil and high for the Butlertown soil.

The seasonal high water table limits these soils as a site for homes with basements and, along with the slow and moderately slow permeability, is a limitation for septic tank absorption fields. Low strength and a frost-action potential also limit the soils as a building site.

The capability subclass is IIIe.

CeB2—Colts Neck loam, 0 to 5 percent slopes, moderately eroded. This soil is nearly level to gently sloping and well drained. It is on uplands, knolls, or knobs and side slopes throughout the county. The areas are irregularly shaped and range from about 2 to 100 acres.

Typically, the surface layer is brown loam about 9 inches thick. The subsoil is 33 inches thick. The upper

part of the subsoil is yellowish red loam, and the lower part is dark reddish brown gravelly sandy clay loam. The substratum is yellowish red and reddish brown sandy loam to a depth of 60 inches.

Included with this soil in mapping are severely eroded spots of Colts Neck soils, soils that have a surface layer of silt loam, and moderately well drained soils. Included areas make up 10 percent of the unit.

This Colts Neck soil has moderate permeability. Available water capacity is moderate. In cultivated areas the surface runoff is medium. The soil is strongly acid to very strongly acid in unlimed areas.

Most areas of this soil are used for cultivated crops. A few areas are in pasture, hay, or woodland.

This soil is classified as prime farmland. It is well suited to cultivated crops but has a moderate hazard of erosion. Using crop rotations, contour strips, grassed waterways, and minimum tillage or no-till farming helps to control erosion in cultivated areas. Leaving crop residue on the surface through the winter protects the soil from blowing, compaction, and sheet erosion; using a permanent cover, such as pasture or hay, is also effective for controlling erosion.

The productivity of pastures on this soil is good, and the grazing season is long. Liming and fertilizing are needed for high-quality forage crops.

This soil is suited to trees. The potential productivity is moderately high. Selective cutting and thinning will help promote growth of desirable species.

This soil is generally suitable for community development, wildlife habitat, and most types of recreation.

The capability subclass is IIe.

CeC2—Colts Neck loam, 5 to 10 percent slopes, moderately eroded. This soil is moderately sloping to rolling and well drained. It is on upland side slopes and knolls. The areas are irregularly shaped and range from about 2 to 80 acres.

Typically, this soil has a surface layer of brown loam 9 inches thick. The subsoil is 33 inches thick. The upper part of the subsoil is yellowish red loam, and the lower part is dark reddish brown gravelly sandy clay loam. The substratum is yellowish red and reddish brown sandy loam to a depth of 60 inches.

Included with this soil in mapping are severely eroded areas of Colts Neck soils that have some gravel on the surface in places. Also included are a few spots of Matapeake and Sassafras soils. Included areas make up about 15 percent of the unit.

This Colts Neck soil has moderate permeability. Available water capacity is moderate. In cultivated areas the surface runoff is medium. The soil is strongly acid or very strongly acid in unlimed areas.

Most areas of this soil are farmed. Some small areas are in woodland.

This soil is suited to farming, mainly for corn, soybeans, small grains, and pasture and hay, but the

hazard of erosion is severe. No-till farming, using close-growing crops, contouring, and using crop residue as a winter mulch will help to control erosion. Sod is needed in draws with large drainage areas to prevent gully formation.

The productivity of improved pastures on this soil is good, but liming and fertilizing are needed. Overgrazing increases the hazard of erosion.

This soil is suited to trees. The potential productivity is moderately high.

Slope is the main limitation of this soil for community development. The soil is generally suitable for recreational use and wildlife habitat.

The capability subclass is IIIe.

CgC2—Colts Neck gravelly loam, 2 to 10 percent slopes, moderately eroded. This soil is gently sloping to moderately sloping and well drained. It is on rolling uplands, side slopes, and knolls. The areas are generally dissected by gullies or waterways, and hills between draws are convex or knoblike. The areas range from 2 to 50 acres and are irregularly shaped.

Typically, the surface layer is brown gravelly loam 9 inches thick. The subsoil is 33 inches thick. The upper part of the subsoil is yellowish red gravelly sandy clay loam. The lower part is reddish brown sandy clay loam and heavy sandy loam. The substratum is yellowish red and reddish brown sandy loam to a depth of 60 inches.

Included with this soil in mapping are places where all of the subsoil and substratum is gravelly and areas where the surface layer is gravelly sandy clay loam and is hard and cloddy when dry. Also included are some wet seepage spots on side slopes and areas of Sassafras soils. Included areas make up about 10 percent of the unit.

The permeability of this Colts Neck soil is moderate. Available water capacity is moderate. In cultivated areas the surface runoff is medium. The soil is strongly acid or very strongly acid in unlimed areas.

This soil is used mostly for cultivated crops and pasture. Some areas are in woodland.

The soil is suited to cultivated crops, but there is a hazard of further erosion. Minimum tillage, using grasses and legumes, using crop residue as a stubble mulch, contour cropping, and no-till farming will help to control erosion. Sod is needed in some drainageways to prevent gully formation.

This soil is suited to pasture and hay, which also help to control erosion. Liming and fertilizing are needed. Overgrazing increases the hazard of erosion.

Slope in some areas is the main limitation of this soil for community development. The soil is generally suitable for wildlife habitat and most types of recreation.

The capability subclass is IIIe.

CgC3—Colts Neck gravelly loam, 5 to 10 percent slopes, severely eroded. This soil is moderately sloping and well drained. It is in the central part of the county on rolling uplands and on side slopes. The areas of this soil

are dissected by gullies and draws. The areas between the draws are convex or on knoblike knolls. The areas of this soil range from 2 to 70 acres and are elongated or irregularly shaped.

Typically, the surface layer is brown gravelly loam about 9 inches thick. The subsoil is 33 inches thick. It is yellowish red gravelly sandy clay loam in the upper part and dark reddish brown heavy sandy clay loam and heavy sandy loam in the lower part. The substratum is yellowish red and reddish brown sandy loam to a depth of 60 inches.

Included with this soil in mapping are some deeply gullied areas. Some areas of this unit have a surface layer of gravelly sandy clay loam that is up to 50 percent gravel, some have a surface layer of silt loam that has no gravel, and some have a surface layer that contains a few stones. Included areas make up about 35 percent of the unit.

The permeability of this Colts Neck soil is moderate. Available water capacity is moderate. In cultivated areas the surface runoff mainly is medium, but it is rapid in a few spots. The soil is very strongly acid or strongly acid in unlimed areas.

This soil is used mostly for cultivated crops and pasture. Some areas are wooded.

A very severe hazard of erosion limits this soil for cultivated crops. No-till farming, using grassed waterways and gully-control structures, and mainly using close-growing grasses and legumes in crop rotations help to reduce erosion. This soil is suitable for crops in years with normal to high rainfall, but it is susceptible to drought in years with low rainfall.

The hazard of erosion makes this soil better suited to hay and pasture than to cultivated crops. Liming and fertilizing are needed for high-quality grasses and legumes. Overgrazing increases the hazard of erosion.

This soil is suited to woodland. The potential productivity is moderately high.

Slope in some areas limits this soil for community development. The soil is generally suitable for openland and woodland wildlife habitat.

The capability subclass is IVe.

CgD2—Colts Neck gravelly loam, 10 to 15 percent slopes, moderately eroded. This soil is strongly sloping and well drained. It is on upland side slopes. The areas range from about 2 to 100 acres.

Typically, this soil has a surface layer of brown gravelly loam 9 inches thick. The subsoil is 33 inches thick. It is yellowish red gravelly sandy clay loam in the upper part and variegated dark reddish brown and dark yellowish brown sandy clay loam in the lower part. The substratum is yellowish red sandy loam to a depth of 60 inches.

Included with this soil in mapping are small seep spots on side slopes and a few places that have large stones on the surface. In a few spots the soil is very gravelly or the surface is gravelly clay loam or gravelly sandy loam. Included areas make up about 20 percent of the unit.

This Colts Neck soil has moderate permeability. Available water capacity is moderate. Surface runoff is rapid. This soil is strongly acid or very strongly acid in unlimed areas.

This soil is used for pasture, woodland, small grains, and cultivated crops.

A very severe erosion hazard makes this soil suited to only intermittent cultivation. Using rotations that mainly consist of close-growing grasses and legumes and leaving crop residue on the surface help to prevent erosion, but soybeans do not provide adequate residues for protection from erosion in winter. In some places diversions can be used to dispose of runoff water. Planting no-till crops on the contour helps to control rills and seed washout. Some gullies in this unit can be shaped and sodded to prevent further gullying. Some of the larger gullies need some type of structure or a rock lining for stabilization.

This soil is suited to pasture and hay. Liming and fertilizing help to maintain high-quality grasses, and the prevention of overgrazing helps to control erosion.

This soil is suited to woodland, and in some gullied places tree seeding or letting the soil revert to woodland helps to prevent further gullying. This soil has moderately high potential productivity for trees. Building logging roads or trails on the contour prevents gullies.

Slope and a frost-action potential limit this soil for community development. The soil is generally suitable for openland and woodland wildlife habitat.

The capability subclass is IVe.

CgD3—Colts Neck gravelly loam, 10 to 15 percent slopes, severely eroded. This soil is strongly sloping and well drained. It is on well dissected upland side slopes. The slopes are complex and in most places inclined in several directions. In wooded areas this soil is dissected by deep ravines and gullies.

Typically, this soil has a surface layer of brown gravelly loam about 4 inches thick. The subsoil is 33 inches thick. It is yellowish red and reddish brown gravelly sandy clay loam in the upper part and dark reddish brown sandy clay loam and sandy loam in the lower part. The substratum is yellowish red sandy clay loam to a depth of 60 inches.

Included with this soil in mapping are knolls in cultivated fields where the surface is gravelly clay loam. Also included are areas of Sassafras soils and areas where the surface layer contains a few stones. Included areas make up about 25 percent of the unit.

This Colts Neck soil has moderate permeability. The available water capacity is moderate, and runoff is rapid. This soil is strongly acid or very strongly acid in unlimed areas.

This soil is used for cultivated crops, for pasture and hay, and for woodland.

A very severe hazard of erosion makes this soil poorly suited to row crops. The soil is suited to grasses and legumes for hay and pasture, especially to close-growing

grasses that help to control erosion. The main pasture management concerns are applying fertilizer and lime and controlling weeds. Prevention of overgrazing controls erosion, and diversions are needed in some waterways and on lower slopes to prevent gullying.

This soil is suited to woodland. The potential productivity is moderately high. Using filter strips near streams and placing roads and trails on the contour help to prevent gullying.

Slope and a frost-action potential limit this soil for community development. The soil is generally suitable for openland and woodland wildlife habitat.

The capability subclass is VIe.

CnE—Colts Neck and Sassafras soils, 15 to 40 percent slopes. This unit consists of steep, well drained soils on upland side slopes and hilly areas. Most areas are deeply dissected by ravines, draws, or gullies (fig. 5). Some units are in narrow, clifflike areas adjacent to large bodies of water. The areas of this unit range from about 5 to 100 acres and are elongated or irregularly shaped. The mapped acreage of the unit is about 35 percent Colts Neck soils, 35 percent Sassafras soils, and 30 percent other soils. Some areas consist of Colts Neck soils, some of Sassafras soils, and some of both. The Colts Neck and Sassafras soils were mapped together because they have no major differences in use and management.

Typically, the Colts Neck soils have a thin layer of partially decomposed hardwood leaves on the surface. The surface layer of the soil is yellowish brown sandy loam or gravelly loam 5 inches thick. The subsoil is reddish brown sandy clay loam 25 inches thick. The substratum is yellowish red sandy loam to a depth of 60 inches.

Typically, the Sassafras soils have a thin layer of hardwood leaves on the surface. The surface layer of the soil is brown gravelly loam or sandy loam about 6 inches thick. The subsoil is strong brown sandy clay loam 25 inches thick. The substratum is yellowish red sandy loam to a depth of 60 inches.

Included with these soils in mapping are a few spots of Matapeake soils on upper slopes, Mattapex soils at the base of slopes, Bibb soils on small flood plains, and Galestown soils on uplands. Some areas are very gravelly, clayey, or stony. Small wet spots are on some side slopes in winter and spring.

The permeability and available water capacity of these Colts Neck and Sassafras soils are moderate. The surface runoff is rapid. These soils are strongly acid to extremely acid.

Most areas of this unit are wooded. A few small, less steep areas are in cropland or pasture.

These soils are generally not suited to cultivation. Slope and a very severe gullying hazard are the major limitations. Some less sloping areas are suited to intermittent crops if intensive management is used.

Some areas of this unit are suited to limited pasture or



Figure 5.—A gullied area of Colts Neck and Sassafras soils, 15 to 40 percent slopes.

grazing if the soils are adequately protected from erosion. The main pasture management practices are seeding, fertilizing, and liming. No-till seeding or seeding in narrow contour strips prevents excessive erosion. Some areas that have good air drainage are suitable for orchards or specialty crops.

These soils are suited to woodland, and potential productivity is moderately high. The use of logging equipment is limited by slope. The hazard of erosion on roads and trails can be controlled by placing them on the contour. Leaving a plant cover or protective strips adjacent to streams helps to trap sediment.

Slope is the main limitation of these soils for nonfarm use.

The capability subclass is VIIe.

Em—Elkton silt loam. This soil is nearly level and poorly drained. It is on broad flats, in closed depressions,

and along drainageways. The areas are mainly in the western part of the county at an elevation of less than 45 feet. They range from about 2 to 50 acres. The smaller areas are mainly round and in closed depressions; the larger areas are irregularly shaped.

Typically, this soil has a surface layer of grayish brown silt loam 9 inches thick. The subsoil is mottled and 36 inches thick. It is gray heavy silt loam in the upper part, gray silty clay loam in the middle part, and dark gray silty clay in the lower part. The substratum is mottled, gray clay to a depth of 60 inches.

Included with this soil in mapping are areas of Othello soils. In some spots the surface layer is olive colored and the upper part of the subsoil is mottled and yellowish brown. In wooded areas the soil is covered by a thin layer of partially decomposed hardwood leaves and has a 3-inch surface layer of very dark gray silt loam and a 6-inch subsoil of gray silt loam. Also included are areas that have a surface layer of sticky silty clay loam,

areas that have a black surface layer that is mucky in places, and areas that have a surface layer of sandy loam. Included areas make up about 30 percent of the unit.

This Elkton soil has slow to very slow permeability. Available water capacity is high. Surface runoff is slow, and water is sometimes ponded on the surface. This soil has a high water table at a depth of less than 1 foot from January to April in most years. The subsoil and substratum normally have a moderate shrink-swell potential, but it is high in some places. Reaction of this soil is strongly acid to extremely acid in unlimed areas.

About half of the acreage of this soil is wooded, and half is farmed. The farmed areas are used for cultivated crops or pasture.

This soil has fair suitability for cultivated crops. The major management concerns are providing drainage, improving tilth, and liming and fertilizing. Open-ditch drainage is generally the most suitable method on this soil. Undrained areas are wet in most years during planting, and the soil warms slowly. If the soil is worked when it is wet, large clods form on the surface.

This soil is suited to water-tolerant hay and pasture plants. Grazing when the soil is wet causes compaction of the surface layer and reduced infiltration of air and water. Frost heaving damages perennial plants during some winters.

The soil is suited to trees, and the potential productivity of water-tolerant species is moderately high. Wetness during winter and spring limits the use of logging equipment.

The high water table and slow to very slow permeability limit this soil for most nonfarm uses, including sites for buildings and septic tank absorption fields. The frost-action potential and low strength are hazards for local roads and streets.

The capability subclass is IIIw.

Fa—Fallsington sandy loam. This soil is nearly level and poorly drained. It is in depressions and potholes, on uplands, and along drainageways. The areas range from about 2 to 100 acres.

Typically, this soil has a surface layer of dark grayish brown sandy loam 9 inches thick over a subsurface layer of light brownish gray sandy loam 6 inches thick. The subsoil is gray and mottled and is 18 inches thick. It is heavy sandy loam in the upper part, sandy clay loam in the middle part, and sandy loam in the lower part. The substratum is mottled, gray loamy sand and sandy loam to a depth of 60 inches.

Included with this soil in mapping are areas of soils similar to this Fallsington soil but that have a thicker, darker surface layer; that have a thin, black surface layer or a thick, mottled surface layer of gray sandy loam; or that have loam or sandy loam in the substratum or gravel in the surface layer or substratum. Also included are some very poorly drained areas in depressions in the eastern part of the county. Included areas make up about 30 percent of the unit.

The permeability of this Fallsington soil is moderate. Surface runoff is slow, and water is ponded on some areas. The seasonal high water table is between the surface and a depth of 1 foot from December to May. This soil is strongly acid to extremely acid in unlimed areas.

Most undrained areas of this soil are wooded. The drained areas are used for farming.

This soil has fair suitability for cultivated crops. Providing drainage is the major management concern. Shallow ditches and subsurface tile are the commonly suitable types of drainage. Deep ditches tend to cave in and fill with sand. Tile lines in this soil need a filter to prevent particles from depositing into the drain, but some areas are so small or have so few outlets that drainage is not practical. Applying lime and fertilizer and using a plant cover and crop residue to prevent soil blowing are common management practices.

This soil is suited to pasture and hay. The high water table in winter and spring limits the grazing period; if the soil is grazed when wet, it becomes compacted. Frost-action is a hazard to perennial grasses in winter.

This soil is suited to trees, and the potential productivity is high. Seasonal wetness limits the use of equipment and causes a high rate of seedling mortality.

The seasonal high water table limits this soil for most types of nonfarm use, including homesites and septic tank absorption fields. The frost action potential is a hazard to roads and streets.

The capability subclass is IIIw.

Fh—Fallsington loam. This soil is nearly level and poorly drained. It is mostly in depressions or potholes, but some areas are on uplands and along drainageways. The areas range from about 2 to 50 acres.

Typically, this soil has a surface layer of dark grayish brown loam 9 inches thick. The subsoil is mottled, gray loam and heavy sandy loam 24 inches thick. The substratum is mottled, gray sandy loam and stratified loamy sand.

Included with this soil in mapping are areas where topsoil from adjacent areas has washed into closed depressions and areas where the substratum is gravelly. Also included are spots of Othello and Elkton soils. Included areas make up about 30 percent of the unit.

The permeability of this Fallsington soil is moderate. The available water capacity is high. Runoff is slow, and water is ponded in some depressions. The seasonal high water table is between the surface and a depth of 1 foot from December to May. In unlimed areas this soil is strongly acid to extremely acid.

Most undrained areas of this soil are wooded. The drained areas are used for farming.

This soil has fair suitability for cultivated crops. Providing drainage is the major management concern, but most areas are so small or have so few drainage outlets that drainage is not practical. Shallow ditches and subsurface tile are the commonly suitable types of

drainage in this soil. Deep ditches tend to cave in and fill with sand, and filters are needed to prevent particles from depositing into tile lines. The soil responds well to fertilizer and lime.

This soil is suited to pasture and hay. The high water table in winter and spring limits the grazing period; if the soil is grazed when wet, it becomes compacted. Frost-action is a hazard to perennial grasses in some winters.

This soil is suited to trees, and the potential productivity is high. Seasonal wetness limits the use of equipment and causes a high rate of seedling mortality.

The seasonal high water table and a frost-action potential limit this soil for most types of nonfarm use, including homesites and septic tank absorption fields.

The capability subclass is IIIw.

FmB—Fort Mott loamy sand, 0 to 5 percent slopes.

This soil is nearly level and gently sloping and is well drained. It is on undulating upland terraces near and well above some of the larger streams and rivers in the county. The areas of the soil are irregular in shape and range from about 2 to 50 acres.

Typically, the surface layer is dark brown loamy sand about 9 inches thick. The subsurface layer is light yellowish brown loamy sand 17 inches thick. The subsoil is 23 inches thick. It is yellowish brown sandy loam in the upper part and strong brown heavy sandy loam in the lower part. The substratum is brownish yellow sand to a depth of 60 inches.

Included with this soil in mapping are small areas of soils that are similar to this Fort Mott soil but that are on knolls, that are in drainageways and depressions and are not as well drained, or that have more clay or gravel. Included areas make up about 20 percent of the unit.

The permeability of this Fort Mott soil is rapid to moderate. Surface runoff is slow. The soil is strongly acid to extremely acid in unlimed areas.

This soil is used for and is suited to a wide variety of crops, mainly sweet corn, field corn, asparagus, and tomatoes (fig. 6). The soil warms early in spring, is easy to work, and is especially suited to early-season truck crops. Late-maturing crops are sometimes damaged by drought, especially in years when rainfall is unevenly distributed. Supplying crops with adequate fertilizer and water is the major management concern. Large additions of organic matter will help to store moisture and increase fertility, and irrigation is practical in some areas. Using cover crops and a stubble mulch helps to protect the soil from wind erosion, and using windbreaks or strips of small grains protects plants from soil blowing.

This soil is suited to pasture or hay. Droughtiness is a hazard in some years.

The soil is suited to trees, and the potential productivity is moderately high. Loose sand causes poor trafficability for equipment in some places.

The main limitation of this soil for nonfarm use is that excavations in the soil are unstable. Droughtiness limits suitability for some garden and landscape plants.



Figure 6.—Tomatoes under hot caps on Fort Mott loamy sand, 0 to 5 percent slopes.

The capability subclass is IIIs.

FmC2—Fort Mott loamy sand, 5 to 10 percent slopes, moderately eroded. This soil is rolling to hilly and is well drained. It is on upland terraces and side slopes near and above some of the larger streams and rivers in the county. The areas are irregularly shaped and range from about 2 to 50 acres.

Typically, the surface layer is dark brown loamy sand 7 inches thick. The subsurface layer is light yellowish brown loamy sand 15 inches thick. The subsoil is 18 inches thick. It is yellowish brown sandy loam in the upper part and strong brown heavy sandy loam in the lower part. The substratum is brownish yellow to a depth of 60 inches.

Included with this soil in mapping are areas that are similar to this Fort Mott soil but in which the combined thickness of the surface and subsurface layers is thicker or gravel is mixed into the surface layer or stratified in the substratum. A few areas of this unit have gullies, and a few have knolls where wind erosion has removed most of the surface and subsurface layers. Included areas make up about 20 percent of the unit.

The permeability of this Fort Mott soil is moderately rapid. Available water capacity is moderate, and surface runoff is slow. The soil is strongly acid to extremely acid in unlimed areas.

This soil is used for cultivated crops, pasture, and woodland.

Droughtiness, low fertility, and a hazard of wind erosion limit use of the soil for row crops to only once every few years. Using cover crops and crop residue, stubble mulching, and planting strips of small grains or windbreaks help to protect the soil and crops from wind erosion. Double-cropping increases droughtiness, making establishment of a following crop difficult.

The soil is suited to pasture and hay. The rapid drainage makes the soil suitable for winter and spring pasture, but the soil is limited by droughtiness in summer.

This soil is suited to trees, especially to drought-tolerant species, and the potential productivity is moderately high. Loose sand causes poor trafficability for equipment in some places, and seedling establishment is difficult during dry seasons.

Slope limits some areas of this soil for nonfarm use. The rapid permeability of the soil causes a hazard of ground-water pollution in areas used for septic tank absorption fields.

The capability subclass is IVs.

GaB—Galestown loamy sand, 0 to 5 percent slopes. This soil is nearly level to gently sloping and somewhat excessively drained. It is on uplands, side slopes, and hummocky areas. The areas are generally irregularly shaped and range from 2 to 25 acres.

Typically, the surface layer is dark brown loamy sand 9 inches thick. The subsoil is strong brown loamy sand 26 inches thick. The substratum is yellow sand to a depth of 60 inches.

Included with this soil in mapping are eroded spots where the surface layer is reddish and areas of moderately well drained soils in depressions that are less than 2 acres. Also included are areas of soils similar to this Galestown soil but that contain more silt and clay in the subsoil or thin layers of gravel in the substratum or pebbles in the surface layer. Included areas make up about 15 percent of the unit.

The permeability of this Galestown soil is rapid. Available water capacity is low, and surface runoff is slow. The soil is strongly acid to extremely acid in unlimed areas.

This soil is used for cultivated crops, vegetables, woodland, and pasture.

Droughtiness in summer limits this soil for cultivated crops. The soil dries and warms early in spring, making it suitable for early-season crops and small grains. Because of the droughty conditions, supplying crops with adequate water and fertilizers and large additions of organic matter is the major management concern. Keeping the soil covered with winter cover crops or using a stubble mulch will help to reduce a hazard of soil blowing.

The soil has fair suitability for pasture or hay, but low fertility and droughtiness in summer are major limitations.

This soil is fairly suited to trees, and potential productivity is moderately high. Trafficability of logging

equipment is restricted in places by loose sand. Droughtiness causes a high rate of seedling mortality and limits productivity.

This soil is generally suitable as a building site, but excavations in the soil are unstable. The rapid permeability of the soil causes a hazard of ground-water pollution in areas used for septic tank absorption fields.

The capability subclass is IVs.

GaD—Galestown loamy sand, 5 to 15 percent slopes. This soil is moderately sloping to strongly sloping and somewhat excessively drained. It is on upland side slopes and hummocks. The areas are generally irregularly shaped and range from 2 to 25 acres.

Typically, the surface layer is dark brown loamy sand 9 inches thick. The subsoil is strong brown loamy sand 26 inches thick. The substratum is loose yellow sand to a depth of 60 inches.

Included with this soil in mapping are a few gullied spots and a few eroded areas where the surface layer is reddish. Some places contain layers of fine textured sediments in the substratum at a depth of 40 inches or more. Included areas make up about 15 percent of the unit.

The permeability of this Galestown soil is rapid. Available water capacity is low, and surface runoff is slow. The soil is strongly acid to extremely acid in unlimed areas.

Most areas of this soil are wooded. A few areas are used for cultivated crops. This soil is so sandy and droughty that it is poorly suited to farming. Irrigation and frequent applications of lime and fertilizer is needed in areas used for crops. This soil is susceptible to wind erosion, and cover crops, a stubble mulch, or permanent vegetation are needed in unprotected areas. Droughtiness and low available water capacity limit the soil for pasture and hay and make it difficult to establish and maintain stands of grasses or legumes.

This soil is suited to trees, and potential productivity is moderately high. Equipment trafficability is limited in spots by loose sand. Droughtiness causes a high rate of seedling mortality.

Slope limits this soil for many types of nonfarm use, and excavations in the soil are unstable. The rapid permeability causes a hazard of ground-water pollution in areas used for septic tank absorption fields.

The capability subclass is VIIs.

GaE—Galestown loamy sand, 15 to 40 percent slopes. This soil is steep and somewhat excessively drained. It is on side slopes, some of which are dissected by many small streams and gullies. The areas range from 10 to 75 acres and are irregularly shaped.

Typically, this soil has a 1-inch layer of hardwood leaves on the surface. The surface layer is very dark gray and yellowish brown loamy sand 8 inches thick. The subsoil is strong brown loamy sand 27 inches thick. The substratum is yellow sand to a depth of 60 inches.

Included with this soil in mapping are a few gravelly spots, a few wet spots on side slopes, and a few areas of Sassafras and Fort Mott soils on upper slopes. Also included are places where the soil has a pale brown subsoil. Included areas make up about 15 percent of the unit.

The permeability of this Galestown soil is rapid. Available water capacity is low, and surface runoff is moderate. The soil is strongly acid to extremely acid in unlimed areas.

Slope, droughtiness, and low fertility make this soil generally unsuitable for cultivated crops and poorly suited to pasture. Use of the soil for pasture requires using lime and fertilizer, avoiding overgrazing, and using diversions in places to control runoff.

This soil is suited to trees, and most areas are wooded. Potential productivity is moderately high. Slope and the sandy texture limit equipment use, and droughtiness causes a high rate of seedling mortality.

Slope, seepage, and a hazard of ground-water pollution in areas used for septic tanks limit this soil for most types of nonfarm use.

The capability subclass is VII_s.

Ih—Ipswich mucky peat. This soil is level and very poorly drained. It is in tidal marshes that are inundated by brackish tidal waters. The tidal marshes are on flood plains near estuaries and on submerged uplands. The areas are generally long and narrow and range from 2 to 80 acres.

Typically, this soil has a surface layer of dark brown, slightly decomposed mucky peat about 14 inches thick. The substratum is very dark brown and black, moderately decomposed mucky peat to a depth of more than 60 inches.

Included with this soil in mapping are areas of Westbrook soils near uplands and mineral soils on dry natural levees adjacent to streams. Included areas make up about 20 percent of the unit.

The permeability of this Ipswich soil is moderate to rapid. Available water capacity is high, and runoff is very slow. This soil has a water table that is commonly near the surface but that fluctuates with the tides. Water is often ponded on the surface of the soil, even at low tides. In some places the soil is flooded by daily tidal action and in other places only during high runoff or abnormally high tides. This soil generally is slightly acid or neutral but becomes extremely acid when dry.

The high water table, salinity, high sulphur content, and low strength of this soil make it unsuitable for most types of farming and nonfarm uses. The soil is suitable for some types of wetland wildlife habitat.

The capability subclass is VIII_w.

Ik—luka silt loam, rarely flooded. This soil is nearly level and moderately well drained. It is on flood plains and around the heads of drainageways. The areas of this soil are long and narrow and range from 3 to 50 acres.

Typically, the surface layer is dark yellowish brown silt loam about 10 inches thick. The subsurface layer is brown silt loam 17 inches thick. The substratum extends to a depth of 60 inches. The upper part of the substratum is mottled, pale brown silt loam, and the lower part is light brownish gray sandy loam.

Included with this soil in mapping are a few areas of silty, well drained alluvial soils on sloping bottom lands, a few spots with a surface layer of loam, and a few areas dissected by a gully or stream channel. A few spots have a few pebbles or some recently deposited sandy overwash on the surface. Included areas make up about 15 percent of the unit.

The permeability of this luka soil is moderate. Available water capacity is high, and surface runoff is slow. Water is briefly ponded on some spots after a heavy rain. The soil has a seasonal high water table at a depth of 12 to 36 inches from December to April. Reaction of the soil is strongly acid or very strongly acid in unlimed areas.

Most areas of this soil are used for cultivated crops. The soil is classified as prime farmland and is well suited to corn, soybeans, small grains, and grasses and legumes for hay and pasture. Impeded drainage and a hazard of flooding are the main limitations for cropland. However, the soil is only rarely flooded for very brief periods and summer crops are usually not damaged. Winter grains incur damage in some years. Drainage can be improved by using ditches or tile lines. Leaving stream channels open or deepening the channel helps protect this soil from overwash and ponding.

This soil is well suited to trees, and potential productivity is very high. The use of logging equipment is limited during some wet periods.

The hazard of flooding and the seasonal high water table limit this soil for nonfarm use. The soil is highly susceptible to frost action.

The capability subclass is II_w.

KmA—Keyport fine sandy loam, 0 to 2 percent slopes. This soil is nearly level and moderately well drained. It is on broad flats and uplands. Large areas of this soil are near the Chester River and along associated necks and creeks and in the western part of the county near Tolchester, Fairlee Creek, and Worton Creek. The areas are irregularly shaped and range from about 4 to 50 acres.

Typically, the surface layer is dark brown fine sandy loam 10 inches thick. The subsoil is 30 inches thick. It is brownish yellow fine sandy loam in the upper part; yellowish brown, mottled silt loam in the middle part; and mottled, grayish brown silty clay and gray silty clay loam in the lower part. The substratum is gray silty clay loam to a depth of 60 inches.

Included with this soil in mapping are a few depressional areas where the soil is somewhat poorly drained and mottled in the upper part of the subsoil. Also included are areas where the subsoil is clayey and thin

and the substratum is sandy loam or gravelly sandy loam. In a few places the subsoil is silt loam and the substratum is silty clay. Included areas make up about 30 percent of the unit.

The permeability of this Keyport soil is slow, but the infiltration rate is moderate until the soil is saturated. Available water capacity is high. In cultivated areas the surface runoff is slow. The soil has a seasonal high water table perched at a depth of 1.5 to 4 feet. The soil has a high frost-action potential. In most cultivated areas this soil has been limed, and the surface layer ranges from slightly acid to strongly acid. In unlimed areas the soil is very strongly acid to extremely acid.

Most areas of this soil are used for cultivated crops. Some areas are wooded.

This soil is suited to cultivated crops, mostly corn and soybeans. Artificial drainage is needed in some areas of this soil, particularly in depressions with no natural outlets.

This soil is suited to pasture and hay. Providing drainage is the major management concern. Deep-rooted perennial crops, such as alfalfa, are likely to be damaged by frost-action in severe winters. Grazing is limited in winter and early spring because the soil is wet. Grazing when the soil is wet causes surface compaction and reduces the infiltration rate. Drainage ditches will help to remove excess water, lessen frost-action, and allow grazing in spring.

This soil is suited to trees, and potential productivity is high. The high water table in winter and spring limits the use of logging equipment.

The seasonal high water table, the frost-action and shrink-swell potentials, and the slow permeability limit this soil for many types of nonfarm use.

The capability subclass is 1lw.

KmB2—Keyport fine sandy loam, 2 to 5 percent slopes, moderately eroded. This soil is gently sloping and moderately well drained. It is on undulating uplands and side slopes mostly at an elevation of less than 45 feet. It is in small areas in the eastern part of the county, but most of the acreage is in the southern and western parts. The areas range from about 2 to 50 acres.

Typically, the surface layer is dark brown fine sandy loam 8 inches thick. The subsoil is 32 inches thick. It is brownish yellow fine sandy loam in the upper part; mottled, yellowish brown silt loam in the middle part; and mottled, grayish brown silty clay in the lower part. The substratum is gray silty clay loam to a depth of 60 inches.

Included with this soil in mapping are a few spots of Elkton and Mattapex soils. Some areas have a thin, firm layer in the subsoil that restricts root growth. In some places the substratum is silty, sandy, or sandy and gravelly. A few pebbles are on the surface of some areas. Included areas make up about 30 percent of the unit.

The permeability of this Keyport soil is slow, but the infiltration rate is moderate until the soil is saturated.

Available water capacity is high, and runoff is slow. This soil has moderate shrink-swell potential and a high frost-action potential. It has a seasonal high water table perched at a depth of 1.5 to 4 feet. In unlimed areas the soil is very strongly acid to extremely acid, but most cultivated areas have been limed.

This soil is used mainly for cultivated crops and pasture. A few small, narrow areas adjacent to streams and draws are wooded.

This soil has fair suitability for cultivated crops. Controlling a moderate hazard of erosion and providing drainage for a few spots are the major management concerns. The subsoil is slowly permeable, causing greater runoff on this soil than on other soils with similar slopes. The soil erodes badly unless contour tillage is used, and erosion is a hazard in winter if a stubble mulch is not used. Gullies form in drainageways that are not protected by grass.

Deep-rooted perennial crops, such as alfalfa, are likely to be damaged by the frost-action potential. Grazing this soil when it is wet in winter and spring compacts the soil and destroys tilth.

The soil is suited to trees, and potential productivity is high. The high water table in winter and spring restricts the use of logging equipment.

The seasonal high water table, slow permeability, and frost-action and shrink-swell potentials limit this soil for nonfarm use.

The capability subclass is 1le.

KpA—Keyport silt loam, 0 to 2 percent slopes. This soil is level to nearly level and moderately well drained. It is on broad flats and uplands mainly at an elevation of less than 45 feet. Large areas of this soil are near the Chester River and its necks and creeks and in the western part of the county near Tolchester, Fairlee Creek, and Worton Creek. Areas of this soil are irregularly shaped and range from a few acres to about 200 acres.

Typically, this soil has a surface layer of brown silt loam 10 inches thick. The subsoil is 20 inches thick. It is brownish yellow silt loam in the upper part and mottled, gray and brown silty clay loam and silty clay in the lower part. The substratum is gray and light gray silty clay loam to a depth of 60 inches.

Included with this soil in mapping are areas underlain by gravel. The soils are similar to this Keyport soil, but most are somewhat poorly drained and have water ponded on the surface briefly after heavy rains. Also included are some small spots of Elkton silt loam and Mattapex silt loam. A few areas have a silty or sandy substratum. Included areas make up about 20 percent of the unit.

This Keyport soil has slow permeability and high available water capacity. In cultivated areas surface runoff is slow. The soil has a moderate shrink-swell potential and a high frost-action potential. A seasonal high water table is perched at a depth of 1.5 to 4 feet. In

unlimed areas the soil is very strongly acid or extremely acid, but most cultivated areas have been limed, and the surface layer ranges from alkaline to strongly acid.

Most areas of this soil are used for row crops such as corn and soybeans. A few areas are used for small grains, pasture, or woodland.

This soil is suited to cultivated crops and responds well to additions of fertilizer and lime. Winter rains compact the surface layer and reduce infiltration if the soil is not adequately covered by crop residues. Artificial drainage is needed in some areas, particularly in depressions with no natural outlets, and open-ditch drainage is generally the more suitable method.

The soil is suited to pasture and hay. The major management concern is providing drainage. Deep-rooted perennial crops, such as alfalfa, are likely to be damaged by frost-action in severe winters. Grazing during wet seasons compacts the soil.

This soil is suited to trees, and potential productivity is high. The use of logging equipment is restricted during wet seasons.

The seasonal high water table, slow permeability, and shrink-swell and frost-action potentials limit this soil for nonfarm use.

The capability subclass is IIw.

KpB2—Keyport silt loam, 2 to 5 percent slopes, moderately eroded. This soil is gently sloping and moderately well drained. It is on undulating uplands and side slopes near the heads of drainageways and is at an elevation of less than 45 feet. Most areas of this soil are in the southern and western parts of the county and are dissected by drainageways, draws, and gullies. The areas range from about 2 to 75 acres.

Typically, the surface layer of this soil is brown silt loam 9 inches thick. The subsoil is 39 inches thick. It is brownish yellow heavy silt loam in the upper part; mottled, brown silty clay loam and silty clay in the middle part; and gray silty clay loam in the lower part. The substratum is light gray silty clay loam to a depth of 60 inches.

Included with this soil in mapping are areas of soils near streams that are similar to this Keyport soil but that have a sandy and gravelly substratum or a silty substratum. In a few somewhat poorly drained areas, the upper part of the subsoil is mottled. Also included are a few severely eroded spots in the more sloping areas. Included areas make up about 35 percent of the unit.

This Keyport soil has slow permeability and high available water capacity. In cultivated areas the surface runoff is slow. The soil has a moderate shrink-swell potential and a high frost-action potential. A seasonal high water table is perched at a depth of 1.5 to 4 feet. In unlimed areas this soil is very strongly acid or extremely acid, but most cultivated areas have been limed, and the surface layer ranges from slightly alkaline to strongly acid.

Most areas of the soil are used for row crops such as corn and soybeans. A few small areas are used for small grains, pasture, or woodland.

This soil has fair suitability for cultivated crops. The major management concern is the control of a moderate erosion hazard. Contour tillage, using a stubble mulch in winter, and using grassed waterways to prevent gully erosion are practices that help to control erosion.

Deep-rooted perennial crops, such as alfalfa, are likely to be damaged by frost-action. Other deep-rooted crops that require good aeration are not suited to this soil. Grazing when the soil is wet in winter and spring compacts the soil and destroys tilth.

This soil is well suited to trees, and potential productivity is high. The water table in winter and spring frequently restricts the use of logging equipment. Filter strips and sediment-holding ponds help to prevent sediment from entering waterways.

The seasonal high water table, slow permeability, and shrink-swell and frost-action potentials limit this soil for nonfarm use.

The capability subclass is IIe.

KpC2—Keyport silt loam, 5 to 15 percent slopes, moderately eroded. This soil is moderately sloping and moderately well drained. It mainly is on side slopes adjacent to streams and drainageways, but a few areas are on rolling uplands or knolls. The soil is mainly at an elevation of less than 45 feet and is in the southern and western parts of the county. This unit is commonly dissected by draws, drainageways, and gullies. The areas range from about 2 to 40 acres.

Typically, this soil has a surface layer of brown silt loam about 9 inches thick. The subsoil is 31 inches thick. It is brownish yellow silty clay loam in the upper part and mottled, brown silty clay in the lower part. The substratum is yellowish brown and mottled, stratified sandy clay loam and sandy loam to a depth of 60 inches.

Included with this soil in mapping are areas that are similar to this Keyport soil but that have layers of gravel, silt, and clay in the substratum or that have a surface layer of silty clay loam. Also included are a few sandy spots that have gravel on the surface and a few areas of Mattapex soils. Included areas make up about 20 percent of the unit.

The permeability of this Keyport soil is slow. Available water capacity is high. In cultivated areas the surface runoff is medium. The soil has a moderate shrink-swell potential and a high frost-action potential. A seasonal high water table is perched at a depth of 1.5 to 4.0 feet. In unlimed areas the soil is very strongly acid or extremely acid, but most cultivated areas have been limed, and the surface layer is slightly acid to strongly acid.

This soil is used for cultivated crops, pasture, and woodland.

The soil has fair suitability for cultivated crops. Controlling a severe erosion hazard is the major

management concern. No-till farming, farming on the contour, using close-growing crops, stubble mulching in winter, and using grassed waterways help to control erosion.

Deep-rooted perennial crops or crops which require good aeration, such as alfalfa, are not suited to this soil. Perennial crops are damaged by frost-action. Grazing when this soil is wet causes compaction of the surface layer and increases runoff.

The soil has a high potential productivity for trees. The use of large equipment is limited when the soil is wet. In areas adjacent to water, sediment-control ponds, filter strips, and contoured roads and trails help to control erosion when trees are planted or harvested.

Slope, the seasonal high water table, the slow permeability, and the shrink-swell and frost-action potentials limit this soil for nonfarm use.

The capability subclass is IIIe.

Ks—Kingsland mucky peat. This soil is level and very poorly drained. It is in marshes that have been cut off from saltwater tidal inundation by narrow, sandy barrier beaches. The marshes are along the upper Chesapeake Bay shoreline and near the mouth of the Sassafras River. The areas of the soil are generally broad and irregularly shaped and are bordered by sloping uplands and coastal beaches. The areas range from 20 to 300 acres.

Typically, this soil consists of very dark brown to black moderately decomposed mucky peat to a depth of 80 inches.

Included with this soil in mapping are areas along the edges of the marsh where the organic material is less than 16 inches thick. Also included are areas of silty or sandy soils where streams enter the marsh. Included areas make up about 15 percent of the unit.

The permeability of this Kingsland soil is rapid. Available water capacity is high. This soil has a high water table near or at the surface year-round. The soil has very low strength and very low bearing capacity. It is slightly acid to strongly acid throughout.

The high content of organic material, the high water table, and the low strength make this soil generally unsuitable for most uses other than as wetland wildlife habitat.

The capability subclass is VIIIw.

MfB—Matapeake fine sandy loam, 2 to 5 percent slopes. This soil is gently sloping and well drained. It is on undulating areas and side slopes and knolls on uplands throughout the county. The areas of this unit are irregularly shaped and range from 2 to 20 acres.

Typically, the surface layer is brown to dark brown fine sandy loam 10 inches thick. The subsoil is 25 inches thick. It is yellowish brown heavy silt loam in the upper part and yellowish brown loam in the lower part. The substratum is strong brown sandy loam to a depth of 60 inches.

Included with this soil in mapping are small areas of soils that are similar to this Matapeake soil but that have a surface layer of loam or sandy loam, that are moderately eroded and have a yellowish brown surface layer, or in which the combined thickness of the surface layer and subsoil is 24 inches. Also included are areas that have rills and gullies and areas of Sassafras soils. Included areas make up about 20 percent of the unit.

The permeability of this Matapeake soil is moderate. Available water capacity is high. In cultivated areas surface runoff is medium. The reaction of this soil is strongly acid or very strongly acid in unlimed areas.

Most areas of this soil are used for cultivated crops. This soil is classified as prime farmland and is suited to corn, soybeans, small grains, and grasses and legumes for hay and pasture. The hazard of erosion is moderate and is the main management concern, and the soil is susceptible to wind erosion. The use of cover crops or a stubble mulch in winter and using grassed waterways, minimum tillage, and contour tillage help to control erosion. The use of proper stocking rates, prevention of overgrazing, and use of pasture rotation are the main pasture management practices.

This soil is suited to trees, and potential productivity is moderately high.

This soil is generally suitable for nonfarm use. Low strength and a frost-action potential limit the soil as a building site and as a site for local roads and streets.

The capability subclass is IIe.

MnA—Matapeake silt loam, 0 to 2 percent slopes. This soil is level to nearly level and is well drained. It is on broad, smooth uplands throughout the county and in a few areas at low elevations, such as Eastern Neck Island. The areas range from about 2 to 200 acres and are irregularly shaped.

Typically, the surface layer is dark brown silt loam 10 inches thick. The subsurface layer is yellowish brown silt loam 4 inches thick. The subsoil is 22 inches thick. It is yellowish brown heavy silt loam in the upper part and yellowish brown loam in the lower part. The substratum is strong brown sandy loam to a depth of 60 inches.

Included with this soil in mapping are small areas that are similar to this Matapeake soil but that have a surface layer of loam or that are silty or loamy to a depth of 60 inches or more. Also included are areas of Butlertown, Mattapex, and Sassafras soils and spots where silt loam extends to a depth of less than 24 inches. Included soils make up about 15 percent of the unit.

The permeability of this Matapeake soil is moderate. Available water capacity is high, and runoff is medium. The soil in unlimed areas is strongly acid or very strongly acid, but reaction of the surface layer varies widely as a result of local liming practices and is generally slightly acid.

Most areas of this soil are farmed. The soil is classified as prime farmland and is well suited to corn, soybeans, small grains, grasses and legumes for hay

and pasture, vegetables, truck crops, and nursery crops. Maintaining soil fertility and organic matter content are the major management concerns. The available water capacity of the soil is high enough to supply crops with adequate water in all but long dry periods, but some areas are irrigated. The surface layer is friable and easily tilled through a wide range of moisture content but sometimes becomes crusty after hard rains. Although the soil is used for vegetables and truck crops, it does not warm up as early in spring as some of the sandy soils. In some winters deep-rooted perennial crops are injured by frost-action.

This soil is well suited to trees, and potential productivity is moderately high.

This soil has few limitations for nonfarm use, but low strength and a frost-action potential limit the soil as a site for local roads and streets.

The capability class is I.

MnB—Matapeake silt loam, 2 to 5 percent slopes.

This soil is gently sloping and well drained. It is on broad, undulating uplands and side slopes throughout the county. The areas range from about 2 to 200 acres and are irregularly shaped.

Typically, the surface layer is dark brown silt loam 10 inches thick. The subsurface layer is yellowish brown silt loam 4 inches thick. The subsoil is 22 inches thick. It is yellowish brown heavy silt loam in the upper part and yellowish brown loam in the lower part. The substratum is strong brown sandy loam to a depth of 60 inches.

Included with this soil in mapping are areas that are similar to this Matapeake soil but that have a surface layer of loam. Also included are areas of strongly sloping, moderately eroded soils that have a surface layer that is cloddy when dry; areas of Sassafras soils and Mattapex silt loam; and areas of soils that are as much as 30 percent gravel. Included areas make up about 20 percent of the unit.

The permeability of this Matapeake soil is moderate, and available water holding capacity is high. Surface runoff is medium. The soil in unlimed areas is strongly acid or very strongly acid. The reaction varies, however, depending on local liming practices, and it is mainly slightly acid where the soil is limed.

This soil is used for a wide variety of cultivated and nursery crops (fig. 7). The soil is classified as prime farmland and is well suited to farming. Controlling a moderate hazard of erosion is the main management concern. The use of cover crops or a stubble mulch in winter, close-growing crops, minimum tillage and contour tillage, and grassed waterways to prevent gullies are practices that help to control erosion. This soil has fair suitability for irrigated crops.

The soil is well suited to trees, and potential productivity is moderately high.

The soil has few limitations for nonfarm use, but low strength and a frost-action potential limit the soil as a site for local roads and streets.

The capability subclass is IIe.

MnC2—Matapeake silt loam, 5 to 10 percent slopes, moderately eroded. This soil is moderately sloping and well drained. It is on rolling and undulating uplands, knolls, and side slopes that generally are dissected by waterways. The areas are generally irregularly shaped and range from above 2 to 50 acres.

Typically, the surface layer is yellowish brown silt loam 9 inches thick. The subsoil is 23 inches thick. It is yellowish brown heavy silt loam in the upper part and strong brown loam in the lower part. The substratum is yellowish brown loamy sand to a depth of 60 inches. It contains up to 30 percent gravel in some places and layers of finer textured sediments in some others.

Included with this soil in mapping are spots of Sassafras soils and Mattapex soils at the base of slopes or along drainageways. Included areas make up 30 percent of the unit.

The permeability of this Matapeake soil is moderate. Available water capacity is high, and surface runoff is medium. The soil in unlimed areas is strongly acid or very strongly acid, but the surface layer in limed areas ranges from neutral to strongly acid.

Most areas of this soil are farmed. The soil has fair suitability for cultivated crops. Controlling a severe hazard of erosion is the major management concern. Using close-growing crops, contour stripcropping, contour tillage, and using grassed waterways help to control erosion in cultivated areas. Cover crops, a stubble mulch, and crop residues help to protect the soil in winter. Using diversions on long slopes safely disposes of runoff water. Gullies can be shaped, seeded to permanent vegetation, and lined with stone.

This soil is suited to hay and pasture. The main management concern is the prevention of overgrazing, which makes the soil susceptible to erosion.

This soil is suitable for trees, and potential productivity is moderately high. Using filter strips and sediment-holding ponds helps to control erosion during planting and harvesting.

The soil has few limitations for nonfarm use, but slope limits some types of development and a frost-action potential limits the soil as a site for local roads and streets.

The capability subclass is IIIe.

MnC3—Matapeake silt loam, 5 to 10 percent slopes, severely eroded. This soil is moderately sloping and well drained. It is on rolling uplands, knolls, and side slopes that generally are dissected by waterways. The areas are generally irregularly shaped and range from 2 to 25 acres.

Typically, the surface layer is yellowish brown silt loam 7 inches thick. The subsoil is yellowish brown heavy silt loam 17 inches thick. The substratum is brownish yellow loamy sand to a depth of 60 inches. In some places it contains up to 30 percent gravel, and in others it contains layers of finer textured sediments.



Figure 7.—Nursery stock in an area of Matapeake silt loam, 2 to 5 percent slopes.

Included with this soil in mapping are small areas of droughty Sassafras soils and wet Mattapex soils. Also included are areas of soils that are similar to this Matapeake soil but that are as much as 10 percent gravel in the surface layer and subsoil. In a few places in this unit the substratum is silty, and in a few others the surface layer is loamy sand. Included areas make up about 30 percent of the unit.

The permeability of this Matapeake soil is moderate. Available water capacity is high. The soil in unlimed areas is strongly acid or very strongly acid.

This soil mainly is used for cultivated crops and pasture and hay. A few areas are wooded.

This soil has fair suitability for cultivated crops. The main management concern is controlling a very severe erosion hazard. Using diversion terraces and contour tillage to reduce runoff, using a crop rotation of mainly close-growing grasses and legumes, growing cover crops or using crop residue as mulch, and using no-till farming are practices that help to control erosion. Using grassed waterways helps to prevent gully formation.

This soil is suited to permanent pasture and hay. Maintaining high-quality grasses and legumes helps to further control erosion, but overgrazing leaves the soil bare and susceptible to erosion. Pastures on this soil need lime and fertilizer.

This soil is suited to trees, and potential productivity is moderately high. Erosion control, mainly by use of sediment-holding ponds, is often needed when establishing new seedlings.

This soil is generally suitable for nonfarm uses, but slope limits some types of development, and low strength and the frost-action potential limit the soil as a site for local roads and streets.

The capability subclass is IVe.

MnD2—Matapeake silt loam, 10 to 15 percent slopes, moderately eroded. This soil is strongly sloping and well drained. It is on side slopes along flood plains. In places it contains deep ravines or gullies. The areas are generally irregularly shaped or elongated and range from about 2 to 50 acres.

Typically, the surface layer is dark yellowish brown silt loam 8 inches thick. The subsoil is yellowish brown heavy silt loam and loam 20 inches thick. The substratum extends to a depth of 60 inches. It is yellowish brown sandy loam in the upper part and loamy sand in the lower part. It is stratified in places with finer textured sediments or gravel.

Included with this soil in mapping are severely eroded areas where the surface layer and some of the subsoil have been removed. These areas are reddish and commonly contain some gravel or have shallow gullies. Also included are areas where the silty textures extend to a depth of 60 inches or more. Included areas make up about 35 percent of the unit.

The permeability of this Matapeake soil is moderate. Available water capacity is high, but this soil often becomes droughty during long dry periods because most of the summer rainfall is lost as runoff. Surface runoff in cultivated areas is rapid. The erosion hazard is very severe. The soil is strongly acid or very strongly acid in unlimed areas.

This soil mainly is used for pasture or woodland. A few areas are cultivated and used for corn, soybeans, or small grains.

The very severe erosion hazard makes this soil suited to only intermittent cultivation. A rotation which includes a row crop only once every 5 years is suitable for controlling erosion. The main erosion-control practices in cultivated areas are the use of contour tillage and contour strips, no-till farming or minimum tillage, and the use of winter cover crops, especially legumes, or a stubble mulch. Diversion terraces are suitable on some slopes.

This soil is suited to hay and pasture. Gullies form in some draws and waterways. Some draws can be shaped to disperse the water or can be kept in permanent vegetation. Some waterways require a stone lining to control gullying. Overgrazing increases the hazard of excessive erosion. Using fertilizer and lime helps to rejuvenate the stand, and no-till seeding keeps the surface protected.

The soil is suited to trees, and potential productivity is moderately high.

Slope is the main limitation of this soil for nonfarm use.

The capability subclass is IVe.

MpA—Mattapex fine sandy loam, 0 to 2 percent slopes. This soil is nearly level and moderately well drained. It is on uplands throughout the county. The areas are irregularly shaped and range from 2 to 25 acres.

Typically, the surface layer is brown fine sandy loam 10 inches thick. The subsoil is yellowish brown silt loam 25 inches thick and is mottled in the lower 16 inches. The substratum mainly is light brownish gray loamy fine sand to a depth of 60 inches and in places has strata of fine sandy clay loam.

Included with this soil in mapping are small areas of Woodstown soils. Also included are areas of soils similar to this Mattapex soil but in which the upper part of the subsoil is mottled. Included areas make up 20 percent of the unit.

The permeability of this Mattapex soil is moderately slow or moderate. Available water capacity is high, and in cultivated areas the surface runoff is slow. A seasonal high water table is at a depth of 1.5 to 2.5 feet. The soil is strongly acid or very strongly acid in unlimed areas.

Most areas of this soil are farmed. The soil is classified as prime farmland and is well suited to corn, soybeans, small grains, and grasses and legumes for hay and pasture. A few small wet depressions are in this soil, and draining these areas is a main management concern. Liming and fertilizing, adding organic matter, and protecting the soil with a cover crop or crop residue are the main management practices. The prevention of overgrazing is the main pasture management concern on the soil.

The soil is suited to trees, and potential productivity is moderately high. The use of logging equipment is restricted during wet seasons.

The main limitations of the soil for nonfarm use are the seasonal high water table, the permeability, and a frost-action potential and low strength. The seasonal high water table limits the soil as a site for homes, the permeability as a site for septic tank absorption fields, and the low strength and frost action as a site for local roads and streets.

The capability subclass is IIw.

MpB—Mattapex fine sandy loam, 2 to 5 percent slopes. This soil is gently sloping and moderately well drained. It is on side slopes and undulating uplands throughout the county. The areas of this soil are irregularly shaped and range from 2 to 30 acres.

Typically, the surface layer is brown fine sandy loam 10 inches thick. The subsoil is yellowish brown silt loam 25 inches thick and is mottled in the lower part. The substratum is light brownish gray fine loamy sand to a depth of 60 inches.

Included with this soil in mapping are moderately eroded spots marked by rills or shallow gullies. Also

included are areas of Woodstown and Sassafras soils. Included areas make up about 15 to 20 percent of the unit.

The permeability of this Mattapex soil is moderately slow or moderate. Available water capacity is high. In cultivated areas surface runoff is medium. A seasonal high water table is at a depth of 1.5 to 2.5 feet. The soil is strongly acid or very strongly acid in unlimed areas.

Most areas of this soil are farmed. This soil is classified as prime farmland and is well suited to corn, soybeans, small grains, and grasses and legumes for hay and pasture. The main management practices are liming, fertilizing, and adding organic matter to increase infiltration. Controlling a moderate hazard of erosion and providing drainage to small closed depressions where water is ponded after rains are the main management concerns. Using cover crops or a stubble mulch in winter, using rotations that include close-growing crops, and using grassed waterways to prevent gully formation are practices that help to control erosion. The prevention of overgrazing or grazing when the soil is wet are the main pasture management concerns.

This soil is suitable for trees, and potential productivity is moderately high. Wetness during winter and spring restricts the use of logging equipment.

The main limitations of the soil for nonfarm use are the seasonal high water table, the permeability, and a frost-action potential and low strength. The seasonal high water table limits the soil as a site for homes, the permeability as a site for septic tank absorption fields, and the low strength and frost-action as a site for local roads and streets.

The capability subclass is IIe.

MtA—Mattapex silt loam, 0 to 2 percent slopes.

This soil is level to nearly level and moderately well drained. It is on broad flat uplands, in slight depressions, and along drainageways. The areas generally are irregularly shaped and range from about 2 to 100 acres.

Typically the surface layer is brown to dark brown silt loam 11 inches thick. The subsoil is yellowish brown silt loam 24 inches thick and is mottled in the lower part. The substratum is mottled, strong brown sandy loam to a depth of 60 inches.

Included with this soil in mapping are areas where the subsoil is slightly compacted or is silty clay loam or where the silt loam extends to a depth of 50 inches or more. Also included are small depressions of Othello silt loam. Included areas make up about 25 percent of the unit.

The permeability of this Mattapex soil is moderate or moderately slow. Available water capacity is high. In cultivated areas surface runoff is slow. This soil has a seasonal high water table 1.5 to 2.5 feet below the surface. The soil is strongly acid or very strongly acid in unlimed areas. In some places along the Chesapeake Bay and its tributaries, however, oyster shells have been applied to the surface for many years and the soil is

mildly alkaline or neutral to a depth of 60 inches or more.

Most areas of this soil have been cleared and are used for cultivated crops. Some small areas, especially those surrounded by wetter soils, are in woodland.

The soil is classified as prime farmland and is well suited to cultivated crops. The major management concern is maintaining fertility and tilth. Some low-lying areas require drainage by tile or ditches. Using cover crops or leaving crop residue on the surface will help to maintain tilth.

This soil is suited to hay and pasture, but frost-action damages deep-rooted perennial crops in some winters. Thus, the soil is better suited to shallow-rooted grasses, or those which will tolerate wetness. Grazing when the soil is wet causes compaction of the surface layer.

The soil is suited to trees, especially those that tolerate wetness, and potential productivity is moderately high. The use of logging equipment is restricted during wet seasons.

The main limitations of the soil for nonfarm use are the seasonal high water table, the permeability, the frost-action potential and low strength. The seasonal high water table limits the soil as a site for homes, the permeability as a site for septic tank absorption fields, and the low strength and frost-action as a site for local roads and streets.

The capability subclass is IIw.

MtB—Mattapex silt loam, 2 to 5 percent slopes.

This soil is gently sloping and moderately well drained. It is on undulating uplands and in depressions or along draws. The areas are generally irregularly shaped and range from about 2 to 100 acres.

Typically the surface layer is brown to dark brown silt loam about 11 inches thick. The subsoil is yellowish brown silt loam 24 inches thick and is mottled in the lower part. The substratum is mottled, yellowish brown sandy loam to a depth of 60 inches.

Included with this soil in mapping are small areas that are silt loam to a depth of 60 inches or more and poorly drained, mottled soils in depressions. Also included are a few spots of Keyport silt loam and moderately eroded soils. Included areas make up about 25 percent of the unit.

The permeability of this Mattapex soil is moderate or moderately slow. Available water capacity is high. In cultivated areas surface runoff is medium. A seasonal high water table is at a depth of 1.5 to 2.5 feet. The soil is strongly acid or very strongly acid in unlimed areas.

Most areas of this soil have been cleared and are used for farming. A few places are wooded.

This soil is classified as prime farmland and is well suited to cultivated crops. Drainage is usually not needed, but a few small wet spots require drainage by ditches or tile. The main management concern is controlling a moderate hazard of erosion. Practices that control erosion on this soil are minimum tillage, using

cover crops or a stubble mulch, using grassed waterways, and contour farming.

This soil is suited to hay and pasture, which further help to control erosion. The main pasture management concerns are liming and fertilizing, avoiding grazing when the soil is wet, and avoiding overgrazing. Perennial crops are subject to frost-action in some winters.

This soil is suited to trees, and potential productivity is moderately high. The use of logging equipment is restricted during wet seasons.

The main limitations of the soil for nonfarm use are the seasonal high water table, the permeability, the frost-action potential, and low strength. The seasonal high water table limits the soil as a site for homes, the permeability as a site for septic tank absorption fields, and the low strength and frost-action as a site for local roads and streets.

The capability subclass is IIe.

MC2—Mattapex silt loam, 5 to 10 percent slopes, moderately eroded. This soil is moderately sloping and moderately well drained. It is on side slopes mostly dissected by drainageways. The areas of this soil are generally irregularly shaped and range from about 2 to 50 acres.

Typically, the surface layer of this soil is dark yellowish brown silt loam 8 inches thick. The subsoil is light yellowish brown silt loam 16 inches thick and is mottled in the lower part. The substratum is yellowish brown sandy loam to a depth of 60 inches.

Included with this soil in mapping are areas of moderately well drained Woodstown soils. Some areas of this soil have been severely eroded, and a few areas have a gravelly surface layer. Included areas make up about 25 percent of the unit.

The permeability in this soil is moderate or moderately slow. Available water capacity is high. The surface runoff is medium in cultivated areas. A seasonal high water table is at a depth of 1.5 to 2.5 feet. In places, ground water seeps to the surface, creating small wet spots. The soil is strongly acid or very strongly acid in unlimed areas.

This soil is used for most crops commonly grown in the county. Some areas are used for pasture and hay and some for woodland.

This soil is suited to cultivated row crops. Controlling erosion is a major management concern, and drainage, mainly by tile or ditches, is needed in some small wet spots. The main erosion-control practices are using cover crops in winter, using rotations that have close-growing crops, contour stripcropping, contour tillage, and no-till farming. Planting permanent grasses in drainageways provides protection from gullying.

This soil is suited to hay and pasture. Using lime and fertilizer is the main pasture management practice. A frost-action potential is a hazard to deep-rooted perennial crops in some winters.

This soil is well suited to trees, and potential productivity is moderately high. Wetness restricts the use of equipment.

The main limitations of the soil for nonfarm use are the seasonal high water table, the permeability, the frost-action potential, and low strength. The seasonal high water table limits the soil as a site for homes, the permeability as a site for septic tank absorption fields, and the low strength and frost-action as a site for local roads and streets. Slope is a limitation for some uses.

The capability subclass is IIIe.

MwD—Mattapex and Woodstown soils, 10 to 15 percent slopes. This unit consists of strongly sloping, moderately well drained soils on side slopes. The areas are irregularly shaped and range from 2 to 75 acres. They are hilly and commonly dissected by drainageways. The total acreage of the unit is about 40 percent Mattapex silt loam, 35 percent Woodstown fine sandy loam, and 25 percent other soils. Some areas of this unit are mostly Mattapex soils, some are mostly Woodstown soils, and some consist of both. The Woodstown and Mattapex soils were mapped together because they have no major differences in use and management.

Typically, the Mattapex soils have a surface layer of yellowish brown silt loam 8 inches thick. The subsoil is yellowish brown silt loam 16 inches thick and is mottled in the lower part. The substratum is mottled, light yellowish brown fine sandy loam to a depth of 60 inches.

Typically, the Woodstown soils have a surface layer of yellowish brown fine sandy loam 8 inches thick. The subsoil is light olive brown heavy fine sandy loam 27 inches thick and is mottled in the lower part. The substratum is olive yellow fine sandy loam to a depth of 60 inches.

Included with these soils in mapping are a few areas of Mattapex soils which are silty to a depth of 60 inches or more. In a few places the lower part of the subsoil is firm and compacted, and the soil is slightly eroded in wooded areas and severely eroded in convex spots in cropland. Also included are spots of well drained Sassafras or Matapeake soils and Woodstown soils that have silt loam in the subsoil.

Permeability is moderately slow or moderate in the Mattapex soils and moderate in the Woodstown soils. Available water capacity is moderate to high in both. Surface runoff is rapid in cultivated areas. The soils have a seasonal high water table at a depth of 1.5 to 2.5 feet. The soils are strongly acid to extremely acid in unlimed areas.

These soils are used for crops, pasture, and woodland.

A very severe erosion hazard limits these soils for cultivated crops. Drainage is generally not needed but is suitable for some small wet spots that delay planting. No-till farming and grassed waterways help to control erosion.

These soils are suited to pasture and hay. Liming and fertilizing and diverting runoff are the main pasture management needs.

These soils are suitable for trees; the potential productivity is high on the Woodstown soils and moderately high on the Mattapex soils. Erosion from gullies in drainageways is a major hazard. Slope limits the use of heavy equipment for planting or harvesting, and the use of logging equipment is restricted during wet seasons.

Slope and the seasonal high water table limit the soils for most nonfarm uses, especially as a site for septic tank absorption fields and homes with basements. A high frost-action potential limits the soils as a site for local roads or streets.

The capability subclass is IVe.

MxA—Mattapex-Matapeake-Butlertown silt loams, 0 to 2 percent slopes. This unit consists of nearly level, well drained and moderately well drained soils on broad uplands throughout the county. The unit generally is in the highest nearly level areas on the landscape, but some areas are in slight depressions. The areas are about 40 percent moderately well drained Mattapex silt loam, 28 percent well drained Matapeake silt loam, 27 percent moderately well drained Butlertown silt loam, and 5 percent other soils. The Mattapex, Matapeake, and Butlertown soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Mattapex soil is dark yellowish brown silt loam 11 inches thick. The subsoil is yellowish brown and light yellowish brown silt loam 24 inches thick and is mottled in the lower part. The substratum is strong brown sandy loam to a depth of 60 inches.

Typically, the Matapeake soil has a surface layer of dark brown silt loam 10 inches thick. The subsurface layer is yellowish brown silt loam 4 inches thick. The subsoil is yellowish brown and 18 inches thick. It is heavy silt loam in the upper part and loam in the lower part. The substratum is strong brown sandy loam to a depth of 60 inches.

Typically, the Butlertown soil has a surface layer of dark brown silt loam 10 inches thick. The subsoil is brownish yellow and yellowish brown silt loam 55 inches thick. It is mottled in the lower part, and the lower 34 inches is firm and brittle. The substratum is pale brown loam to a depth of 75 inches.

Included with these soils in mapping are areas of Othello silt loam in depressions that are less than 2 acres each. A few of these areas have sand in the surface layer.

Permeability is moderate in the Matapeake soils in this unit, moderately slow or moderate in the Mattapex soils, and slow in Butlertown soils. Available water capacity is high in all three soils. In cultivated areas the surface runoff is slow on the Mattapex and Matapeake soils and medium on the Butlertown soils. The hazard of erosion is

slight. A seasonal high water table is at a depth of 1.5 to 2.5 feet in Mattapex soils and is perched at a depth of 2 to 4 feet in Butlertown soils. The soils are strongly acid to extremely acid in unlimed areas.

Most of the acreage of this unit is used for row crops. A small acreage is in pasture and woodland.

This unit is classified as prime farmland and is well suited to cultivated crops. Water is ponded in some shallow depressions after rains, and providing drainage to such areas is a management concern. The seasonal high water table in the Matapex and Butlertown soils in some years delays spring planting or delays harvesting.

The soils are well suited to hay and pasture, especially to water-tolerant crops. Frost-action is a hazard to some perennial crops.

The soils of this unit are well suited to trees; potential productivity is moderately high on the Matapeake and Mattapex soils and high on the Butlertown soils. The use of logging equipment is limited on the Butlertown and Mattapex soils in wet seasons.

The seasonal high water table in the Butlertown and Mattapex soils is the main limitation of this unit for nonfarm use, especially for homesites and septic tank absorption fields. Low strength and a frost-action potential limit the soils as a site for local roads and streets.

The capability subclass is IIw.

MxB—Mattapex-Matapeake-Butlertown silt loams, 2 to 5 percent slopes. This unit consists of gently sloping, well drained and moderately well drained soils on undulating uplands and side slopes throughout the county. The unit is in the highest gently sloping areas on the landscape or in areas that are slightly lower than the surrounding soils. The areas are about 40 percent Mattapex silt loam, 35 percent Matapeake silt loam, 20 percent Butlertown silt loam, and 5 percent other soils. The Mattapex, Matapeake, and Butlertown soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Mattapex soil is dark yellowish brown silt loam 11 inches thick. The subsoil is yellowish brown and light yellowish brown silt loam and is mottled in the lower part. The substratum is strong brown sandy loam to a depth of 60 inches.

Typically, the Matapeake soil has a surface layer of dark brown silt loam 10 inches thick. The subsurface layer is yellowish brown silt loam 4 inches thick. The subsoil is yellowish brown and 18 inches thick. It is heavy silt loam in the upper part and loam in the lower part. The substratum is strong brown sandy loam to a depth of 60 inches.

Typically, the Butlertown soil has a surface layer of dark brown silt loam 10 inches thick. The subsoil is brownish yellow and yellowish brown silt loam 55 inches thick. It is mottled in the lower part, and the lower 34 inches is firm and brittle. The substratum is pale brown loam to a depth of 75 inches.

Included with this unit in mapping are a few spots of Sassafras soils, a few depressional areas of Othello soils, and spots of moderately eroded soils.

The Matapeake soils have moderate permeability, the Mattapex soils have moderately slow or moderate permeability, and the Butlertown soils have slow permeability. The available water capacity is high in all three soils. In cultivated areas the surface runoff is medium. A seasonal high water table is at a depth of 1.5 to 2.5 feet in the Mattapex soils and is perched at a depth of 2 to 4 feet in the Butlertown soils. The soils are strongly acid to extremely acid in unlimed areas.

Most of the acreage of this unit is used for row crops. A small acreage is in pasture or woodland.

This unit is classified as prime farmland and is well suited to most crops commonly grown in the county. The soils respond well to lime and fertilizer. Using stubble mulch or cover crops in winter, use of grassed waterways, minimum tillage, and contour tillage help to control a moderate hazard of erosion in cultivated areas. Drainage is needed in some depressional areas where water is ponded on the surface.

The soils are suited to hay or pasture. Some deep-rooted perennial crops are damaged by frost-action in winter.

The soils are suited to trees; potential productivity is high on the Butlertown soils and moderately high on Matapeake and Mattapex soils. The seasonal high water table limits the use of logging equipment on the Butlertown and Mattapex soils in winter and spring.

The seasonal high water table in the Butlertown and Mattapex soils is the main limitation of this unit for nonfarm use, especially for homesites and septic tank absorption fields. Low strength and a frost-action potential limit the soils as a site for local roads and streets.

The capability subclass is IIe.

MzA—Mattapex Variant silt loam, 0 to 2 percent slopes. This soil is nearly level and moderately well drained. It is on broad terraces in the western and southern parts of the county. The areas of this soil are irregularly shaped and range from about 2 to 100 acres.

Typically, the surface layer of this soil is brown to dark brown silt loam about 11 inches thick. The subsoil is 31 inches thick. It is yellowish brown silt loam in the upper part and mottled, yellowish brown heavy silt loam in the lower part. The next layer is 23 inches thick. It is 10 inches of very dark gray silty clay over 13 inches of mottled, grayish brown clay loam. The substratum is light brownish gray gravelly sandy loam to a depth of 70 inches.

Included with this soil in mapping are some poorly drained, level or slightly depressional areas in which the surface layer is olive brown and the subsoil is mottled. Included areas make up about 25 percent of the unit.

The permeability of this Mattapex Variant soil is moderately slow in the subsoil and very slow in the layer

under the subsoil. Available water capacity is high. In cultivated areas the surface runoff is slow. A seasonal high water table is perched at a depth of 1.5 to 2.5 feet. The layer under the subsoil has a high shrink-swell potential. The soil is strongly acid to extremely acid in unlimed areas.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture, and some are wooded.

This soil is classified as prime farmland and suited to corn, soybeans, and grasses and legumes. The main management concerns are improving drainage and increasing the fertility and organic matter content in areas that have been cultivated and that are easily crusted during rains. This soil is not used extensively for small grains, because it is wet in winter, is susceptible to frost-action, and is in areas where crop damage from feeding geese is severe. Although artificial drainage of large areas is usually not necessary, a few depressional areas require it.

This soil is suited to pasture and hay. Deep-rooted perennial crops, such as alfalfa, that require good aeration and that are subject to frost-action are not well suited to this soil. Restricted grazing during wet periods helps to reduce surface compaction.

This soil is suitable for trees, and potential productivity is moderately high. The seasonal high water table sometimes limits use of heavy equipment for harvesting or planting.

The seasonal high water table and high shrink-swell potential limit this soil for nonfarm use, especially for septic tank absorption fields and homesites. The permeability in the lower layers further restricts the soil as a site for septic tanks. Low strength and the frost-action potential limit the soil as a site for local roads and streets.

The capability subclass is IIw.

MzB—Mattapex Variant silt loam, 2 to 5 percent slopes. This soil is gently sloping and moderately well drained. It is on uplands near the heads of drainageways in the western and southern parts of the county. The areas are dissected by shallow draws or drainageways. The areas of the soil are irregularly shaped and range from about 2 to 70 acres.

Typically the surface layer is brown to dark brown silt loam about 11 inches thick. The subsoil is 31 inches thick. It is yellowish brown silt loam in the upper part and mottled, yellowish brown heavy silt loam in the lower part. The next layer is 23 inches thick. It is 10 inches of very dark gray silty clay over 13 inches of mottled, grayish brown clay loam. The substratum is light brownish gray gravelly sandy loam to a depth of 70 inches.

Included with this soil in mapping are poorly drained areas that are mottled in the upper part of the subsoil. Included areas make up about 20 percent of the unit.

The permeability of this Mattapex Variant is moderately slow in the subsoil and very slow in the layer

under the subsoil. Available water capacity is high. In cultivated fields the surface runoff is medium and the hazard of erosion is moderate. A seasonal high water table is at a depth of 1.5 to 2.5 feet. The layer beneath the subsoil has a high shrink-swell potential. The soil is strongly acid to extremely acid in unlimed areas.

Most areas of this soil are used for row crops. Some areas are used for hay and pasture, and some are wooded.

This soil is classified as prime farmland and well suited to crops commonly grown in the county. The soil responds well to lime and fertilizer. Using a rotation that includes close-growing crops and no-till crops and leaving crop residue on the soil in winter are practices that help to control the moderate erosion hazard in cultivated areas. This soil is not used extensively for small grains, because it is wet, is susceptible to frost-action, and mainly is in areas where geese feed heavily in winter.

This soil is suited to pasture and hay. Deep-rooted perennial crops, such as alfalfa, that require good aeration and that are subject to frost-action are not well suited to this soil. Grazing when the soil is wet causes surface compaction and increases runoff and erosion.

This soil is suited to trees, and potential productivity is moderately high. Use of equipment is restricted during wet seasons, but there are no other major limitations.

The seasonal high water table and high shrink-swell potential limit this soil for nonfarm use, especially for septic tank absorption fields and homesites. The permeability in the lower layers further restricts the soil as a site for septic tanks. Low strength and the frost-action potential limit the soil as a site for local roads and streets.

The capability subclass is IIe.

Oh—Othello silt loam. This soil is nearly level and poorly drained. It is in depressions or broad, flat areas. The areas are generally irregularly shaped and range from a few acres to about 500 acres.

Typically, the surface layer is dark grayish brown silt loam 8 inches thick. The subsoil is mottled, light brownish gray and light gray silt loam 32 inches thick. The substratum extends to a depth of 78 inches. It is dark gray loam in the upper part, light gray very fine sandy loam in the middle part, and very dark grayish brown loamy fine sand in the lower part.

Included with this soil in mapping are a few areas of soils that are similar to this Othello soil but that are somewhat sandier and more permeable, that are mottled, yellowish brown silt loam in the upper part of the subsoil and are slightly better drained, and that are slightly compacted in the lower part of the subsoil. Also included in mapping are areas of Elkton silt loam that is less permeable in the subsoil than this Othello soil. Included areas make up about 40 percent of the unit.

The permeability of this Othello soil is moderately slow. Available water capacity is high. In cultivated areas

runoff is slow to very slow, and water is sometimes ponded on some wooded areas. A seasonal high water table is within a foot of the surface. The soil is strongly acid to extremely acid in unlimed areas.

Some areas of soil are used for cultivated crops, mainly corn and soybeans, and some areas are wooded.

This soil is suited to cultivated crops. The major management concern is providing drainage, mainly by open-ditch methods. The moderately slow permeability of the soil limits the effectiveness of tile drainage. Continuous cropping compacts the soil, especially if it is worked when wet. Minimum tillage will help to maintain soil structure and lessen compaction, and use of a stubble mulch in winter helps to increase the rate of infiltration for air and water.

This soil is suited to water-tolerant pasture and hay crops, but some perennial crops are damaged by frost-action in winter. The soil is not suited to crops that require a well aerated root zone, such as alfalfa. Grazing when the soil is wet causes compaction.

This soil is suitable for trees, and potential productivity is moderately high. Logging is limited for long periods because of wetness.

The seasonal high water table limits the soil for many types of nonfarm use, including septic tank absorption fields and homesites. A high frost-action potential limits the soil as a site for local roads and streets.

The capability subclass is IIIw.

Pt—Pits, gravel and sand. This unit consists of excavations from which sand and gravel have been removed and used for various types of fill material. These areas range from about 2 to 50 acres and are throughout the county. Included with the unit is one area east of Chestertown that is used as a source of clay.

Some areas of this unit are suitable for reclamation and use as wildlife habitat, but determination of the suitability of any of these areas requires onsite investigation.

This unit is not assigned to a capability subclass.

SaA—Sassafras sandy loam, 0 to 2 percent slopes. This soil is nearly level and well drained. It is on broad uplands throughout the county. Most areas of this soil are at an elevation of more than 45 feet. The areas are generally about 2 to 75 acres and are irregularly shaped.

Typically, the surface layer is brown to dark brown sandy loam about 9 inches thick (fig. 8). The subsoil is 29 inches thick. It is yellowish brown sandy loam in the upper part and strong brown sandy clay loam in the lower part. The substratum is brownish yellow sand to a depth of 60 inches.

Included with this soil in mapping are small areas of Matapeake, Fort Mott, and Woodstown soils. A few places have gravel on the surface, have oyster shells mixed into the plow layer, or are moderately eroded. Included areas make up about 15 to 25 percent of the unit.

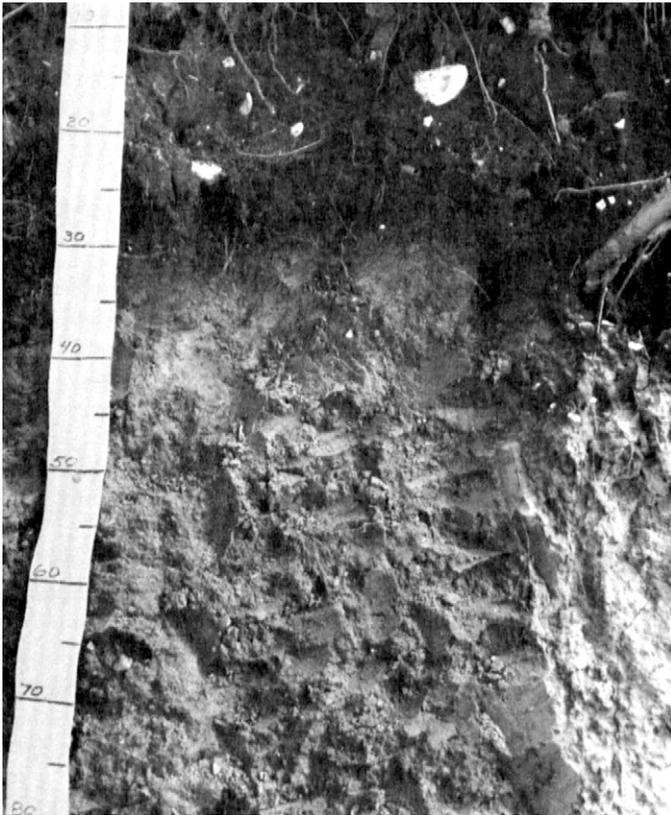


Figure 8.—A typical profile of Sassafras sandy loam, 0 to 2 percent slopes. The increments on the marker are in centimeters.

The permeability of this Sassafras soil is moderate. Available water capacity is moderate. In cultivated areas the surface runoff is medium. The soil is strongly acid to extremely acid in unlimed areas. The substratum remains acid in areas that have been limed frequently.

This soil is used mainly for corn, soybeans, and small grains. In a few areas it is used for building sites.

This soil is classified as prime farmland and is well suited to row crops, including early-season truck crops and irrigated crops, and to hay and pasture. The main management concern is a hazard of wind erosion. Using a stubble mulch, keeping crop residue on the surface, and using cover crops or fall-seeded small grains help to control wind erosion and maintain tilth.

This soil is suited to trees, and potential productivity is moderately high.

This soil is generally suitable for most types of nonfarm use.

The capability class is I.

SaB—Sassafras sandy loam, 2 to 5 percent slopes.

This soil is gently sloping and well drained. It is on broad, undulating uplands and side slopes throughout

the county (fig. 9). The areas generally range from 2 to 50 acres and are irregularly shaped. Most large areas of this soil are at an elevation of more than 45 feet.

Typically, the surface layer is brown to dark brown sandy loam 9 inches thick. The subsoil is 29 inches thick. It is yellowish brown sandy loam in the upper part and strong brown sandy clay loam in the lower part. The substratum is brownish yellow sand to a depth of 60 inches.

Included with this soil in mapping are areas of Matapeake, Woodstown, and Fallsington soils. The Woodstown and Fallsington soils are in depressions and are shown by a spot symbol on the soil maps. Also included are a few sloping, moderately eroded areas of Sassafras soils and areas that have gravel on or throughout the soil. Included areas make up about 25 percent of the unit.

The permeability of this Sassafras soil is moderate. Available water capacity is moderate. In cultivated areas runoff is medium and the hazard of erosion is moderate. The soil is strongly acid to extremely acid in unlimed areas.

This soil mainly is used for cultivated crops. Some small areas are used for homesites, and a few small areas are wooded or in pasture.

This soil is classified as prime farmland and is well suited to most crops, including truck crops and irrigated crops, and to hay and pasture. Controlling a moderate hazard of erosion and soil blowing is the main management concern. Contour farming, grassed waterways, minimum tillage, using crop residue, and using rotations that include grasses and legumes help to control erosion. The use of cover crops, fall-seeded small grains, or a stubble mulch will help to control soil blowing.

This soil is well suited to woodland, and potential productivity is moderately high.

This soil is generally suitable for most types of nonfarm use.

The capability subclass is IIe.

SaC2—Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded. This soil is moderately sloping and well drained. It is on rolling uplands, knolls, and side slopes throughout the county. The areas generally range from 2 to 50 acres and are irregularly shaped or elongated.

Typically, the surface layer is dark yellowish brown sandy loam 9 inches thick. The subsoil is strong brown sandy loam or sandy clay loam 26 inches thick. The substratum is brownish yellow sand to a depth of 60 inches.

Included with this soil in mapping are a few severely eroded spots where the surface layer contains more clay than in this Sassafras soil. Also included are areas of Colts Neck soils, areas that have gravel or a few large cobblestones on the surface, and areas of less sloping

Matapeake soils. Included areas make up about 20 percent of the unit.

The permeability of this Sassafras soil is moderate. Available water capacity is moderate. In cultivated areas surface runoff is medium and the hazard of erosion is moderate. The soil is strongly acid to extremely acid in unlimed areas.

This soil mainly is used for cultivated crops, pasture, hay, and woodland. A few areas are used for homesites.

This soil is suited to cultivated crops, but controlling erosion is a major management concern. Minimum tillage, no-till farming, crop rotations, contour tillage, stripcropping, and diversions help to control erosion in cultivated areas. Growing small grains or cover crops or using crop residue as a mulch helps to prevent soil blowing. Using grassed waterways prevents gully formation, and existing gullies can be shaped and revegetated to prevent further cutting into cropped fields. This soil tends to be droughty during long dry periods. Practices that reduce erosion will also reduce runoff and increase infiltration and help to reduce droughtiness.

This soil is well suited to hay and pasture. Avoiding overgrazing, which leaves the soil susceptible to erosion, is the major management concern.

This soil is well suited to trees, and potential productivity is moderately high.

Slope is the main limitation of this soil for nonfarm use.

The capability subclass is IIIe.

SaD2—Sassafras sandy loam, 10 to 15 percent slopes, moderately eroded. This soil is strongly sloping and well drained. It is on rolling uplands and side slopes throughout the county. Some large areas of this soil are in the northern part of the county along drainageways leading to the Sassafras River. The areas of the soil generally range from 2 to 50 acres and are irregularly shaped.

Typically, the surface layer is dark yellowish brown sandy loam 8 inches thick. The subsoil is strong brown heavy sandy loam or sandy clay loam 27 inches thick. The substratum is brownish yellow sand to a depth of 60 inches.



Figure 9.—Radical shore erosion on an area of Sassafras sandy loam, 2 to 5 percent slopes, on Eastern Neck Island.

Included with this soil in mapping are a few severely eroded spots where the surface layer is thinner and contains more clay than in this Sassafras soil. These areas generally are on shoulder slopes. Also included are areas of Colts Neck soils, a few areas that have gravel or a few stones on the surface, and a few spots of less sloping Matapeake soils. Included areas make up about 30 percent of the unit.

The permeability of this Sassafras soil is moderate. Available water capacity is moderate, but cultivated areas are droughty during long dry periods because the surface runoff is medium to rapid. This soil is strongly acid to extremely acid in unlimed areas.

This soil is used for cultivated crops, pasture, hay, and woodland.

The soil is suited to cultivated crops, but a severe hazard of erosion is a major management concern. No-till farming, using a crop rotation dominated by grasses and legumes, contour farming, using diversions, and covering the soil in winter with grass, small grains, or crop residue are practices that help to control erosion. Using grassed waterways helps to prevent gully formation, and existing small gullies can be shaped, graded, and stabilized with vegetation. Practices that help to reduce erosion also help to reduce droughtiness by controlling runoff and increasing infiltration.

This soil is suited to pasture or permanent hay crops. The prevention of overgrazing, which leaves the soil bare and susceptible to water erosion, is the main management concern.

This soil is suited to trees, and potential productivity is moderately high. Slope limits the use of heavy equipment.

Slope is the main limitation of the soil for most types of nonfarm use.

The capability subclass is IVe.

SaD3—Sassafras sandy loam, 10 to 15 percent slopes, severely eroded. This soil is strongly sloping and well drained. It is on rolling uplands and side slopes throughout the county. Some large areas of this soil are in the northern part of the county along drainageways leading to the Sassafras River. Gullies are in some draws, and rills are in most fields. The areas of the soil are irregularly shaped and range from about 3 to 50 acres.

Typically, the surface layer is yellowish brown heavy sandy loam 7 inches thick. The subsoil is strong brown sandy loam or sandy clay loam 21 inches thick. The substratum is yellowish brown sand to a depth of 60 inches.

Included with this soil in mapping are convex areas with a surface layer of sandy clay loam. Also included are a few areas between elevations of 40 and 60 feet of Galestown soils and a few areas of soils that have a subsoil of sandy clay or clay loam. Included areas make up about 30 percent of the unit.

The permeability of this Sassafras soil is moderate. Available water capacity is moderate, but the soil is

droughty in late summer because surface runoff is medium to rapid. This soil is strongly acid to extremely acid in unlimed areas.

Most areas of this soil are used for pasture, hay, or woodland. Some shorter slopes or areas surrounded by less sloping soils are cultivated.

A very severe erosion hazard makes this soil poorly suited to cultivated crops. Shaping, grading, and establishing a plant cover helps to prevent further erosion in small gullies.

This soil is suited to pasture or hay. Liming, fertilizing, and reseeding are the main pasture management practices. Overgrazing makes the soil susceptible to further erosion. Diversion of runoff is needed in some pastures.

This soil is suitable for woodland, and potential productivity is moderately high. Most wooded areas of this soil are small.

Slope is the main limitation of this soil for nonfarm use.

The capability subclass is VIe.

SfA—Sassafras loam, 0 to 2 percent slopes. This soil is nearly level and well drained. It is on broad uplands throughout the county. The areas are irregularly shaped and range from about 3 to 100 acres.

Typically, the surface layer is brown to dark brown loam 10 inches thick. The subsoil is yellowish brown loam 26 inches thick. The substratum is yellowish brown loamy sand to a depth of 60 inches.

Included with this soil in mapping are spots of Woodstown soils in small depressions that have a dark surface layer. Also included are areas of Matapeake soils. Included areas make up about 25 percent of the unit.

The permeability of this Sassafras soil is moderate. Available water capacity is moderate. In cultivated areas the surface runoff is slow. The water infiltration rate is moderate. The water table generally is at a depth of more than 6 feet, but in a few areas at low elevations the seasonal high water table is at a depth of about 4 feet. In most unlimed areas the soil is strongly acid to extremely acid.

This soil is used mostly for cash grains. Some small areas are used for nonfarm development, trees, pasture, or irrigated grain crops.

This soil is classified as prime farmland and is well suited to most crops grown in the county, including early-season truck crops, and to pasture and hay. Cover crops or the use of crop residue as a mulch protects cultivated areas of this soil from blowing in winter months and prevents crusting of the surface after rains. Using the soil for hay and pasture helps to improve tilth in continuously cultivated areas.

The soil is well suited to trees, and potential productivity is moderately high.

This soil is generally suitable for most types of nonfarm use.

The capability class is I.

SfB—Sassafras loam, 2 to 5 percent slopes. This soil is gently sloping and well drained. It is on broad uplands and side slopes near draws. Areas of this soil are generally irregularly shaped and range from about 2 to 100 acres.

Typically, the surface layer is brown to dark brown loam 10 inches thick. The subsoil is yellowish brown loam 26 inches thick. The substratum is yellowish brown loamy sand to a depth of 60 inches.

Included with this soil in mapping are a few small areas of Woodstown soils in depressions and along some narrow drainageways. Also included are places where Sassafras and Matapeake soils are mixed and some moderately eroded spots where the subsoil is mixed into the surface layer. Included areas make up about 25 percent of the unit.

The permeability of this Sassafras soil is moderate. Available water capacity is moderate. In cultivated areas the surface runoff is medium. The soil in unlimed areas is strongly acid to extremely acid.

Most areas of this soil are used for cash grains, mainly corn and soybeans. Some areas are used for small grains or truck crops, and a few are used for homesites, pasture, or woodland.

This soil is classified as prime farmland and is well suited to most crops commonly grown in the county, including truck crops, and to hay and pasture. Cover crops or a stubble mulch, rotations that include grass crops, and minimum tillage or no-till farming help to control a moderate erosion hazard in cultivated areas. Shaping and using sod help to prevent gully formation in waterways.

This soil is suited to trees, and potential productivity is moderately high.

This soil is generally suitable for most nonfarm uses, but slope limits some types of recreational use.

The capability subclass is IIe.

SfC2—Sassafras loam, 5 to 10 percent slopes, moderately eroded. This soil is moderately sloping and well drained. It is on rolling uplands, knolls, and side slopes throughout the county. The areas generally range from 3 to 75 acres and are irregularly shaped.

Typically, the surface layer is yellowish brown loam 7 inches thick. The subsoil is 25 inches thick. It is yellowish brown to strong brown loam in the upper part and heavy sandy loam in the lower part. The substratum is yellowish brown loamy sand to a depth of 60 inches.

Included with this soil in mapping are areas of Matapeake silt loam and areas that are a mixture of Matapeake silt loam and this Sassafras soil. Also included are areas of Woodstown soils in small depressions and along drainageways and areas on knolls and shoulder slopes that have a sandy surface layer. Included areas make up about 35 percent of the unit.

The permeability of this Sassafras soil is moderate. Available water capacity is moderate, but the soil is sometimes droughty because runoff is medium. The soil is strongly acid to extremely acid in unlimed areas.

This soil is used for cultivated crops, small grains, pasture, hay, and woodland.

This soil is suited to row crops and hay and pasture. No-till farming, using a crop rotation that includes close-growing crops, and contour tillage help to control a moderate hazard of erosion and protect the soil from drought. The use of the soil for pasture or hay further controls erosion. Use of proper stocking rates, prevention of overgrazing, and applying lime and fertilizer are the main pasture management practices.

The soil is suited to trees, and potential productivity is moderately high.

Slope is the main limitation of this soil for nonfarm use.

The capability subclass is IIIe.

SfC3—Sassafras loam, 5 to 10 percent slopes, severely eroded. This soil is moderately sloping and well drained. It is on rolling uplands, knolls, and side slopes throughout the county. The areas generally range from 3 to 75 acres and are irregularly shaped.

Typically, the surface layer is yellowish brown loam about 5 inches thick. The subsoil is yellowish brown to strong brown sandy clay loam 20 inches thick. The substratum is yellowish brown and extends to a depth of 60 inches. It is sandy loam in the upper part and loamy sand in the lower part.

Included with this soil in mapping are areas where the surface layer contains more clay than this Sassafras soil and is sticky when wet and crusty when dry. Also included are spots where the surface layer and subsoil have been removed by erosion or where the surface layer and upper part of the subsoil are silt loam and silty clay loam. Included areas make up about 30 percent of the unit.

The permeability of this Sassafras soil is moderate. Available water capacity is moderate. In cultivated areas the surface runoff is medium. The soil is strongly acid to extremely acid in unlimed areas.

This soil is used for cultivated crops, small grains, pasture, hay, and woodland.

The soil is fairly suited to cultivated crops and to hay and pasture. It is difficult to work in most places, and seedbeds are difficult to prepare because of a low organic matter content in the surface layer. Using a crop rotation dominated by close-growing crops, keeping the surface covered in winter with a stubble mulch or cover crops, using grassed waterways or terraces to prevent gully formation, and no-till farming are practices that are necessary to control a severe erosion hazard in cultivated areas. The use of proper stocking rates, prevention of overgrazing, pasture rotation, and use of lime and fertilizer are the main pasture management practices.

This soil is suited to trees, and potential productivity is moderately high.

Slope is the main limitation of this soil for nonfarm use, including homesites and septic tank absorption fields.

The capability subclass is IVe.

SfD3—Sassafras loam, 10 to 15 percent slopes, severely eroded. This soil is strongly sloping and well drained. It is on knolls separated by ravines and draws. The areas generally range from 3 to 50 acres and are irregularly shaped or slightly elongated.

Typically, the surface layer is yellowish brown loam about 5 inches thick. The subsoil is strong brown sandy clay loam 20 inches thick. The substratum extends to a depth of 60 inches. It is yellowish brown sandy loam in the upper part and loamy sand in the lower part.

Included with this soil in mapping are spots where the surface layer is sticky when wet and cloddy when dry. Also included are areas of Matapeake soils and a few spots that have pebbles on the surface. Some areas are similar to this Sassafras soil but have gravel or silt loam or silty clay in the substratum or have a subsoil of clay loam. Included areas make up about 35 percent of the unit.

This Sassafras soil has moderate permeability. Available water capacity is moderate. The soil is strongly acid to extremely acid in unlimed areas.

Some areas of this soil are used for cultivated crops, but most are used for pasture, hay, or woodland.

Slope and a very severe erosion hazard make this soil poorly suited to cultivated crops. Erosion and a low organic matter content make seedbeds difficult to prepare. Using a crop rotation dominated by close-growing crops and no-till crops helps to control erosion in cultivated areas, and the use of grassed waterways helps to prevent gully formation. The use of the soil for hay and pasture helps to further control erosion. The use of proper stocking rates, the prevention of overgrazing, and the use of lime and fertilizer are the main pasture management practices.

This soil is suitable for trees, and potential productivity is moderately high.

Slope is the main limitation of the soil for nonfarm use, including use as a site for homes and septic tanks.

The capability subclass is VIe.

SgB—Sassafras gravelly loam, 0 to 5 percent slopes. This soil is nearly level and gently sloping and is well drained. It is on upland side slopes and knolls. The areas generally range from 2 to 60 acres and are elongated or irregularly shaped.

Typically, the surface layer is dark yellowish brown gravelly loam 10 inches thick. The subsoil is 30 inches thick. It is strong brown sandy clay loam in the upper part and yellowish brown sandy loam in the lower part. The substratum is brownish yellow loamy sand to a depth of 60 inches.

Included with this soil in mapping are areas where the surface layer is gravelly sandy loam or cobbly sandy loam and the subsoil has more clay than this Sassafras soil. Also included are areas of Colts Neck gravelly loam. Included areas make up about 25 percent of the unit.

The permeability of this Sassafras soil is moderate. Available water capacity is moderate. In cultivated areas the surface runoff is medium. The soil is strongly acid to extremely acid in unlimed areas.

This soil mainly is used for cultivated crops and hay and pasture. A small acreage is wooded.

This soil is classified as prime farmland and is well suited to cultivated crops and hay and pasture. Controlling a moderate erosion hazard and supplying crops with adequate water and nutrients are the major management concerns. Using a crop rotation that includes close-growing crops, using contour tillage, minimum tillage, or no-till farming, using grassed waterways, and protecting the soil in winter with a stubble mulch, cover crops, or small grains are practices that help to prevent erosion. The gravelly surface causes rapid wear of tillage and cultivating equipment. The prevention of overgrazing and the use of lime and fertilizer are the main pasture management practices.

This soil is suited to trees, and potential productivity is moderately high.

This soil is generally suitable for nonfarm use and is a source of roadfill.

The capability subclass is IIe.

SgC2—Sassafras gravelly loam, 5 to 10 percent slopes, moderately eroded. This soil is moderately sloping and well drained. It is on upland knolls, side slopes, and ridges throughout the county and is generally well dissected by waterways. The areas range from about 2 to 100 acres and are irregularly shaped.

Typically, the surface layer is dark yellowish brown gravelly loam about 8 inches thick. The subsoil is strong brown sandy clay loam 27 inches thick. The substratum is strong brown loamy sand to a depth of 60 inches.

Included with this soil in mapping are spots of gravelly Colts Neck soils. Also included are droughty spots on some knolls where the soil contains as much as 50 percent gravel, a few areas where the surface layer is gravelly sandy loam, and spots that are cloddy when plowed and hard when dry. Included areas make up 20 percent of the unit.

The permeability of this Sassafras soil is moderate. Available water capacity is moderate. In cultivated areas the surface runoff is medium. The soil commonly is strongly acid to extremely acid in the subsoil and substratum, but reaction varies in the surface layer according to local liming practices.

This soil is used for cultivated crops, pasture, hay, and woodland.

The soil is suitable for most crops commonly grown in the county and for hay and pasture but has a severe hazard of erosion when cultivated. Minimum tillage,

contour tillage, cover crops, a stubble mulch, and no-till farming help to control erosion in cultivated areas. Grassed waterways help to prevent gully formation. The use of the soil as pasture or for hay helps to further control erosion. The prevention of overgrazing and the use of fertilizer and lime are the main pasture management practices.

This soil is suited to woodland, and potential productivity is moderately high.

Slope is the main limitation of this soil for some types of nonfarm use.

The capability subclass is IIIe.

SgC3—Sassafras gravelly loam, 5 to 10 percent slopes, severely eroded. This soil is moderately sloping and well drained. It is on rolling uplands and side slopes throughout the county. The areas generally range from 2 to 30 acres and are irregularly shaped.

Typically, the surface layer is yellowish brown gravelly loam 6 inches thick. The subsoil is strong brown sandy clay loam 24 inches thick. The substratum is yellowish brown loamy sand to a depth of 60 inches.

Included with this soil in mapping are areas of gravelly Colts Neck soils. Some areas of this unit have a subsoil of clay loam, and some have a few stones on the surface. Included areas make up about 20 percent of the unit.

The permeability of this Sassafras soil is moderate. Available water capacity is moderate. In cultivated areas the surface runoff is medium. The soil is strongly acid to extremely acid in unlimed areas.

A very severe erosion hazard makes this soil poorly suited to cultivated crops. A crop rotation that is dominated by close-growing crops, contour tillage, minimum tillage, and no-till farming are needed in cultivated areas to control erosion and increase available water capacity. Grassed waterways help to prevent gully formation. The use of the soil for pasture or hay helps to further control erosion. The use of lime and fertilizer and the prevention of overgrazing are the main pasture management practices.

The soil is suitable for trees, and potential productivity is moderately high.

The soil is suitable as a source of roadfill, but slope limits some other types of nonfarm use.

The capability subclass is IVe.

SgD3—Sassafras gravelly loam, 10 to 15 percent slopes, severely eroded. This soil is strongly sloping and well drained. It is on rolling side slopes throughout the county. The areas generally range from 2 to 100 acres and are irregularly shaped.

Typically, the surface layer is yellowish brown gravelly loam 6 inches thick. The subsoil is strong brown sandy clay loam 24 inches thick. The substratum is yellowish brown loamy sand to a depth of 60 inches.

Included with this soil in mapping are places where the surface layer is gravelly sandy loam. Also included are

some severely gullied areas, areas of Colts Neck gravelly loam, and areas with slopes of more than 15 percent. Included areas make up about 35 percent of the unit.

The permeability of this Sassafras soil is moderate. Available water capacity is moderate. The soil is strongly acid to extremely acid in unlimed areas.

This soil is used for crops, pasture, and woodland. A very severe erosion hazard makes the soil poorly suited to cultivated crops, but the soil is suited to hay and permanent pasture. Droughtiness is the main limitation for hay and pasture. Use of lime and fertilizer and the prevention of overgrazing are the main pasture management practices.

The soil is suitable for trees, and potential productivity is moderately high.

Slope is the main limitation of this soil for nonfarm use, especially for homesites and septic tank absorption fields. The soil is a good source of roadfill.

The capability subclass is VIe.

We—Westbrook peat. This soil is level and very poorly drained. It is in marshes along the necks of the lower Chester River and along Eastern Neck Island. The marshes are periodically inundated by saltwater. The areas are generally long and narrow or irregularly shaped and range from 2 to 100 acres.

Typically, this soil is very dark brown and dark brown, slightly decomposed and moderately decomposed organic material to a depth of 43 inches. From a depth of 43 to a depth of 55 inches it is gray, mottled very fine sandy clay loam. Greenish gray, mottled fine sandy clay loam is at a depth of more than 55 inches.

Included with this soil in mapping are areas of Ipswich mucky peat. Some areas, especially where upland streams enter the marsh, have mineral sediments in the organic material. Also included are small areas of mineral soils along the upland edge of some marshes and small ponds of brackish water. The organic material in the Rock Hall area is underlain by silty clay loam and along Eastern Neck and the Chester River by fine sandy clay loam. Included areas make up about 15 percent of the unit.

The permeability of this Westbrook soil is moderate to rapid in the organic material and moderate in the mineral soil. Available water capacity is high, and runoff is very slow. The water table fluctuates with the tides but usually is at the surface. In some places the soil is overflowed by daily tidal action, and in other places it is flooded only during periods of high runoff or abnormally high tides. The organic part of this soil has very low strength and very low bearing capacity in its natural condition. The soil has moderate salinity and is slightly acid or neutral.

The salinity, low strength, high water table, and high organic matter content make this soil generally unsuitable for most uses other than as wetland wildlife habitat or as a retaining area for storm water.

The capability subclass is VIIIw.

WoA—Woodstown sandy loam, 0 to 2 percent slopes. This soil is nearly level and moderately well drained. It is on uplands, in depressions, and along drainageways. The areas are irregularly shaped and range from 2 to 50 acres.

Typically, the surface layer is brown to dark brown sandy loam 10 inches thick. The subsoil is 28 inches thick. It is yellowish brown loam in the upper part and light yellowish brown, mottled fine sandy loam in the lower part. The substratum is mottled, light yellowish brown loamy sand to a depth of 60 inches.

Included with this soil in mapping are areas of Mattapex silt loam. In some spots, especially those on knolls or other high areas, the mottling is deeper than in this Woodstown soil. Areas of this unit in the eastern part of the county have common small potholes or wet spots of poorly drained soils that lack drainage outlets and have spots of sandy soils on side slopes. Also included are areas of poorly drained soils in small depressions or along drainageways. Included areas make up about 25 percent of the unit.

The permeability of this Woodstown soil is moderate. Available water capacity is moderate. In cultivated areas surface runoff is slow. A seasonal high water table is at a depth of 1.5 to 2.5 feet in winter and early spring. The soil is very strongly acid to extremely acid in unlimed areas.

This soil is used for cultivated crops, woodland, pasture, and hay.

The soil is classified as prime farmland and is well suited to cultivated crops and hay and pasture. Providing adequate drainage and aeration to some areas and increasing fertility are the major management concerns. In most places the soil has adequate natural drainage, but water collects in some depressions, especially in winter and spring, and these depressions require drainage by tile lines or open ditches. Restriction of grazing during wet periods is the main pasture management concern.

This soil is well suited to trees, and potential productivity is high. The use of equipment is limited by wetness in spring.

The seasonal high water table limits this soil for some types of nonfarm use, including homesites and septic tank absorption fields. A frost-action potential is a limitation of the soil as a site for local roads and streets.

The capability subclass is IIw.

WoB—Woodstown sandy loam, 2 to 5 percent slopes. This soil is gently sloping and moderately well drained. It is on uplands, low terraces, and along drainageways. The areas are irregularly shaped and range from 2 to 80 acres.

Typically, the surface layer is brown to dark brown sandy loam 10 inches thick. The subsoil is 28 inches thick. It is yellowish brown loam in the upper part and light yellowish brown, mottled fine sandy loam in the lower part. The substratum is mottled, light yellowish brown loamy sand to a depth of 60 inches.

Included with this soil in mapping are areas of Mattapex silt loam, areas of Sassafras soils, areas of excessively drained to moderately well drained soils with a surface layer of loamy sand, and areas of moderately eroded Woodstown soils. Areas of this unit in the eastern part of the county commonly have small potholes with no drainage outlets. Also included are areas of Fallsington soils in sinkholes that have no drainage outlets and that are shown on the soil maps by a wet spot symbol. Included areas make up about 25 percent of the unit.

The permeability of this Woodstown soil is moderate, and available water capacity is moderate. In cultivated areas surface runoff is slow. A seasonal high water table is at a depth of 1.5 to 2.5 feet in winter and early spring. The soil is strongly acid to extremely acid in unlimed areas.

This soil is mostly cultivated, wooded, or used for pasture. Some areas are used for homesites.

This soil is classified as prime farmland and is well suited to cultivated crops. Providing drainage and aeration to some areas, increasing fertility, and controlling erosion are the main management concerns. This soil generally is adequately drained, but some small, low-lying areas or wet spots require drainage by tile or open ditches. The soil is susceptible to wind erosion in winter. Use of cover crops, crop residue, or stubble mulch will help to protect the soil in winter and add organic matter in spring (fig. 10). Contour tillage and grassed waterways help to control erosion by water. The soil is droughty during long dry periods, especially on the more sloping areas, and it warms slowly in spring.

This soil is suitable for water-tolerant pasture and hay crops. The frost-action potential is high and is a hazard to deep-rooted crops.

The soil is well suited to trees, and potential productivity is high. The use of logging equipment is restricted during wet seasons.

The seasonal high water table limits this soil for some types of nonfarm use, including homesites and septic tank absorption fields. The frost-action potential is a limitation of the soil as a site for local roads and streets.

The capability subclass is IIe.

WsA—Woodstown loam, 0 to 2 percent slopes.

This soil is nearly level and moderately well drained. It is on uplands, along drainageways, and on low terraces. The areas range from 2 to 30 acres.

Typically, the surface layer is dark grayish brown loam 10 inches thick. The subsoil is yellowish brown and is 25 inches thick. It is loam in the upper part and mottled sandy loam in the lower part. The substratum is mottled, light yellowish brown loamy sand to a depth of 60 inches.

Included with this soil in mapping are areas of Mattapex silt loam, areas of Sassafras soils, and a few areas of poorly drained Fallsington and Othello soils. A few areas in small depressions are similar to this

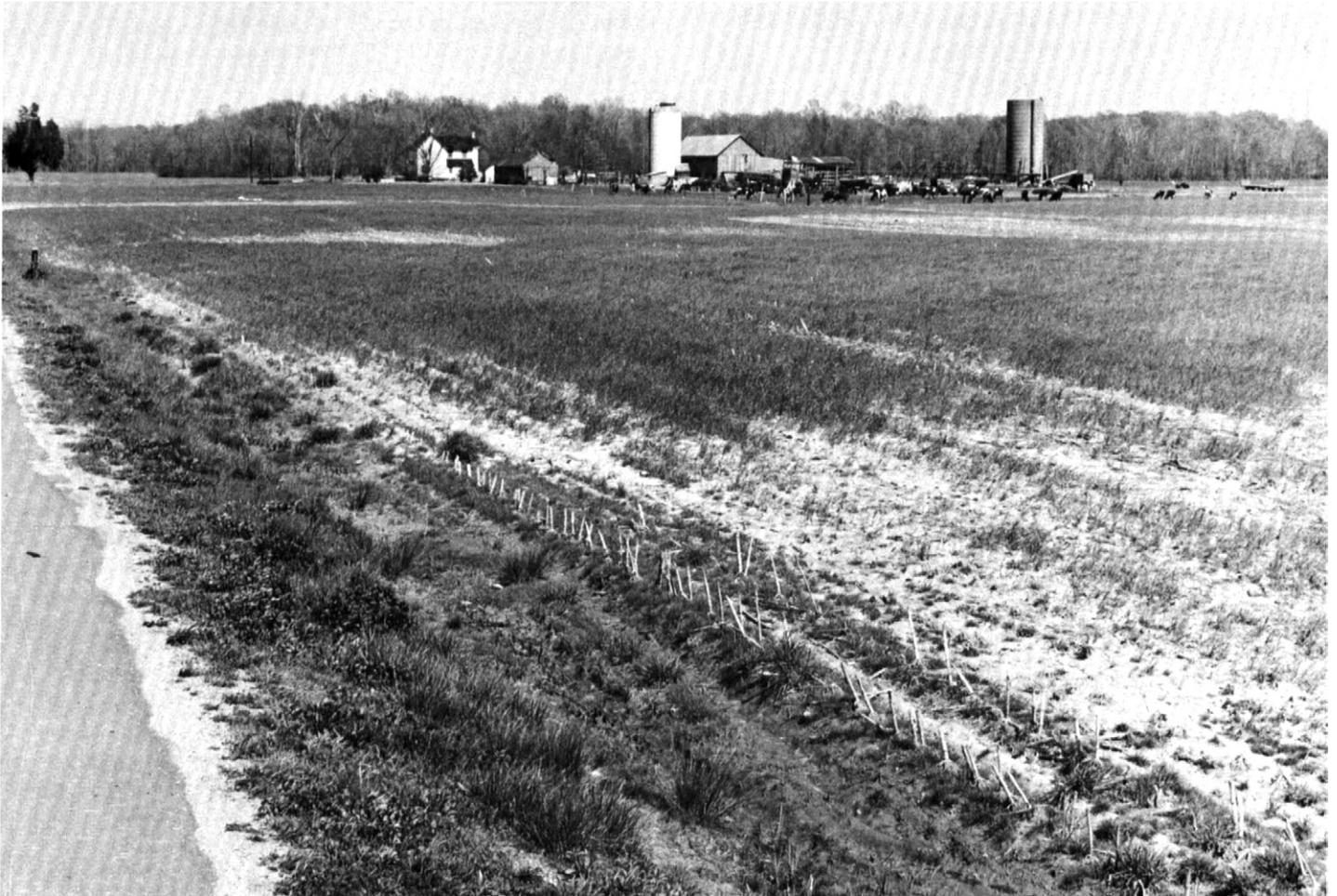


Figure 10.—Stubble mulch on Woodstown sandy loam, 2 to 5 percent slopes. The light-colored areas are spots of poorly drained Fallsington sandy loam.

Woodstown soil but have a thicker, darker surface layer. Included areas make up about 25 percent of the unit.

The permeability of this Woodstown soil is moderate. Available water capacity is moderate. The surface runoff is slow in cultivated areas. A seasonal high water table is at a depth of 1.5 to 2.5 feet in winter and early spring. The soil is very strongly acid to extremely acid in unlimed areas.

This soil is cultivated, wooded, or used for pasture.

The soil is classified as prime farmland and is well suited to cultivated crops. Providing drainage and aeration, increasing fertility, and maintaining tilth are the major management concerns. Drainage is needed because the soil is wet until late in spring and thus cannot be plowed as early as well drained soils and water collects in depressed areas in winter, causing crop damage. Drainage, by ditches or tile, further provides better aeration and a deeper root zone for crops in

spring; a deep rooting zone is necessary because the soil is droughty during long dry periods. Keeping the soil covered with crop residue in winter prevents rains from compacting the surface layer.

The soil is suited to water-tolerant pasture and hay crops. The frost-action potential is high and is a hazard to deep-rooted crops.

This soil is well suited to trees, and potential productivity is high. The use of heavy equipment is limited during wet seasons.

The seasonal high water table limits this soil for some nonfarm uses, including septic tank absorption fields and homesites. The frost-action potential limits the soil as a site for local roads and streets.

The capability subclass is 1lw.

WsB—Woodstown loam, 2 to 5 percent slopes.
This soil is gently sloping and moderately well drained. It

is on rolling uplands, on terraces, and along drainageways and side slopes. The areas range from about 2 to 40 acres and are irregularly shaped.

Typically, the surface layer is dark grayish brown loam 10 inches thick. The subsoil is yellowish brown and is 25 inches thick. It is loam in the upper part and mottled sandy loam in the lower part. The substratum is mottled, light yellowish brown loamy sand to a depth of 60 inches.

Included with this soil in mapping are areas of Mattapex silt loam, areas of Sassafras loam, and areas of Fallsington loam or Othello silt loam in depressions that are indicated on the soil maps by a wet spot symbol. Some areas of this unit in the eastern part of the county have small potholes of poorly drained soils. Included areas make up about 25 percent of the unit.

The permeability of this Woodstown soil is moderate. Available water capacity is moderate. Surface runoff is medium in cultivated areas, and the hazard of erosion is moderate. A seasonal high water table is at a depth of 1.5 to 2.5 feet. The soil is very strongly acid to extremely acid in unlimed areas.

This soil is used for cultivated crops, woodland, and pasture.

The soil is classified as prime farmland and is well suited to cultivated crops. Controlling the moderate erosion hazard, providing drainage and aeration in places, and increasing fertility are the main management concerns. Most areas are adequately drained, but potholes of poorly drained soils require drainage by ditches or tile. A stubble mulch, small grains, or cover crops in winter, grassed waterways, and contour tillage are practices that help to control erosion.

The soil is well suited to water-tolerant pasture and hay crops. A high frost-action potential is a hazard to deep-rooted perennial crops. Overgrazing or grazing when the soil is too wet causes surface compaction, reduced infiltration of rainfall, and excess runoff and poor tilth.

The soil is well suited to trees, and potential productivity is high. The use of heavy equipment is restricted in winter and spring.

The seasonal high water table is the main limitation of the soil for nonfarm use, including use for septic tank absorption fields and homesites. The frost-action potential is a limitation of the soil as a site for local roads and streets.

The capability subclass is IIe.

prime farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. It is of major importance in providing the Nation's short- and long-range needs for food and fiber. The supply of high quality farmland is limited, and the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, must encourage and facilitate the use of our Nation's prime farmland with wisdom and foresight.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to economically produce a sustained high yield of crops

when it is treated and managed using acceptable farming methods. Prime farmland produces the highest yields with minimal inputs of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland may now be in crops, pasture, woodland, or other land, but not urban and built-up land or water areas. It must either be used for producing food or fiber or be available for these uses.

Prime farmland usually has an adequate and dependable supply of water from precipitation or irrigation. It also has favorable temperature and growing season and acceptable acidity or alkalinity. It has few or no rocks or stones and is reasonably permeable to water



Figure 11.—This area of prime farmland consists of Matapeake silt loam, 0 to 2 percent slopes, and Sassafra loam, 2 to 5 percent slopes.

and air. Prime farmland is not excessively erodible or saturated with water for long periods and is not flooded during the growing season. The slope range of prime farmland in Kent County is mainly 0 to 5 percent. For more detailed information on the criteria for prime farmland consult the local staff of the Soil Conservation Service.

Prime farmland covers 102,251 acres, or about 57 percent of Kent County. Most of the acreage of prime farmland is in associations 1, 2, and 6 of the general soil map (fig. 11). Approximately 100,000 acres of this prime farmland is used for crops, mainly corn and soybeans.

Soil map units that make up prime farmland in Kent County are listed in this section. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps in the back of this publication. The soil qualities that affect use and management are described in the section "Detailed soil map units."

The map units that meet the soil requirements for prime farmland are:

- BuA—Butlertown-Mattapex silt loams, 0 to 2 percent slopes
- BuB2—Butlertown-Mattapex silt loams, 2 to 5 percent slopes, moderately eroded

CeB2—Colts Neck loam, 0 to 5 percent slopes, moderately eroded

Ik—Iuka silt loam, rarely flooded

MfB—Matapeake fine sandy loam, 2 to 5 percent slopes

MnA—Matapeake silt loam, 0 to 2 percent slopes

MnB—Matapeake silt loam, 2 to 5 percent slopes

MpA—Mattapex fine sandy loam, 0 to 2 percent slopes

MpB—Mattapex fine sandy loam, 2 to 5 percent slopes

MtA—Mattapex silt loam, 0 to 2 percent slopes

MtB—Mattapex silt loam, 2 to 5 percent slopes

MxA—Mattapex-Matapeake-Butlertown silt loams, 0 to 2 percent slopes

MxB—Mattapex-Matapeake-Butlertown silt loams, 2 to 5 percent slopes

MzA—Mattapex Variant silt loam, 0 to 2 percent slopes

MzB—Mattapex Variant silt loam, 2 to 5 percent slopes

SaA—Sassafras sandy loam, 0 to 2 percent slopes

SaB—Sassafras sandy loam, 2 to 5 percent slopes

SfA—Sassafras loam, 0 to 2 percent slopes

SfB—Sassafras loam, 2 to 5 percent slopes

SgB—Sassafras gravelly loam, 0 to 5 percent slopes

WoA—Woodstown sandy loam, 0 to 2 percent slopes

WoB—Woodstown sandy loam, 2 to 5 percent slopes

WsA—Woodstown loam, 0 to 2 percent slopes

WsB—Woodstown loam, 2 to 5 percent slopes

use and management of the soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

crops and pasture

Ralph A. Timmons, Jr., district conservationist, Soil Conservation Service, and Dr. W. James Milliken, extension agent, Cooperative Extension Service, University of Maryland, helped to prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil

Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed soil map units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Soil amendments. Most of the 125,000 acres of soils used for farming in Kent County are low in natural plant nutrients, and some are very low. All of the soils are naturally acid, and some are extremely acid. For these reasons, additions of lime and fertilizer are needed for crop production.

Generally, applications of lime are needed every 2 to 3 years. Very sandy soils, such as Fort Mott and Galestown soils, need small, frequent applications. Wet, fine textured soils, such as Elkton and Othello soils, require larger quantities. Soils that are regularly cultivated become deficient in nitrogen, phosphorus, and potassium if these elements are not regularly applied. Some soils need additions of minor elements such as sulfur, boron, manganese, and zinc.

Drainage. Approximately 35 percent of the soils in Kent County have a limitation of excess wetness, although the degree of limitation and need for drainage vary. For example, the Butlertown and Iuka soils have a moderate need for drainage, while the Bibb and Elkton soils have an intense need if they are farmed.

Irrigation. The nature of a soil determines how much water can be applied efficiently without waste and the rate at which to apply it.

In general, soils with a low available water capacity need irrigation. The Galestown and Fort Mott soils in Kent County are examples of soils that have a low available water capacity. For specific information about other soils see table 13.

Erosion control. Approximately 55 percent of the soils in Kent County have a hazard of erosion if cultivated.

Loss of the surface layer through erosion is damaging for two reasons. First, plant nutrients and organic matter are lost and water infiltration and soil fertility are reduced as the surface layer is lost and part of the subsoil is

incorporated into the plow layer. Second, soil erosion on farmland results in sediment entering streams, lowering the quality of water available for municipal use, recreation, and fish and wildlife.

Using a cropping system that keeps plant cover on the soil for extended periods, especially during winter, reduces soil erosion, maintains organic matter content of the soil, and helps to preserve the productive capacity of the soil.

Excessive tillage breaks down soil structure, causes loss of organic matter, and increases the hazard of erosion. Soils that are susceptible to erosion but suited to cultivation—soils in capability subclasses IIe, IIIe, and IVe—require contour tillage, stripcropping, no-till farming, or minimum tillage.

Diversions and terraces are used to reduce the length of slope and thus reduce erosion and runoff. Grassed waterways are used on sloping soils to reduce erosion and prevent gully formation. Drop structures are sometimes used with waterways and diversions to provide a safe outlet for runoff.

yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils.

land capability classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined 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. The classes are defined as follows:

Class I soils have slight 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 or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that 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.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

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 very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the

subclasses indicated by *w*, *s*, or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-6.

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of each map unit is given in the section "Detailed soil map units."

woodland management and productivity

Robert C. Webster, project forester, Maryland Forest Service, Maryland Department of Natural Resources, assisted with the preparation of this section.

Of the 43,500 acres of woodland in the county, a total of about 3,000 acres is in the Millington Wildlife Management Area and the Eastern Neck Wildlife Refuge. The rest is privately owned and is distributed evenly over the county. Most of the wooded areas are on farms, and nearly all woodland in the county has been cut several times. Hardwoods make up nearly 90 percent of the growing stock, and softwoods, mainly Virginia pine and loblolly pine, make up the rest. The dominant hardwoods on uplands are white oak, red oak, and tulip poplar. The dominant hardwoods on bottom lands are red maple, black gum, and sweet gum. The principal products from the woodland in the county are lumber, veneer, pulpwood, and fuelwood.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *w*, indicates excessive water in or on the soil; *s*, sandy texture; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: *w*, *s*, and *r*.

In table 7, *slight*, *moderate*, and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the

expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Ratings of *windthrow hazard* are based on soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that a few trees may be blown down by normal winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in 50 years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

recreation

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also

important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the

surface. The suitability of the soil for tees or greens is not considered in rating the soils.

wildlife habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil

properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse, seeds, and cones. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, shore birds, muskrat, mink, and beaver.

engineering

Richard R. Nagel, conservation engineer, Soil Conservation Service, assisted in preparing this section.

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, estimations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed

small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

building site development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of

gravel, crushed rock, or stabilized coarse-grained material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

sanitary facilities

Table 11 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the

effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to effectively filter the effluent. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of

landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

construction materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair, or poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water

table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation ranges of grain sizes are given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

water management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, and grassed waterways.

Pond reservoir areas hold water behind an embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable

compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to a cemented pan or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones,

slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

soil properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 17.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

engineering index properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil series and their morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains particles coarser than sand, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (2) and the system

adopted by the American Association of State Highway and Transportation Officials (7).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as Pt. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 17.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and plasticity index (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

physical and chemical properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available

water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

soil and water features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are

assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes are not considered flooding.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than

that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An artesian water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A perched water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion

than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

engineering index test data

Table 17 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil series and their morphology." The soil samples were tested by the

National Soil Survey Laboratory, Soil Conservation Service, Lincoln, Nebraska.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are: AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); Moisture density, Method A—T 99 (AASHTO), D 698 (ASTM); California bearing ratio—T 193 (AASHTO), D 1883 (ASTM); Shrinkage—T 92 (AASHTO), D 427 (ASTM); Limestone bearing ratio—Florida Highway Standard; Volume change (Abercrombie)—Georgia Highway Standard.

classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*β*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. In table 18, the soils of the survey area are classified according to the system. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Fluvaquents (*Fluv*, meaning river, plus *aquent*, the suborder of the Entisols that have an aquatic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Fluvaquents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class,

mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-loamy, siliceous, acid, thermic Typic Fluvaquents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

soil series and their morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (7). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (8). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed soil map units."

Axis series

The soils of the Axis series are coarse-loamy, mixed, nonacid, thermic Typic Sulfaquents. The soils are deep and very poorly drained and formed in alluvial sediments deposited by streams or tidal action. They are on low, level estuary meanders and at the mouths of small streams. Sulfidic materials from brackish water are in these soils.

Axis soils are similar and adjacent to but downstream from Bibb Variant soils, which contain no sulfidic materials.

Typical pedon of Axis mucky silt loam in a tidal marsh at the mouth of Morgan Creek, 50 yards northeast of the end of Chesmar Road:

- A1g—0 to 20 inches; very dark gray (5Y 3/1) mucky silt loam; massive; slightly sticky; flows easily between fingers when squeezed, leaving a residue of live roots and hemic material; 10 percent organic matter by volume; slightly acid; clear smooth boundary.
- C1g—20 to 40 inches; dark greenish gray (5GY 4/1) mucky silt loam; massive; sticky; flows easily between fingers when squeezed, leaving a residue of hemic material; about 20 percent organic matter by volume; slightly acid; clear smooth boundary.
- C2g—40 to 80 inches; dark greenish gray (5GY 4/1) silt loam; massive; sticky; flows easily between fingers when squeezed; neutral.

The *N* value is more than 0.7 in all mineral layers. Some pedons have a histic epipedon up to 7 inches thick. Thin lenses of hemic organic matter or sand or both are throughout the profile. Reaction ranges from slightly acid to neutral throughout but is extremely acid after air drying.

Salinity is low. Sulfidic materials are in all horizons. The content of sulfidic materials ranges from 0.3 to 1.4 percent in the A horizon and 0.3 to 2.9 percent in the C horizon.

The A horizon has hue of 10YR to 5Y, value of 3, and chroma of 1 or 2. It is mucky silt loam.

The C horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 or less. It is dominantly silt loam but ranges from silt loam to sandy clay loam.

Bibb series

The soils of the Bibb series are coarse-loamy, siliceous, acid, thermic Typic Fluvaquents. The soils are deep and poorly drained and formed in recent alluvial sediments. They are on flood plains. Slopes range from 0 to 2 percent.

Bibb soils are similar and adjacent to very poorly drained Bibb Variant soils but are not affected by tidal water. Bibb soils are adjacent to well drained Sassafra and Colts Neck soils on upland side slopes that are not flooded.

Typical pedon of Bibb silt loam on a wooded flood plain about 200 yards north of Walnut Tree No. 10 School Road and 50 feet west of Cypress Branch:

- A11—0 to 2 inches, dark grayish brown (10YR 4/2) silt loam; moderate fine granular structure; friable; many fine to coarse roots; very strongly acid; abrupt smooth boundary.
- A12g—2 to 9 inches, dark gray (10YR 4/1) silt loam; common medium faint dark yellowish brown (10YR 4/4) mottles along roots; weak fine granular structure; friable; many fine to coarse roots; very strongly acid; clear smooth boundary.
- C1g—9 to 23 inches, gray to light gray (10YR 7/1) silt loam; many coarse prominent dark yellowish brown (10YR 4/4) mottles; massive; friable; few roots; very strongly acid; gradual smooth boundary.

- C2g—23 to 35 inches, light gray (10YR 7/1) silt loam; common medium prominent brownish yellow (10YR 6/6) mottles; massive; friable; few roots; very strongly acid; clear smooth boundary.
- C3g—35 to 60 inches, light gray (10YR 7/1) sandy loam; many very coarse prominent yellowish brown (10YR 5/6) mottles; massive; friable; very strongly acid; clear smooth boundary.
- C4g—60 to 66 inches, gray (10YR 6/1) loamy sand; single grain; loose; very strongly acid.

The Bibb soils are strongly acid or very strongly acid throughout in unlimed areas.

The A horizon has hue of 10YR and chroma of 0 to 2. The value is 2 to 4 in the A11 horizon and 4 or 5 in the A12 horizon. The A horizon is dominantly silt loam.

The C horizon has hue of 10YR or 2.5Y, value of 3 to 7, and chroma of 0 or 1. In places it contains strata with a high content of gravel or organic matter. The horizon ranges from silt loam through sand.

Bibb Variant

The soils of the Bibb Variant are fine-silty, mixed, nonacid, mesic Typic Hydraquents. They are deep and very poorly drained and formed in alluvial sediments deposited by streams and tidal action. The soils are in low, level backwater areas on flood plains. Slopes range from 0 to 1 percent.

Bibb Variant soils are adjacent to but downstream from Bibb soils, which have an *N* value of less than 0.7, and upstream from Axis mucky silt loam, which contains sulfidic materials.

Typical pedon of Bibb Variant silt loam along Lloyds Creek, 1 mile northeast of the intersection of Dutch Lande and Rosedale Cannery Road:

- A1—0 to 6 inches, very dark brown (10YR 2/2) mucky silt loam; massive; soft, sticky; flows easily between fingers when squeezed, leaving a residue of live roots and fibric material; 10 percent organic matter by volume; slightly acid; clear smooth boundary.
- C1g—6 to 12 inches, very dark grayish brown (2.5Y 3/2) mucky silt loam; massive; soft, slightly sticky; flows easily between fingers when squeezed, leaving a small residue of live roots and hemic material; 10 percent live roots by volume, 30 percent organic matter by volume; neutral; abrupt smooth boundary.
- Oe—12 to 28 inches, very dark grayish brown (2.5Y 3/2) hemic material; 20 percent silt loam by volume; neutral; clear smooth boundary.
- C2g—28 to 41 inches, dark olive gray (5Y 3/2) mucky silt loam; massive; sticky; flows easily between fingers when squeezed, leaving a small residue of hemic material; 20 percent organic matter by volume; neutral; abrupt smooth boundary.
- C3g—41 to 55 inches, black (5Y 2/2) silt loam; massive; sticky; flows easily between fingers when squeezed; neutral; clear smooth boundary.

C4g—55 to 79 inches, black (5Y 2/1) silt loam; massive; sticky; flows easily between fingers when squeezed; neutral.

These soils have an *N* value of more than 0.7 in all mineral layers. Layers or thin lenses of hemic organic matter or sand or both are throughout the profile. Reaction is slightly acid or neutral throughout.

The A horizon has hue of 10YR to 5Y, value of 2 to 6, and chroma of 2 or less. It is silt loam or silty clay loam.

The C horizon has hue of 10YR to 5Y, value of 2 to 6, and chroma of 2 or less. It is dominantly silt loam but ranges from sand to silty clay loam.

Butlertown series

The soils of the Butlertown series are fine-silty, mixed, mesic Typic Fragiudults. They are deep and moderately well drained and have a fragipan. They formed in silty, wind-deposited loess over older, loamy or gravelly Coastal Plain deposits. The Butlertown soils are on broad uplands. Slopes range from 0 to 10 percent but are dominantly 0 to 5 percent.

Butlertown soils are similar to Mattapex soils. Butlertown soils are adjacent to Mattapex, Matapeake, and Sassafras soils, none of which has a fragipan. Butlertown soils are not as well drained as Matapeake or Sassafras soils.

Typical pedon of Butlertown silt loam, in an area of Butlertown-Mattapex silt loam, 0 to 2 percent slopes, in a cornfield 0.6 mile southwest of the intersection of Md. Routes 313 and 290 and 200 yards east of Route 290:

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

B21t—10 to 23 inches, brownish yellow (10YR 6/6) heavy silt loam; moderate very coarse prismatic structure parting to moderate medium subangular blocky; friable; darker coatings on prism faces; few discontinuous clay skins; many fine roots; medium acid; abrupt smooth boundary.

B22t—23 to 31 inches, yellowish brown (10YR 5/6) heavy silt loam; common fine distinct light gray (10YR 7/2) and brownish yellow (10YR 6/8) mottles; moderate very coarse prismatic structure parting to moderate medium subangular blocky; friable; few discontinuous strong brown (7.5YR 5/6) clay films; common fine roots; medium acid; clear wavy boundary.

Bx1—31 to 41 inches, yellowish brown (10YR 5/4) silt loam; many medium and coarse distinct light gray (10YR 7/2) mottles; moderate very coarse prismatic structure parting to moderate medium platy; firm, slightly hard; few patchy strong brown (7.5YR 5/6) clay films; few fine roots along ped faces; strongly acid; clear wavy boundary.

Bx2—41 to 65 inches, yellowish brown (10YR 5/4) silt loam; many medium prominent light brownish gray (10YR 6/2) and brownish yellow (10YR 6/6) mottles; moderate very coarse prismatic structure parting to weak medium platy; firm, slightly hard; prism faces 2 to 25 millimeters thick filled with light gray (10YR 7/1) uncoated silt; few roots in vertical cracks; very strongly acid; clear wavy boundary.

IIC—65 to 75 inches, pale brown (10YR 6/3) stratified loam, silt loam, and sandy loam; light gray (10YR 7/1) mottles; massive; friable; strongly acid.

The solum thickness ranges from 42 to 56 inches. The depth to the fragipan ranges from 30 to 38 inches. The solum generally has no coarse fragments. Reaction is medium acid to very strongly acid in unlimed areas, but most areas of this soil are limed and are slightly acid to medium acid.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is dominantly silt loam but is very fine sandy loam in some pedons.

The B horizon has hue of 7.5YR or 10YR but is dominantly 10YR. The value is 5 or 6, and chroma is mainly 6 but ranges from 4 to 8. The horizon is dominantly silt loam or heavy silt loam but is loam in a few pedons.

The C horizon has hue of 5YR through 2.5Y, value of 5 or 6, and chroma of 2 to 6. It is dominantly silt loam or loam but has strata of silty clay loam, clay loam, sandy clay loam, sandy loam, or loamy sand in some pedons.

Colts Neck series

The soils of the Colts Neck series are fine-loamy, mixed, mesic Typic Rhodudults. These soils are deep and well drained. They formed in sandy Coastal Plain sediments containing moderate amounts of glauconite. The Colts Neck soils are on strongly dissected uplands. Slopes range from 2 to 40 percent but are dominantly 5 to 25 percent.

Colts Neck soils are similar and commonly adjacent to Sassafras soils. Colts Neck soils contain glauconite and have a reddish brown to yellowish red B horizon; Sassafras soils do not contain glauconite and commonly have a strong brown B horizon. Colts Neck soils are also adjacent to Matapeake soils, which have a silty solum.

Typical pedon of Colts Neck gravelly loam, 5 to 10 percent slopes, severely eroded, in a field on the northeast side of Md. Route 448, 1/5 mile southeast of Kennedyville:

Ap—0 to 9 inches, brown to dark brown (7.5YR 4/2) gravelly loam; weak medium subangular blocky structure; friable; common roots; 20 percent quartzose pebbles and ironstone fragments 1/2 to 2 inches in diameter; slightly acid; abrupt smooth boundary.

B1—9 to 19 inches, yellowish red (5YR 4/6) gravelly sandy clay loam; weak to moderate medium

subangular blocky structure; friable, firm in place; common roots; 20 percent quartzose pebbles and ironstone fragments 1/2 to 2 inches in diameter; strongly acid; clear smooth boundary.

- B2t—19 to 36 inches, dark reddish brown (2.5YR 3/4) heavy sandy clay loam; moderate medium and coarse subangular blocky structure; friable; few roots; trace of quartzose pebbles in upper part, 10 percent ironstone fragments about 1/2 inch in diameter throughout; 25 percent glauconitic grains; strongly acid; gradual smooth boundary.
- B3—36 to 42 inches, dark reddish brown (2.5YR 3/4) heavy sandy loam; pockets of yellowish brown (10YR 5/4); mainly weak medium subangular blocky structure, some weak medium platy structure; friable; few roots; 15 percent ironstone fragments 1/2 to 2 inches in diameter; 50 percent glauconitic grains; very strongly acid; gradual smooth boundary.
- C1—42 to 47 inches, yellowish red (5YR 4/8) gravelly sandy loam; dark olive gray (5Y 3/2) glauconitic grains in lower part; weak coarse subangular blocky structure grading to massive; friable; few roots; 30 percent ironstone fragments 1/2 to 2 inches in diameter; 50 percent glauconitic grains; very strongly acid; gradual wavy boundary.
- C2—47 to 60 inches, reddish brown (5YR 4/4) gravelly sandy loam; massive to weak coarse ironstone fragments; slightly firm in place, friable when removed; 30 percent ironstone fragments 1/2 to 2 inches in diameter; 30 to 50 percent glauconitic grains; very strongly acid; gradual wavy boundary.

The solum thickness ranges from 30 to 48 inches. The content of coarse fragments ranges from 0 to 30 percent in the solum and C horizon. Glauconite is throughout all profiles that do not have a silty mantle. The glauconite grains are coated and highly weathered in the A and B horizons. Reaction in unlimed areas is strongly acid or very strongly acid in the solum.

The A horizon has hue of 7.5YR, value of 3 or 4, and chroma of 2 to 4. It is dominantly loam or sandy loam or their gravelly counterparts. The loam is where loess has been deposited on the surface.

The B horizon has hue of 2.5YR or 5YR, value of 3 or 4, and chroma of 4 to 6. It is dominantly sandy loam or sandy clay loam or their gravelly counterparts. In some pedons, the texture ranges to loam in the upper part of the B horizon.

The C horizon has hue of 5YR through 10YR, value of 3 to 6, and chroma of 4 to 8. It ranges from loamy sand to sandy clay loam and their gravelly counterparts.

Elkton series

The soils of the Elkton series are clayey, mixed, mesic Typic Ochraquults. The Elkton soils are deep and poorly drained. They formed in old deposits of clayey sediments covered by thin silty deposits. The soils are on broad

uplands and in depressions. Slopes range from 0 to 2 percent.

Elkton soils and Keyport soils are moderately well drained and formed in similar clayey sediments. Elkton soils are commonly adjacent to Keyport, Mattapex Variant, and Othello soils. Elkton soils contain more clay in the solum than Othello soils. Elkton soils in the eastern part of Kent County are in depressions adjacent to the moderately well drained Woodstown soils at higher elevations.

Typical pedon of Elkton silt loam in a cultivated field near Melitota, about 2,000 feet south of Melitota crossroads and 700 feet west of Route 298:

- Ap—0 to 9 inches, grayish brown (2.5Y 5/2) silt loam; weak medium subangular blocky structure; very friable, slightly sticky; common medium roots; neutral; abrupt smooth boundary.
- B21tg—9 to 20 inches, gray to light gray (10YR 6/1) heavy silt loam; many medium and coarse prominent yellowish brown (10YR 5/6) mottles; moderate medium and coarse subangular blocky structure; friable, slightly sticky; common thin discontinuous clay films; common roots; very strongly acid; abrupt smooth boundary.
- B22tg—20 to 28 inches, gray to light gray (10YR 6/1) silty clay loam; many coarse prominent strong brown (7.5YR 5/8) mottles; strong medium and coarse subangular blocky structure; friable, sticky; many dark gray (10YR 4/1) clay skins and flows; common roots; extremely acid; clear wavy boundary.
- B23tg—28 to 45 inches, dark gray (10YR 4/1) silty clay; common medium distinct strong brown (7.5YR 5/8) mottles; strong coarse subangular blocky structure; firm, very sticky and slick; slickensides on some ped faces; very few roots; extremely acid; clear wavy boundary.
- C1g—45 to 69 inches, gray to light gray (10YR 6/1) clay; many medium prominent strong brown (7.5YR 5/8) mottles; massive; firm, very sticky; extremely acid.
- IIcG—69 to 80 inches, mixed light gray (10YR 7/1) and light brownish gray (2.5Y 6/2) sandy loam; massive; loose; slightly sticky; very strongly acid.

The solum thickness ranges from 30 to 50 inches. The solum is generally free of coarse fragments. Reaction is strongly acid to extremely acid unless this soil has been limed.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 0 to 3. It is dominantly silt loam. Reaction is strongly acid to extremely acid throughout in unlimed areas.

The B horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 0 to 2. It is mottled with yellowish brown to strong brown. It ranges from silt loam in the B21t horizon to silty clay or clay.

The C horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 0 to 2. It mainly ranges from silty clay

loam to clay, but the IIC2 horizon ranges from sand to sandy loam.

The Elkton soils in this survey area are a taxadjunct; the silt loam in the upper part of the B horizon is outside the defined range for the series.

Fallsington series

The soils of the Fallsington series are fine-loamy, siliceous, mesic Typic Ochraquults. The Fallsington soils are deep and poorly drained. They formed in sandy Coastal Plain sediments that contain moderate amounts of silt and clay. The Fallsington soils are on upland flats, in depressions, and at the heads of drainageways. Slopes range from 0 to 5 percent but are dominantly 0 to 2 percent.

Fallsington soils are commonly adjacent to and formed in the same material as moderately well drained Woodstown soils and well drained Sassafras soils. Fallsington soils are commonly adjacent to poorly drained Othello and Elkton soils but formed in sediments containing more sand and less silt than the Othello soils and not as much clay as the Elkton soils.

Typical pedon of Fallsington sandy loam, 0 to 2 percent slopes, in an idle field about 1,300 feet north of the Massey-Delaware line road and 800 feet east of Black Bottom Road:

- Ap—0 to 9 inches, dark grayish brown (2.5Y 4/2) sandy loam; common fine distinct strong brown (7.5YR 5/8) mottles along roots; weak medium granular and subangular blocky structure; friable; common roots; slightly acid; abrupt smooth boundary.
- A2—9 to 15 inches, light brownish gray (2.5Y 6/2) sandy loam; many coarse distinct strong brown (7.5YR 5/8) and light gray (10YR 7/1) mottles; weak medium subangular blocky structure; friable; common roots; slightly acid; clear smooth boundary.
- B21tg—15 to 21 inches, gray to light gray (10YR 6/1) heavy sandy loam; many coarse prominent strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; common roots; thin discontinuous clay films; extremely acid; clear wavy boundary.
- B22tg—21 to 28 inches, gray to light gray (10YR 6/1) sandy clay loam; many coarse prominent strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; common roots; thin discontinuous clay films; extremely acid; gradual wavy boundary.
- B23tg—28 to 33 inches, light gray (N 7/0) sandy loam; many coarse prominent strong brown (7.5YR 5/8) and brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; friable; patchy gray (5Y 5/1) clay films; common roots; very strong acid; gradual wavy boundary.
- C1g—33 to 55 inches, gray to light gray (N 6/0) loamy sand; many coarse prominent light olive brown (2.5Y

5/4) and yellowish brown (10YR 5/6) mottles; massive; loose; few roots; very strongly acid; gradual smooth boundary.

IIC2g—55 to 60 inches, gray to light gray (N 6/0) sandy loam; massive; friable; very strongly acid.

The solum thickness ranges from 30 to 40 inches. There are no coarse fragments in the solum, but the coarse-fragment content is as high as 5 percent in the C horizon. Reaction in unlimed areas is strongly acid to extremely acid throughout.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 1 to 3. It is loam, sandy loam, or fine sandy loam. The A1 horizon has value of 3 in wooded areas.

The B horizon has hue of 10YR through 5Y, value of 5 to 7, and chroma of 0 to 2. The B horizon is mottled and mainly ranges from heavy fine sandy loam to sandy clay loam; loam is in some pedons.

The C horizon is neutral or has hue of 10YR through 5Y, value of 5 to 7, and chroma of 0 to 2. It is dominantly sandy loam or loamy sand, but in some pedons the C horizon is stratified and the texture is variable.

Fort Mott series

The soils of the Fort Mott series are loamy, siliceous, mesic Arenic Hapludults. The Fort Mott soils are deep and well drained. They formed in sandy and loamy Coastal Plain sediments that have been at least partly reworked by wind. The soils are on uplands and stream terraces. Slopes range from 0 to 10 percent.

Fort Mott soils are similar to Sassafras soils and commonly are adjacent to Sassafras, Galestown, and Woodstown soils. Fort Mott soils have more clay in the B horizon than the Galestown soils and are better drained than Woodstown soils. The Sassafras and Woodstown soils have a surface layer of sandy loam.

Typical pedon of Fort Mott loamy sand, 0 to 5 percent slopes, in a soybean field 1/2 mile east of Millington and 1,000 feet south of Md. Route 291:

- Ap—0 to 9 inches, dark brown (10YR 4/3) loamy sand; single grain; loose; many roots; strongly acid; abrupt smooth boundary.
- A2—9 to 26 inches, light yellowish brown (10YR 6/4) loamy sand; single grain; loose; many roots; very strongly acid; clear smooth boundary.
- B1—26 to 29 inches, yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; very friable; common roots; very strongly acid; clear wavy boundary.
- B2t—29 to 49 inches, strong brown (7.5YR 5/6) heavy sandy loam; weak medium subangular blocky structure; very friable; slightly sticky; common roots; few thin clay films and bridgings on sand grains; strongly acid; gradual wavy boundary.

C—49 to 65 inches, brownish yellow (10YR 6/6) sand; single grain; loose; few roots; very strongly acid.

The solum ranges from 40 to 60 inches in thickness. It is 0 to 5 percent smooth pebbles. Reaction in unlimed areas is strongly acid to extremely acid throughout the soil.

The A horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 6. The A2 horizon is the only part of the A horizon that has hue of 2.5Y, value of 6, and chroma of 6.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is sandy loam or sandy clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 8. It is loamy sand or sand or their gravelly counterparts.

Galestown series

The soils of the Galestown series consist of sandy, siliceous, mesic Psammentic Hapludults. The Galestown soils are deep and somewhat excessively drained. They formed in sandy Coastal Plain sediments containing small amounts of silt and clay. The soils are on uplands, on sandy knolls, and on terraces along and well above major streams. Slopes range from 0 to 40 percent but are mostly 0 to 5 percent.

Galestown soils are similar to and near Fort Mott soils but do not have as much clay in the B horizon. Galestown soils are commonly near Sassafras and Woodstown soils. Galestown soils do not contain as much silt or clay as either of those soils and are better drained than Woodstown soils.

Typical pedon of a Galestown loamy sand, 0 to 5 percent slopes, in a cornfield about 500 feet south of Md. Route 291 and 0.2 mile east of Morgan Creek:

Ap—0 to 9 inches; dark brown (10YR 4/3) loamy sand; weak medium granular structure; very friable; many roots; strongly acid; abrupt smooth boundary.

B1—9 to 17 inches, strong brown (7.5YR 5/8) loamy sand; weak medium angular blocky structure; friable; common roots; thin clay coats on some sand grains; medium acid; gradual smooth boundary.

B22t—17 to 35 inches, strong brown (7.5YR 5/8) loamy sand; moderate medium angular blocky structure; friable; common roots; sand grains coated with clay; medium acid; diffuse wavy boundary.

C—35 to 60 inches, yellow (10YR 7/6) sand; single grain; loose, noncoherent; few roots; strongly acid.

The solum ranges from 30 to 45 inches in thickness. It is generally free of coarse fragments. Reaction is strongly acid to extremely acid throughout in unlimed areas.

The A horizon has hue of 10YR, value of 4, and chroma of 1 to 3; chroma of 1 is in the A1 horizon only. The A horizon is loamy sand.

The B horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It mainly is loamy sand.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 4 to 6. It is loamy sand or sand. A gravelly IIC horizon is at a depth of more than 40 inches in some places.

Ipswich series

The soils of the Ipswich series consist of Euic, mesic Typic Sulfishemists. The Ipswich soils are deep and very poorly drained. They formed in plant materials over silty or sandy mineral sediments and have sulfidic materials from brackish water inundation. The soils are on low, level estuary meanders and on submerged uplands.

Ipswich soils are adjacent to Westbrook soils, which have organic material less than 50 inches thick over mineral soil.

Typical pedon of Ipswich mucky peat 2 miles east of Morgnac on Md. Route 291, and 0.8 mile south of Route 291:

Oe1—0 to 14 inches, dark brown (10YR 3/3) mucky peat; hemic material; 10 percent silt loam by volume; slightly acid; clear smooth boundary.

Oe2—14 to 47 inches, very dark brown (10YR 2/2) hemic material; 10 percent silt loam by volume; neutral; clear smooth boundary.

Oe3—47 to 55 inches, black (5Y 2/2) hemic material; 30 percent silt loam by volume; neutral; clear smooth boundary.

Oe4—55 to 70 inches, dark brown (7.5YR 3/2) hemic material; 10 percent silt loam by volume; neutral; clear smooth boundary.

Oe5—70 to 79 inches, very dark brown (10YR 2/2) hemic material; 10 percent silt loam by volume; neutral.

These soils have sulfidic materials and thin lenses of mineral sediments throughout the profile. The soil ranges from slightly acid to neutral throughout in its natural condition. It becomes extremely acid if it is oxidized and subjected to wetting and drying. The organic materials are more than 50 inches thick and are dominantly hemic, but in some pedons there is a surface layer of fibric material up to 20 inches thick.

The surface tier has hue of 10YR to 5Y, value of 2 to 4, and chroma of 0 to 3. The organic matter content ranges from 10 to 90 percent.

The subsurface and lower tiers have hue of 7.5YR to 5Y, value of 2 to 5, and chroma of 0 to 3. The organic matter content ranges from 20 to 90 percent.

The underlying mineral sediments range from silt loam to sand and in places are as deep as 10 feet. Typically, they are at a depth of 6 to 10 feet.

luka series

The soils of the luka series consist of coarse-loamy, siliceous, acid, thermic Aquic Udifluvents. The Ipswich soils are deep and moderately well drained. They formed in recent alluvial sediments and are on flood plains and in alluvial valleys. Slopes range from 0 to 2 percent.

luka soils are similar and adjacent to poorly drained Bibb soils but are nearer to the headwaters than the Bibb soils. luka soils are near Mattapex soils but are on alluvial positions and have a less developed profile. luka soils are adjacent to better drained Matapeake and Sassafras soils on side slopes.

Typical pedon of luka silt loam in a cultivated field about 100 feet northwest of Md. Route 213 and 1 mile northeast of Hassengers Corner:

- Ap—0 to 10 inches, dark yellowish brown (10YR 4/4) silt loam; weak medium granular structure; very friable; many coarse to fine roots; slightly acid; abrupt smooth boundary.
- A1—10 to 27 inches, brown (10YR 5/3) silt loam; thin strata of dark yellowish brown (10YR 4/4) silt loam; weak coarse subangular blocky structure parting to massive; friable; common roots; strongly acid; clear smooth boundary.
- C1—27 to 50 inches, pale brown (10YR 6/3) silt loam; common medium faint grayish brown (10YR 5/2) mottles; massive; friable; few roots; strongly acid; clear smooth boundary.
- C2—50 to 60 inches, light brownish gray (10YR 6/2) sandy loam; massive; friable; few roots; very strongly acid.

The luka soils range from slightly acid to extremely acid but are strongly acid or very strongly acid in unlimed areas.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is mainly silt loam but is loam in places.

The C horizon has hue of 10YR, value of 4 to 6, and chroma of 2 to 6. Mottles with chroma of 2 or less are at a depth of less than 30 inches. The C horizon ranges from silt loam to sandy loam.

The luka soils in this survey area are a taxadjunct because they have been influenced by a silty mantle of loess that has caused the upper part of the solum to be more silty than is described in the range for the series. Further, these luka soils do not have low-chroma mottles within 50 centimeters of the surface.

Keyport series

The soils of the Keyport series consist of clayey, mixed, mesic Aquic Hapludults. The Keyport soils are deep and moderately well drained. They formed in a thin, silty mantle underlain by older deposits of silty clay. The soils are on uplands of the Coastal Plain; most large

areas in this county are on Talbot Terrace at an elevation of less than 45 feet. Slopes range from 0 to 15 percent but are dominantly 0 to 5 percent.

Keyport soils are commonly adjacent to Elkton, Mattapex, Butlertown, and Othello soils. Keyport and Elkton soils formed from similar kinds of sediments. Keyport soils have more clay in the B horizon than Mattapex, Butlertown, or Othello soils. Keyport soils are better drained than Elkton or Othello soils.

Typical pedon of Keyport silt loam, 2 to 5 percent slopes, in a cornfield about 300 yards south of Md. Route 291 behind the State Highway Administration building:

- Ap—0 to 9 inches, brown (10YR 5/3) silt loam; weak fine and medium granular structure; very friable, nonsticky; many roots; mildly alkaline; abrupt smooth boundary.
- B1—9 to 18 inches, brownish yellow (10YR 6/6) heavy silt loam; common medium faint yellowish brown (10YR 5/6) mottles; moderate medium and coarse subangular blocky structure; friable, slightly sticky; many roots; neutral; clear smooth boundary.
- B21t—18 to 23 inches, brown (10YR 5/3) silty clay loam; common fine prominent white (10YR 8/1) mottles; moderate coarse prismatic structure parting to strong medium and coarse angular and subangular blocky; firm, sticky, plastic; many thin continuous clay films; many roots along ped faces; extremely acid; gradual wavy boundary.
- B22tg—23 to 34 inches, brown (10YR 5/3) silty clay; common fine prominent strong brown (7.5YR 5/6) mottles; moderate coarse prismatic structure parting to strong medium and coarse blocky; firm, sticky, plastic; common thick dark brown (7.5YR 4/3) clay films; common roots on ped faces; extremely acid; gradual wavy boundary.
- B23tg—34 to 48 inches, gray (10YR 5/1) silty clay loam; common fine and medium prominent white (10YR 8/1) and strong brown (7.5YR 5/6) mottles; moderate very coarse prismatic structure parting to strong coarse blocky; firm, sticky, plastic; continuous thin brown (10YR 5/3) clay films on ped faces; extremely acid; gradual irregular boundary.
- C—48 to 60 inches, gray to light gray (10YR 6/1) silty clay loam; massive; firm, sticky, plastic; silt and very fine sand within cracks; few roots; extremely acid.

The solum ranges from 40 to 50 inches thick. It is generally free of coarse fragments. Reaction is very strongly acid or extremely acid throughout unless lime has been applied.

The A horizon has a hue of 10YR, a value of 4 or 5, and chroma of 3 or 4. It is dominantly silt loam, but some pedons have an A horizon of fine sandy loam or loam.

The B horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 6. Low-chroma mottling is in the B

horizon at a depth of 15 to 30 inches. The Bt horizon is silty clay loam, silty clay, or clay loam. The B1 horizon in some pedons is silt loam or fine sandy loam.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 to 6. It is dominantly silty clay loam to silt loam, but in unconforming C horizons it ranges from sandy loam to silty clay loam. High value and chroma are in the IIC horizon.

Kingsland series

The soils of the Kingsland series are Euic, thermic Typic Medihemists. The Kingsland soils are deep and very poorly drained. They formed in accumulated organic plant materials and are in low, level to nearly level marshes. The soils have no sulfidic materials, because they are located on inland marshes that have been cut off from saltwater inundation by narrow barrier beaches.

Kingsland soils are adjacent to strongly sloping upland soils and sandy beaches. They are similar to Ipswich soils, which have sulfidic material.

Typical pedon of Kingsland mucky peat in Big Marsh, 50 yards west of the construction gravel pit:

- Oe1—0 to 10 inches; black (5YR 2.5/1) mucky peat, hemic material; slightly acid; clear smooth boundary.
 Oe2—10 to 40 inches; dark reddish brown (5YR 3/2) mucky peat, hemic material; slightly acid; clear smooth boundary.
 Oe3—40 to 80 inches; black (10YR 2/1) mucky peat, hemic material; slightly acid.

The thickness of the organic material ranges from 50 inches to more than 80 inches. Thin lenses of mineral sediments are throughout the profile. The organic material mainly consists of hemic material, but some pedons have lenses of sapric material. Unless limed, the soils are strongly acid to slightly acid throughout.

The surface tier has hue of 5YR to 10YR, value of 1 or 2, and chroma of 0 to 2. The organic matter content ranges from about 10 to 80 percent. The organic matter is hemic.

The subsurface and bottom tiers have hue of 5YR to 10YR, value of 1 to 3, and chroma of 0 to 2. The organic matter content ranges from about 10 to 80 percent. The organic matter is hemic. The underlying mineral sediments range from silt loam to sand.

Matapeake series

The soils of the Matapeake series consist of fine-loamy, mixed, mesic Typic Hapludults. The Matapeake soils are deep and well drained. They formed in wind-deposited silts overlying older, coarser textured marine sediments. Matapeake soils are on broad uplands of the Coastal Plain. Slopes range from 0 to 15 percent but are dominantly 0 to 5 percent.

Matapeake soils formed in the same kind of sediments as the Butlertown, Othello, and Mattapex soils.

Matapeake soils are commonly adjacent to those soils and to Sassafras soils. Matapeake soils have a silty solum not typical of the Sassafras soils and do not have the fragipan typical of the Butlertown soils. Matapeake soils are well drained, but Butlertown and Mattapex soils are moderately well drained and Othello soils are poorly drained. Matapeake soils are higher and more sloping than Mattapex soils.

Typical pedon of Matapeake silt loam, 0 to 2 percent slopes, in a soybean field about 1.2 miles north of Massey and 20 yards east of Md. Route 229:

- Ap—0 to 10 inches, brown to dark brown (10YR 4/3) silt loam; weak fine and medium granular structure; very friable, nonsticky; many roots; slightly acid; abrupt smooth boundary.
 A2—10 to 14 inches, yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; common roots; medium acid; clear wavy boundary.
 B21t—14 to 30 inches, yellowish brown (10YR 5/6) heavy silt loam; weak coarse prismatic structure parting to moderate medium subangular blocky; friable, slightly sticky, slightly plastic; common roots; few thin distinct patchy clay films with hue of 7.5YR; neutral; clear smooth boundary.
 B22t—30 to 36 inches, yellowish brown (10YR 5/6) loam; moderate fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few thin patchy clay films; neutral; clear smooth boundary.
 IIC—36 to 70 inches, strong brown (7.5YR 5/6) sandy loam; very pale brown (10YR 7/3) mottles in upper 3 inches; massive; friable, slightly sticky; very strongly acid.

The solum ranges from 24 to 55 inches in thickness and is generally free of pebbles. Unless the soil has been limed, reaction generally is strongly acid or very strongly acid throughout but is extremely acid in some areas below a depth of 40 inches. The depth to the unconforming IIC horizon ranges from 24 inches to more than 42 inches.

The A horizon has hue of 10YR, value of dominantly 4 but in some pedons 5, and chroma of 3 or 4. It is dominantly silt loam, but some pedons have a surface layer of fine sandy loam or loam.

The B horizon has hue of 7.5YR or 10YR, value of mainly 5 but 4 and 6 in places, and chroma of 4 to 8. It is dominantly silt loam or heavy silt loam but includes silty clay loam and loam; the loam is commonly in the lower part of the B horizon. Some pedons have an unconforming IIB horizon of sandy loam or fine sandy loam or their gravelly counterparts.

The C horizon has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. It ranges from silt loam to loamy sand and their gravelly counterparts.

The Matapeake soils in this survey area are a taxadjunct because they have a higher reaction and

higher base saturation than defined in the range for the series.

Mattapex series

The soils of the Mattapex series consist of fine-loamy, mixed, mesic Aquic Hapludults. The Mattapex soils are deep and moderately well drained. They formed in silts overlying older, coarser textured sediments. They are on broad uplands of the Coastal Plain. Slopes range from 0 to 15 percent but are dominantly 0 to 5 percent.

Mattapex soils formed in the same kinds of sediments as and are adjacent to Matapeake, Butlertown, and Othello soils. Mattapex soils are not as well drained as Matapeake soils, do not have the fragipan of Butlertown soils, and are not as poorly drained as Othello soils. Mattapex soils are adjacent to Keyport soils in a few areas but do not have the high clay content in the B horizon typical of the Keyport soils.

Typical pedon of Mattapex silt loam, in an area of Mattapex-Matapeake-Butlertown silt loams, 0 to 2 percent slopes, 0.5 mile northeast of Harmony Corners and 100 yards south of Md. Route 213:

- Ap—0 to 11 inches, dark yellowish brown (10YR 4/4) silt loam; weak fine granular and medium subangular blocky structure; friable; many roots; slightly acid; abrupt smooth boundary.
- B21t—11 to 19 inches, yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable, slightly sticky; few thin patchy brown to dark brown (7.5YR 4/4) clay films; common roots; neutral; clear wavy boundary.
- B22t—19 to 26 inches, yellowish brown (10YR 5/6) heavy silt loam; common medium distinct light brownish gray (10YR 6/2) mottles; weak thick platy and moderate medium subangular blocky structure; friable, slightly sticky; few thin patchy clay films; common roots; neutral; clear smooth boundary.
- B23t—26 to 35 inches, light yellowish brown (2.5Y 6/4) silt loam; many medium distinct yellowish brown (10YR 5/6) and light brownish gray (2.5Y 6/2) mottles; weak thick platy and moderate medium subangular blocky structure; friable, slightly sticky; few thin very patchy clay films; few roots; very strongly acid; abrupt wavy boundary.
- IIC—35 to 60 inches, strong brown (7.5YR 5/8) sandy loam; massive; loose; few roots; very strongly acid.

The solum ranges from 24 to 48 inches in thickness and is generally free of coarse fragments. Reaction in unlimed areas is strongly acid or very strongly acid in the upper part of the solum and strongly acid to extremely acid in the lower part of the solum and in the substratum.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 3 or 4. It is dominantly silt loam, but loam and fine sandy loam are in some pedons.

The B horizon has hue of 2.5Y to 7.5YR, value of 5 or 6, and chroma of 2 to 8. It is dominantly heavy silt loam but ranges to silty clay loam. It is mottled in the lower part.

The C horizon has hue of 2.5Y to 7.5YR, value of 5 or 6, and chroma of 2 to 8. The C horizon has few to common, faint to prominent mottles. It ranges from loamy to loamy sand. In some pedons it is up to 20 percent pebbles.

The Mattapex soils in this survey area are a taxadjunct because they have higher reaction and higher base saturation than defined in the range for the series, and the hue of 7.5YR in the B and C horizons and 5Y in the C horizon is also outside the range for the series.

Mattapex Variant

The soils of the Mattapex Variant consist of fine-loamy, mixed, mesic Aquic Hapludults. The Mattapex Variant soils are deep and moderately well drained. They formed in silty loess deposited by wind on an older, clayey soil. They are on broad terraces on uplands. Slopes range from 0 to 5 percent.

Mattapex Variant soils are similar to and associated with Keyport soils but have thicker layers of silt and dark colored clay. Mattapex Variant soils formed in the same loess as Mattapex soils but are underlain by a buried clayey soil.

Typical pedon of a Mattapex Variant silt loam, 0 to 2 percent slopes, in a cultivated field about 2,400 feet southwest of the intersection of Fish Hatchery Road and Handys Point Road:

- Ap—0 to 11 inches, brown to dark brown (10YR 4/3) silt loam; weak medium granular and subangular blocky structure; friable, slightly sticky; few thin patchy clay films; common roots; strongly acid; abrupt wavy boundary.
- B21t—11 to 27 inches, yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable, slightly sticky; common thin patchy clay films; common roots; strongly acid; abrupt wavy boundary.
- B22t—27 to 42 inches, yellowish brown (10YR 5/6) heavy silt loam; common medium distinct light gray (10YR 7/1) and brownish yellow (10YR 6/8) mottles; weak thick platy and moderate medium subangular blocky structure; friable, slightly sticky; common thick discontinuous clay skins; few roots; strongly acid; clear smooth boundary.
- IIA1b—42 to 52 inches, very dark gray (10YR 3/1) silty clay; few fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm, sticky; common slickensides; few roots; very strongly acid; clear smooth boundary.
- IIB2tb—52 to 65 inches, grayish brown (2.5Y 5/2) clay loam; few fine distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky

structure; firm, sticky; common thick discontinuous clay skins and common slickensides; very strongly acid.

IIIC—65 to 70 inches, light brownish gray (2.5Y 6/2) gravelly sandy loam; few fine distinct strong brown (7.5YR 5/6) mottles; massive; friable; very strongly acid.

The solum thickness ranges from 29 to 45 inches. The depth to the buried clayey soil ranges from 30 to 55 inches but is generally 40 inches or more. The solum generally is free of coarse fragments, but a few oyster shells have been mixed into the Ap horizon in places. Reaction ranges from strongly acid to extremely acid where the soil has not been limed.

The A horizon has hue of 10YR to 2.5Y, value of 4 or 5, and chroma of 3 or 4. It is silt loam.

The B horizon has hue of 2.5Y to 7.5YR, value of 5 or 6, and chroma of 4 to 6. It is dominantly heavy silt loam but ranges from silt loam to silty clay loam. It is mottled in the lower part.

The IIAb horizon has hue of 2.5Y to 7.5YR, value of 3 or 4, and chroma of 1 or 2. It is silty clay loam, silty clay, or clay.

The IIBb horizon has hue of 2.5Y or 10YR, value of 4 to 6, and chroma of 1 to 4. It is clay loam, silty clay loam, silty clay, or clay.

The IIIC horizon has variable color and texture but generally is sandy loam, loamy sand, or their gravelly analogs. It is mainly stratified.

Othello series

The soils of the Othello series consist of fine-silty, mixed, mesic Typic Ochraquults. The Othello soils are deep and poorly drained. They formed in silty loess material underlain by coarser textured sediments. The soils are on level or depressional uplands and at the heads of drainageways. Slopes range from 0 to 2 percent.

Othello soils formed in the same kinds of sediments as and commonly are adjacent to Matapeake and Mattapex soils. Othello soils also are near Fallsington and Elkton soils. Othello soils are poorly drained, Matapeake soils are well drained, and Mattapex soils are moderately well drained. Othello soils do not contain as much clay in the B horizon as Elkton soils and are not as sandy in the solum as Fallsington soils.

Typical pedon of Othello silt loam, about 900 feet north of Reese's Corner Road and 2,000 feet west of Reese's Corner, in a cornfield:

Ap—0 to 8 inches, dark grayish brown (2.5Y 4/2) silt loam; weak medium granular structure; very friable, slightly sticky; many roots; neutral; abrupt smooth boundary.

B21tg—8 to 21 inches, light brownish gray (2.5Y 6/2) silt loam variegated with light gray (5Y 7/1); many

medium and large prominent yellowish brown (10YR 5/6) mottles; moderate medium angular and subangular blocky structure; firm, slightly sticky, plastic; common roots; common thick patchy dark gray (2.5Y 4/0) clay films; strongly acid; clear wavy boundary.

B22tg—21 to 32 inches, light gray (5Y 7/1) silt loam; many medium and large prominent yellowish brown (10YR 5/6) mottles; moderate coarse angular blocky structure; firm, slightly sticky, slightly plastic; common roots; common thick patchy clay films; very strongly acid; gradual wavy boundary.

B3g—32 to 40 inches; light gray (5Y 7/1) silt loam; few fine prominent yellowish brown (10YR 5/6) mottles; weak medium angular and subangular blocky structure; hard, firm, nonsticky; few roots; very strongly acid; clear wavy boundary.

IIC1g—40 to 51 inches, dark gray (5Y 4/1) loam; few fine faint light gray (5Y 7/1) mottles; massive; friable; slightly sticky; few roots; very strongly acid; abrupt wavy boundary.

IIC2g—51 to 71 inches, light gray (10YR 7/1) very fine sandy loam; few medium prominent yellowish brown (10YR 5/6) mottles; massive; friable; few roots; very strongly acid.

IIC3g—71 to 78 inches, very dark grayish brown (10YR 3/2) loamy fine sand; loose; single grain; friable, nonsticky; very strongly acid.

The solum ranges from 24 to 40 inches in thickness and is generally free of pebbles. Reaction in unlimed areas is strongly acid to extremely acid throughout. The depth to the unconforming IIC horizon ranges from 24 inches to more than 50 inches.

The A horizon has hue of 10YR to 5Y, value of 3 to 6, and chroma of 0 to 2. It is dominantly silt loam but in a few pedons is fine sandy loam.

The B horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 0 to 2. It mainly is silt loam or silty clay loam. Fine sandy loam is in the unconforming B horizon of some pedons.

The C horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 0 to 2. It ranges from sandy clay loam to loamy sand.

Sassafras series

The soils of the Sassafras series consist of fine-loamy, siliceous, mesic Typic Hapludults. The Sassafras soils are deep and well drained. They formed in sandy Coastal Plain sediments containing moderate amounts of silt and clay and, in places, gravel. Sassafras soils are on level uplands, side slopes, and ridges and knolls. Slopes range from 0 to 25 percent but are dominantly 2 to 15 percent.

Sassafras soils formed in the same kinds of sediments as and are adjacent to Woodstown and Fallsington soils. Sassafras soils are better drained than moderately well

drained Woodstown soils and poorly drained Fallsington soils. Sassafras soils are adjacent to Matapeake and Colts Neck soils. Sassafras soils dominantly have a strong brown B horizon; Colts Neck soils have a reddish brown to yellowish red B horizon that contains glauconite. Sassafras soils do not have the silty mantle typical of Matapeake soils.

Typical pedon of Sassafras sandy loam, 2 to 5 percent slopes, in a soybean field 1.25 miles east of Md. Route 313 on Walnut Tree No. 10 School Road and 1,320 feet south of No. 10 Road:

- Ap—0 to 9 inches, brown to dark brown (10YR 4/3) sandy loam; weak fine and medium granular structure; very friable; many roots; strongly acid; abrupt smooth boundary.
- B21t—9 to 20 inches, yellowish brown (10YR 5/6) sandy loam; weak very coarse prismatic structure parting to moderate medium subangular blocky; friable, slightly sticky; common roots; few thin patchy clay films and coatings on sand grains; medium acid; gradual wavy boundary.
- B22t—20 to 38 inches, strong brown (7.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky; few roots; common thick patchy clay films; strongly acid; clear wavy boundary.
- C—38 to 60 inches, brownish yellow (10YR 6/8) sand; single grain; loose; 10 percent smooth pebbles; few roots; strongly acid.

The solum thickness ranges from 25 to 45 inches. In some pedons smooth pebbles make up as much as 20 percent of the solum and 30 percent of the C horizon. Reaction is strongly acid to extremely acid in unlimed areas.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4. It is loam, sandy loam, or their gravelly phases.

The B horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is loam, sandy loam, or sandy clay loam or their gravelly phases.

The C horizon has hue of 10YR or 7.5YR, value of 4 to 8, and chroma of 4 to 8. It is sandy loam, loamy sand, sand, or their gravelly phases.

Westbrook series

The soils of the Westbrook series are Euic, mesic Typic Sulphihemists. The Westbrook soils are deep and very poorly drained. They formed in accumulated plant materials over older mineral soils which were uplands but have been submerged by rising sea levels. Sulfidic materials from tidal inundation of brackish water are in this soil. Westbrook soils are in level, low marshes.

Westbrook soils are similar to Ipswich soils, in which the organic material is more than 50 inches thick. Westbrook soils are adjacent to gently sloping soils and shallow open water.

Typical pedon of Westbrook peat on the Chesapeake Bay side of Eastern Neck Island, 1 mile south of the Wildlife Refuge Office:

- Oi1—0 to 12 inches, very dark brown (10YR 2/2) peat; fibric material; less than 10 percent fine sandy loam, by volume; slightly acid; clear smooth boundary.
- Oe1—12 to 43 inches, dark brown (7.5YR 3/2) mucky peat; hemic material; less than 20 percent fine sandy loam, by volume; neutral; abrupt smooth boundary.
- IIB21g—43 to 55 inches, gray (5Y 6/1) very fine sandy clay loam; few medium distinct olive yellow (5Y 6/6) mottles; massive; firm in place, does not flow through fingers when squeezed; *N* value of less than 0.7; neutral; clear smooth boundary.
- IIB22g—55 to 79 inches, greenish gray (5BG 6/1) fine sandy clay loam; common medium distinct brownish yellow (10YR 6/8) mottles; massive; firm, does not flow through fingers when squeezed; *N* value of less than 0.7; neutral.

These soils generally have sulfidic material only in the organic material. The organic material contains thin lenses of mineral sediments in a few places. The thickness of the organic material ranges from 16 to 50 inches. The soils are slightly acid or neutral in their natural condition but become extremely acid if oxidized and exposed to wetting and drying.

The surface tier has hue of 7.5YR through 2.5Y, value of 2 to 4, and chroma of 0 to 2. The organic material is dominantly hemic, but the surface layer of most pedons is fibric material. The organic matter content is more than 50 percent.

The subsurface or lower tiers have hue of 7.5YR to 5Y, value of 2 to 5, and chroma of 0 to 3. Organic matter content ranges from 20 to 70 percent.

The IIB horizon has hue of 10YR to 5BG, value of 2 to 6, and chroma of 0 to 2. It ranges from silt loam to sand. The organic matter content ranges from 2 to 20 percent. The horizon is gleyed and has an *N* value of less than 0.7.

Woodstown series

The soils of the Woodstown series consist of fine-loamy, siliceous, mesic Aquic Hapludults. The Woodstown soils are deep and moderately well drained. They formed in sandy Coastal Plain sediments that contain moderate amounts of silt and clay. The soils are in areas with no silty mantle. Slopes range from 0 to 5 percent.

Woodstown soils formed in the same kind of sediments as poorly drained Fallsington soils and well drained Sassafras soils and are adjacent to those soils. Woodstown soils are near Mattapex soils, which have a silty mantle.

Typical pedon of Woodstown sandy loam, 2 to 5 percent slopes, in a field about 100 yards southwest of

Walnut Tree Road and 0.4 mile northwest of its intersection with No. 10 School Road:

- Ap—0 to 10 inches, brown to dark brown (10YR 5/6) loam; weak medium granular structure; very friable, many roots; slightly acid; abrupt smooth boundary.
- B21t—10 to 24 inches, yellowish brown (10YR 4/3) sandy loam; moderate medium subangular blocky structure; friable; slightly sticky; many fine roots; common thin patchy clay films; very strongly acid; clear wavy boundary.
- B22tg—24 to 38 inches, light yellowish brown (10YR 6/4) fine sandy loam; common coarse distinct strong brown (7.5YR 5/6) and light gray (10YR 7/2) mottles; moderate thick platy and moderate medium subangular blocky structure; firm, slightly sticky; few vesicular pores; few roots; common thin patchy clay films; very strongly acid; clear wavy boundary.
- Cg—38 to 60 inches, light yellowish brown (10YR 6/4) loamy sand; common medium distinct yellowish

brown (10YR 5/6) and light gray (10YR 7/2) mottles; massive; firm; 10 percent rounded pebbles; very strongly acid.

The solum ranges from 24 to 40 inches in thickness and is generally free of pebbles, but in some pedons it is up to 20 percent rounded quartz. The C horizon is up to 20 percent pebbles in many pedons. Reaction of the soil is very strongly acid to extremely acid in unlimed areas.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. It is loam, fine sandy loam, or sandy loam.

The B horizon has hue of 10YR to 2.5Y, value of 5 or 6, and chroma of 4 to 6. It is loam, fine sandy loam, sandy loam, or sandy clay loam. The B horizon has low-chroma mottles in the lower part.

The C horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 2 to 8. It mainly is sandy loam or loamy sand. Many pedons have finer textured strata within the C horizon that commonly are mottled silt loam.

formation of the soils

This section describes the five factors of soil formation as they relate to the soils in Kent County, gives the differences and similarities among the soils, and explains the process of soil formation.

factors of soil formation

Soils are formed by the interaction of five factors: (1) parent material, (2) relief, (3) time, (4) plant and animal life, and (5) climate.

parent material

The kind of material from which a soil is formed is significant in determining major differences in the soils. Parent material influences the mineral and chemical composition of soils, and to some extent it influences the rate at which soil is formed.

All soils in Kent County have formed in unconsolidated sediments deposited by water or wind. The particle size of these sediments ranges from clay, silt, and sand to gravel and boulders. The sediments were deposited as a Coastal Plain and as an alluvial delta. On top of these sediments lies wind-deposited loess that is thickest near the Chesapeake Bay in the western part of the County (3) but nonexistent in the southeastern part of the county. Most of the soils in Kent County, including the Butlertown, Matapeake, Mattapex, and Othello soils, have formed in thick deposits of this loess. Since the parent material of those soils is essentially the same, the differences between them can be attributed to horizon differentiation.

Where the loess is thin, absent, or eroded away, other sedimentary deposits are exposed on the surface, and it is from those sediments that the soil has formed. The Colts Neck soils, for example, formed in sediments which contain glauconite. As the iron in the glauconite oxidizes, it imparts the characteristic red color to the Colts Neck soils. Sassafras soils have formed in sediment that contains a mixture of sand, silt, and clay and, in places, gravel. Fort Mott soils have formed in sandy sediments that have been moved by wind and deposited over the sediments from which Sassafras soils formed.

time

The length of time that parent material has been in place and exposed to weathering, climate, and plant and animal life influences the nature of the resulting soil.

Since the soils in Kent County are all formed from sediments, they have in fact been "preweathered" to a certain extent before being transported to Kent County. Many soluble minerals were removed from these sediments long before they were deposited in Kent County. Nevertheless, the soils reflect the length of time they have been exposed to horizon differentiation.

The oldest sediments in Kent County were deposited from 75 million to 175 million years ago during the Cretaceous period. Other old sediments were deposited during the Tertiary period. The soils formed in these deposits, however, are not that old because the county was covered by a series of Pleistocene deposits during a period from about 2 million years ago to 10,000 years ago. Thus, most of the soils in Kent County have been subjected to soil formation processes only for about 10,000 years. The exception to this is in areas where erosion has removed the loess and paleosol or ancient soils have been exposed to weathering for perhaps 1 million years or more.

The youngest soils in Kent County are in fresh deposits on flood plains and in tidal marshes. Organic materials are still accumulating on some marshes. The organic material in Big Marsh, for example, under a Kingsland mucky peat, was dated at about 1,000 to 1,500 years old at a 12-foot depth (4); the organic material near the surface is even younger.

relief

The relief, or topographic position, of a soil controls surface drainage, affects the percolation of water through a soil, and influences erosion. The Matapeake and Othello soils, for example, have formed in the same kind of loess. The Othello soils, however, are in depressions in which the water table is near the surface, and the soils are poorly drained. The Matapeake soils, which are well drained, are on uplands and sloping areas where the water table is not so near to the surface.

Relief also influences the type of parent material in which a soil is formed. For instance, the Bibb soils are on flood plains which are still receiving fresh sediments. On steep areas and stream dissections, water has eroded the youngest, uppermost sediments, leaving older sediments exposed on the surface.

plant and animal life

Living organisms, including vegetation, bacteria, fungi, animals, and man, have influenced soil formation.

Vegetation supplies organic matter which decomposes and gives a dark color to the soil. Man has mixed this organic matter into the plow layer throughout most of Kent County. Plants alternately remove and redeposit nutrients. Bacteria and fungi decompose organic materials and, when they in turn die, release these minerals for plant use or to be leached out of the soil. Many of the processes of bacteria and fungi release materials, such as organic acids that affect the soil-forming processes. Larger animals burrow in the soil, mix it, and generally make the soil more open and porous.

Man also affects soil formation and structure through cultivation. Some soils have become compacted by heavy equipment. The organic matter content of some soils has been reduced by continuous cropping. Tillage exposes the organic materials to oxidation and rapid decomposition and causes accelerated erosion in some areas. Man has also influenced the soils of the county by adding fertilizers, lime, and pesticides, by removing plant life, and by using drainage and irrigation. The influence of man dates back to the time when Indians mounded oyster shells in some spots. These areas now have a dark-colored A horizon that has a high calcium content.

climate

Climate influences the rate of weathering, the amount and depth of leaching, the kind and amount of vegetation, and the decomposition rate and activity of organic soil constituents. The climate of Kent County is humid and temperate. Detailed climate data are given in the section "General nature of the survey area."

Soils in Kent County are not only affected by present-day climate; for example, the great depth of leaching and soil formation in the Colts Neck soils and the highly weathered materials under the Matapeake and Butlertown soils indicate that the climate of the county was warmer and wetter prior to the time that loess was deposited over most of the county.

Most of the soils have been leached of most of their natural soluble salts and basic ions. As a result of this leaching, the soils in Kent County mainly are naturally strongly acid to extremely acid. Some tidal marsh soils, such as Westbrook, Axis, and Ipswich soils, differ in that they receive additions of salts when they are inundated by brackish water.

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glossary

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.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

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 40-inch profile or to a limiting layer is expressed as—

	<i>Inches</i>
Very low.....	0 to 2.4
Low.....	2.4 to 3.2
Moderate.....	3.2 to 5.2
High.....	More than 5.2

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Brackish water. Water in which the content of salt is greater than in fresh water but less than in sea water; commonly in the tidal reaches of a river where seawater and freshwater mix.

Cemented iron pan. Also referred to as "ironstone layer." A discontinuous, indurated soil horizon in which iron is the principal cementing agent. It interrupts downward movement of water and causes seepage zones on slopes and is easily broken by heavy equipment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural

class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15.2 to 38.1 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

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.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

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.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or arresting grazing for a prescribed period.

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 rapidly. 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 they are wet 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.

Drainage, surface. Runoff, or surface flow of water, from an area.

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

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tillage, and other growth factors are favorable.

Fine textured soil. Sandy clay, silty clay, and clay.

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.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter 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.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Glaucanite. A mineral that consists of a dull green, earthy iron potassium silicate; abundant in greensand.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Greensand. A sedimentary deposit that consists largely of dark greenish grains of glauconite commonly mingled with clay or sand.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:
O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.
A horizon.—The mineral horizon 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.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have 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 in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2.....	very low
0.2 to 0.4.....	low
0.4 to 0.75.....	moderately low
0.75 to 1.25.....	moderate
1.25 to 1.75.....	moderately high
1.75 to 2.5.....	high
More than 2.5.....	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—
Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.
Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.
Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.
Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-

growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

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).

Muck. Dark colored, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of the three simple 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.

Nvalue. The relation between the percentage of water under field conditions and the percentages of inorganic clay and of humus. The *N* value is helpful in predicting whether the soil may be grazed by livestock or will support loads and the degree of subsidence that would occur after drainage. Field determination of *N* value is made by squeezing the soil in the hand. If the soil flows with difficulty between the fingers, the *N* value is low. If the soil flows easily between the fingers, the *N* value is high. Soils that have been permanently saturated, such as in tidal marshes, are likely to have a high *N* value.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated 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 inch to 2.0 inches
Moderately rapid.....	2.0 to 6.0 inches
Rapid.....	6.0 to 20 inches
Very rapid.....	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or 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.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure 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—

	<i>pH</i>
Extremely acid.....	Below 4.5
Very strongly acid.....	4.5 to 5.0
Strongly acid.....	5.1 to 5.5
Medium acid.....	5.6 to 6.0
Slightly acid.....	6.1 to 6.5
Neutral.....	6.6 to 7.3
Mildly alkaline.....	7.4 to 7.8
Moderately alkaline.....	7.9 to 8.4
Strongly alkaline.....	8.5 to 9.0
Very strongly alkaline.....	9.1 and higher

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water 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 soils that is 85 percent or more sand and not more than 10 percent clay.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

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.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to insure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil separates. Mineral particles less than 2 mm in equivalent diameter and ranging between specified

size limits. The names and sizes of separates recognized in the United States are as follows:

	<i>Millimeters</i>
Very coarse sand.....	2.0 to 1.0
Coarse sand.....	1.0 to 0.5
Medium sand.....	0.5 to 0.25
Fine sand.....	0.25 to 0.10
Very fine sand.....	0.10 to 0.05
Silt.....	0.05 to 0.002
Clay.....	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in 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 plant and animal activities are largely confined to the solum.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or 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).

Submerged uplands. Marshes that have developed over areas which were uplands. The soils show evidence of pedogenic processes that are normally associated with above-water environments. They are essentially thin, organic soils over older soils which had developed from wind-blown silts or sands and were later submerged by the slowly rising sea level.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A₂ horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. 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."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and

are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

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 water soaks into the soil or flows slowly to a prepared outlet. 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.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy loam*, *loam*, *silt loam*, *silt*, *sandy clay loam*, *clay loam*, *silty clay loam*, *sandy clay*, *silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

tables

TABLE 1.--TEMPERATURE AND PRECIPITATION
 [Recorded in the period 1951-77 at Chestertown, Maryland]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have--		Average number of growing degree days ¹	Average	2 years in 10 will have--		Average number of days with 0.10 inch or more	Average snowfall
				Maximum temperature higher than--	Minimum temperature lower than--			Less than--	More than--		
<u>°F</u>	<u>°F</u>	<u>°F</u>	<u>°F</u>	<u>°F</u>	<u>Units</u>	<u>In</u>	<u>In</u>	<u>In</u>	<u>In</u>	<u>In</u>	
January----	41.4	25.0	33.3	67	3	49	2.98	1.71	4.01	7	5.3
February---	44.6	27.1	35.9	69	7	43	3.00	1.78	4.08	7	5.5
March-----	52.8	34.0	43.4	79	18	159	3.94	2.56	5.18	7	3.6
April-----	64.9	43.3	54.1	88	29	423	3.28	2.01	4.42	8	.0
May-----	74.5	52.8	63.7	93	37	735	3.60	2.05	4.85	8	.0
June-----	83.0	62.1	72.6	96	48	978	4.31	2.30	5.94	7	.0
July-----	87.2	66.9	77.0	98	54	1,147	3.94	1.84	5.64	6	.0
August-----	85.7	65.5	75.7	97	51	1,107	4.61	2.02	6.70	7	.0
September--	79.5	59.1	69.3	95	40	879	3.58	1.78	5.04	5	.0
October----	68.7	47.5	58.1	87	29	561	3.18	1.71	4.43	5	.0
November---	56.4	37.5	47.0	78	20	222	3.52	1.50	5.16	6	1.1
December---	45.0	28.7	36.9	67	11	83	4.01	2.10	5.57	7	3.7
Yearly:											
Average--	65.3	45.8	55.6	---	---	---	---	---	---	---	---
Extreme--	---	---	---	100	3	---	---	---	---	---	---
Total----	---	---	---	---	---	6,386	43.95	37.69	49.96	80	19.2

¹A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL
 [Recorded in the period 1951-77 at Chestertown, Maryland]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 26	April 8	April 18
2 years in 10 later than--	March 21	April 3	April 14
5 years in 10 later than--	March 11	March 25	April 7
First freezing temperature in fall:			
1 year in 10 earlier than--	November 14	October 25	October 19
2 years in 10 earlier than--	November 19	October 30	October 24
5 years in 10 earlier than--	November 29	November 11	November 1

TABLE 3.--GROWING SEASON
 [Recorded in the period 1951-77 at Chestertown, Maryland]

Probability	Length of growing season if daily minimum temperature is--		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	240	209	190
8 years in 10	247	216	196
5 years in 10	262	230	208
2 years in 10	277	245	220
1 year in 10	285	252	226

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
Ax	Axis mucky silt loam-----	373	0.2
Be	Beaches-----	208	0.1
Bs	Bibb silt loam-----	6,330	3.2
Bt	Bibb Variant silt loam-----	1,416	0.7
BuA	Butlertown-Mattapex silt loams, 0 to 2 percent slopes-----	4,085	2.1
BuB2	Butlertown-Mattapex silt loams, 2 to 5 percent slopes, moderately eroded-----	4,433	2.2
BuC2	Butlertown-Mattapex silt loams, 5 to 10 percent slopes, moderately eroded-----	3,058	1.6
CeB2	Colts Neck loam, 0 to 5 percent slopes, moderately eroded-----	318	0.2
CeC2	Colts Neck loam, 5 to 10 percent slopes, moderately eroded-----	318	0.2
CgC2	Colts Neck gravelly loam, 2 to 10 percent slopes, moderately eroded-----	645	0.3
CgC3	Colts Neck gravelly loam, 5 to 10 percent slopes, severely eroded-----	764	0.4
CgD2	Colts Neck gravelly loam, 10 to 15 percent slopes, moderately eroded-----	426	0.2
CgD3	Colts Neck gravelly loam, 10 to 15 percent slopes, severely eroded-----	1,250	0.6
CnE	Colts Neck and Sassafras soils, 15 to 40 percent slopes-----	5,663	2.9
Em	Elkton silt loam-----	5,924	3.0
Fa	Fallsington sandy loam-----	3,233	1.6
Fh	Fallsington loam-----	1,466	0.7
FmB	Fort Mott loamy sand, 0 to 5 percent slopes-----	875	0.4
FmC2	Fort Mott loamy sand, 5 to 10 percent slopes, moderately eroded-----	378	0.2
GaB	Galestown loamy sand, 0 to 5 percent slopes-----	1,494	0.8
GaD	Galestown loamy sand, 5 to 15 percent slopes-----	460	0.2
GaE	Galestown loamy sand, 15 to 40 percent slopes-----	372	0.2
Ih	Ipswich mucky peat-----	440	0.2
Ik	Iuka silt loam, rarely flooded-----	1,191	0.6
KmA	Keyport fine sandy loam, 0 to 2 percent slopes-----	348	0.2
KmB2	Keyport fine sandy loam, 2 to 5 percent slopes, moderately eroded-----	802	0.4
KpA	Keyport silt loam, 0 to 2 percent slopes-----	1,696	0.9
KpB2	Keyport silt loam, 2 to 5 percent slopes, moderately eroded-----	1,730	0.9
KpC2	Keyport silt loam, 5 to 15 percent slopes, moderately eroded-----	725	0.4
Ks	Kingsland mucky peat-----	422	0.2
MfB	Matapeake fine sandy loam, 2 to 5 percent slopes-----	490	0.2
MnA	Matapeake silt loam, 0 to 2 percent slopes-----	11,134	5.6
MnB	Matapeake silt loam, 2 to 5 percent slopes-----	15,356	7.8
MnC2	Matapeake silt loam, 5 to 10 percent slopes, moderately eroded-----	2,709	1.4
MnC3	Matapeake silt loam, 5 to 10 percent slopes, severely eroded-----	1,081	0.5
MnD2	Matapeake silt loam, 10 to 15 percent slopes, moderately eroded-----	420	0.2
MpA	Mattapex fine sandy loam, 0 to 2 percent slopes-----	3,337	1.7
MpB	Mattapex fine sandy loam, 2 to 5 percent slopes-----	2,389	1.2
MtA	Mattapex silt loam, 0 to 2 percent slopes-----	11,402	5.8
MtB	Mattapex silt loam, 2 to 5 percent slopes-----	7,006	3.6
MtC2	Mattapex silt loam, 5 to 10 percent slopes, moderately eroded-----	2,292	1.2
MwD	Mattapex and Woodstown soils, 10 to 15 percent slopes-----	865	0.4
MxA	Mattapex-Matapeake-Butlertown silt loams, 0 to 2 percent slopes-----	5,316	2.7
MxB	Mattapex-Matapeake-Butlertown silt loams, 2 to 5 percent slopes-----	11,723	5.9
MzA	Mattapex Variant silt loam, 0 to 2 percent slopes-----	3,544	1.8
MzB	Mattapex Variant silt loam, 2 to 5 percent slopes-----	1,186	0.6
Oh	Othello silt loam-----	9,645	4.9
Pt	Pits, gravel and sand-----	210	0.1
SaA	Sassafras sandy loam, 0 to 2 percent slopes-----	936	0.5
SaB	Sassafras sandy loam, 2 to 5 percent slopes-----	6,525	3.3
SaC2	Sassafras sandy loam, 5 to 10 percent slopes, moderately eroded-----	2,578	1.3
SaD2	Sassafras sandy loam, 10 to 15 percent slopes, moderately eroded-----	384	0.2
SaD3	Sassafras sandy loam, 10 to 15 percent slopes, severely eroded-----	513	0.3
SfA	Sassafras loam, 0 to 2 percent slopes-----	1,713	0.9
SfB	Sassafras loam, 2 to 5 percent slopes-----	6,246	3.2
SfC2	Sassafras loam, 5 to 10 percent slopes, moderately eroded-----	1,637	0.8
SfC3	Sassafras loam, 5 to 10 percent slopes, severely eroded-----	1,165	0.6
SfD3	Sassafras loam, 10 to 15 percent slopes, severely eroded-----	440	0.2
SgB	Sassafras gravelly loam, 0 to 5 percent slopes-----	897	0.5
SgC2	Sassafras gravelly loam, 5 to 10 percent slopes, moderately eroded-----	1,956	1.0
SgC3	Sassafras gravelly loam, 5 to 10 percent slopes, severely eroded-----	1,832	0.9
SgD3	Sassafras gravelly loam, 10 to 15 percent slopes, severely eroded-----	3,377	1.7
We	Westbrook peat-----	1,751	0.9
WoA	Woodstown sandy loam, 0 to 2 percent slopes-----	1,421	0.7
WoB	Woodstown sandy loam, 2 to 5 percent slopes-----	4,336	2.2
WsA	Woodstown loam, 0 to 2 percent slopes-----	464	0.2
WsB	Woodstown loam, 2 to 5 percent slopes-----	721	0.4
	Water-----	17,280	8.8
	Total-----	197,120	100.0

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Corn	Corn silage	Soybeans	Wheat	Alfalfa hay	Grass- legume hay	Pasture
	Bu	Ton	Bu	Bu	Ton	Ton	AUM*
Ax----- Axis	---	---	---	---	---	---	---
Be**. Beaches							
Bs----- Bibb	---	---	---	---	---	---	6.5
Bt----- Bibb Variant	---	---	---	---	---	---	---
BuA----- Butlertown-Mattapex	135	27	45	45	4.5	3.5	9.0
BuB2----- Butlertown-Mattapex	135	27	45	45	4.5	3.5	9.0
BuC2----- Butlertown-Mattapex	125	25	40	40	4.5	3.5	8.0
CeB2----- Colts Neck	130	20	35	45	5.0	3.5	8.0
CeC2, CgC2----- Colts Neck	90	18	30	40	4.5	3.0	8.0
CgC3, CgD2----- Colts Neck	80	16	---	35	4.5	3.0	8.0
CgD3----- Colts Neck	---	---	---	---	---	---	7.5
CnE----- Colts Neck and Sassafras	---	---	---	---	---	---	---
Em----- Elkton	105	21	40	---	---	3.5	6.5
Fa, Fh----- Fallsington	120	24	35	---	---	3.0	6.0
FmB----- Fort Mott	80	16	20	---	3.0	2.5	7.0
FmC2----- Fort Mott	80	16	20	---	3.0	2.5	6.5
GaB----- Galestown	60	12	---	25	---	2.5	4.5
GaD----- Galestown	---	---	---	---	---	---	---
GaE----- Galestown	---	---	---	---	---	---	---
Ih----- Ipswich	---	---	---	---	---	---	---
Ik----- Iuka	130	26	45	45	4.5	3.5	8.5

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Soybeans	Wheat	Alfalfa hay	Grass- legume hay	Pasture
	Bu	Ton	Bu	Bu	Ton	Ton	AUM*
KmA, KmB2, KpA, KpB2----- Keyport	110	22	40	40	---	3.0	6.5
KpC2----- Keyport	90	18	30	35	---	3.0	6.5
Ks----- Kingsland	---	---	---	---	---	---	---
MfB----- Matapeake	140	28	45	50	5.5	3.5	10.5
MnA----- Matapeake	140	28	45	50	5.5	3.5	10.5
MnB----- Matapeake	140	28	45	50	5.5	3.5	10.5
MnC2----- Matapeake	130	26	40	45	5.0	3.5	9.5
MnC3----- Matapeake	110	22	---	40	4.5	3.0	8.5
MnD2----- Matapeake	110	22	---	40	4.5	3.0	8.5
MpA----- Mattapex	135	27	40	45	4.5	3.5	8.0
MpB----- Mattapex	135	27	40	45	4.5	3.5	8.0
MtA----- Mattapex	135	27	40	45	4.5	3.5	8.0
MtB----- Mattapex	135	27	40	45	4.5	3.5	8.0
MtC2----- Mattapex	130	26	40	40	4.0	3.5	7.5
MwD----- Mattapex and Woodstown	110	22	---	35	3.5	3.0	7.0
MxA----- Mattapex-Matapeake- Butlertown	135	27	45	45	4.5	3.5	9.0
MxB----- Mattapex-Matapeake- Butlertown	135	27	45	45	5.0	3.5	9.5
MzA----- Mattapex Variant	135	27	40	45	4.5	3.5	8.0
MzB----- Mattapex Variant	135	27	40	45	4.5	3.5	8.0
Oh----- Othello	110	22	40	---	---	3.0	6.5
Pt**. Pits							
SaA----- Sassafras	130	26	45	50	5.5	3.5	10
SaB----- Sassafras	130	26	45	50	5.5	3.5	10

See footnotes at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Soybeans	Wheat	Alfalfa hay	Grass- legume hay	Pasture
	<u>Bu</u>	<u>Ton</u>	<u>Bu</u>	<u>Bu</u>	<u>Ton</u>	<u>Ton</u>	<u>AUM*</u>
SaC2----- Sassafras	120	24	40	45	5.0	3.5	9.5
SaD2----- Sassafras	100	20	---	40	4.5	3.0	8.5
SaD3----- Sassafras	---	---	---	---	---	---	7.5
SfA----- Sassafras	130	26	45	50	5.5	3.5	10
SfB----- Sassafras	130	26	45	50	5.5	3.5	10
SfC2----- Sassafras	120	24	40	45	5.0	3.5	9.5
SfC3----- Sassafras	100	20	---	40	4.5	3.0	8.5
SfD3----- Sassafras	---	---	---	---	---	---	7.5
SgB----- Sassafras	130	26	45	50	5.5	3.5	10
SgC2----- Sassafras	120	24	40	45	5.5	3.5	9.5
SgC3----- Sassafras	100	20	---	40	4.5	3.0	8.5
SgD3----- Sassafras	---	---	---	---	---	---	7.5
We----- Westbrook	---	---	---	---	---	---	---
WoA, WoB, WsA, WsB----- Woodstown	130	26	40	40	4.5	3.5	8.0

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES
 [Miscellaneous areas are excluded. Absence of an
 entry indicates no acreage]

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		<u>Acres</u>	<u>Acres</u>	<u>Acres</u>
I	13,783	---	---	---
II	94,573	61,769	32,804	---
III	39,451	18,308	20,268	875
IV	8,809	6,937	---	1,872
V	6,330	---	6,330	---
VI	5,580	5,580	---	---
VII	7,911	5,663	1,416	832
VIII	3,194	---	2,986	208

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Common trees	Site index	
Bs-----	2w	Slight	Severe	Severe	Slight	Sweetgum-----	90	Sweetgum, loblolly pine.
BuA*, BuB2*, BuC2*: Butlertown-----	2w	Slight	Moderate	Slight	Slight	Northern red oak---- White oak----- Yellow-poplar----- Sweetgum-----	80 80 90 90	Yellow-poplar, loblolly pine.
Mattapex-----	3w	Slight	Moderate	Slight	Slight	White oak----- Northern red oak---- Sweetgum----- Virginia pine-----	70 70 80 70	Loblolly pine, eastern white pine, yellow-poplar, sweetgum.
CeB2, CeC2----- Colts Neck	3o	Slight	Slight	Slight	Slight	White oak----- Yellow-poplar----- Virginia pine-----	70 70 80	Yellow-poplar, eastern white pine, loblolly pine.
CgC2, CgC3, CgD2, CgD3----- Colts Neck	3o	Slight	Slight	Slight	Slight	White oak----- Yellow-poplar----- Virginia pine-----	70 70 80	Yellow-poplar, eastern white pine, loblolly pine.
CnE*: Colts Neck-----	3r	Moderate	Moderate	Slight	Slight	White oak----- Yellow-poplar----- Virginia pine-----	70 70 80	Yellow-poplar, eastern white pine, loblolly pine.
Sassafras-----	3r	Moderate	Moderate	Slight	Slight	White oak----- Yellow-poplar----- Virginia pine-----	70 80 70	Loblolly pine, eastern white pine, yellow-poplar.
Em----- Elkton	3w	Slight	Severe	Slight	Slight	White oak----- Sweetgum----- Willow oak-----	80 80 ---	Loblolly pine, sweetgum.
Fa, Fh----- Fallsington	2w	Slight	Severe	Severe	Slight	Loblolly pine----- Sweetgum----- White oak----- Willow oak-----	85 80 --- ---	Loblolly pine, eastern white pine, sweetgum.
FmB, FmC2----- Fort Mott	3o	Slight	Moderate	Slight	Slight	Shortleaf pine----- Virginia pine----- Black oak----- White oak-----	70 70 70 70	Virginia pine, loblolly pine, shortleaf pine.
GaB, GaD----- Galestown	3s	Slight	Moderate	Moderate	Slight	Black oak----- Virginia pine----- Shortleaf pine-----	70 70 70	Loblolly pine, shortleaf pine, Virginia pine.
GaE----- Galestown	3s	Slight	Severe	Moderate	Slight	Black oak----- Virginia pine----- Shortleaf pine-----	70 70 70	Loblolly pine, shortleaf pine, Virginia pine.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Common trees	Site index	
Ik----- Iuka	1w	Slight	Moderate	Slight	Slight	White oak----- Sweetgum-----	70 100	Loblolly pine, yellow- poplar, sweetgum.
KmA, KmB2, KpA, KpB2, KpC2----- Keyport	2w	Slight	Moderate	Slight	Slight	Yellow-poplar----- Northern red oak----- American beech-----	--- 70 ---	Yellow-poplar, northern red oak, loblolly pine, sweetgum.
Ks----- Kingsland	4w	Slight	Severe	Severe	Severe	Water tupelo----- Baldcypress----- Pond pine-----	--- --- 60	Baldcypress.
MfB, MnA, MnB, MnC2, MnC3, MnD2-- Matapeake	3o	Slight	Slight	Slight	Slight	White oak----- Virginia pine----- Yellow-poplar-----	75 75 90	Loblolly pine, yellow- poplar, eastern white pine, sweetgum.
MpA, MpB, MtA, MtB, MtC2----- Mattapex	3w	Slight	Moderate	Slight	Slight	White oak----- Northern red oak----- Sweetgum----- Virginia pine-----	70 70 80 70	Loblolly pine, eastern white pine, yellow- poplar, sweetgum.
MwD*: Mattapex-----	3w	Moderate	Moderate	Slight	Slight	White oak----- Northern red oak----- Sweetgum----- Virginia pine-----	70 70 80 70	Loblolly pine, eastern white pine, yellow- poplar, sweetgum.
Woodstown-----	2w	Moderate	Moderate	Slight	Slight	White oak----- Yellow-poplar----- Sweetgum----- Northern red oak-----	80 90 90 80	Loblolly pine, yellow- poplar, eastern white pine, sweetgum.
MxA*, MxB*: Mattapex-----	3w	Slight	Moderate	Slight	Slight	White oak----- Northern red oak----- Sweetgum----- Virginia pine-----	70 70 80 70	Loblolly pine, eastern white pine, yellow- poplar, sweetgum.
Matapeake-----	3o	Slight	Slight	Slight	Slight	White oak----- Virginia pine----- Yellow-poplar-----	75 75 90	Loblolly pine, yellow- poplar, eastern white pine, sweetgum.
Butlertown-----	2w	Slight	Moderate	Slight	Slight	Northern red oak----- White oak----- Yellow-poplar----- Sweetgum-----	80 80 90 90	Yellow-poplar, loblolly pine.
MzA, MzB----- Mattapex Variant	3w	Slight	Moderate	Slight	Slight	White oak----- Northern red oak----- Sweetgum----- Virginia pine-----	70 70 80 70	Eastern white pine, yellow-poplar, sweetgum.
Oh----- Othello	3w	Slight	Severe	Slight	Slight	White oak----- Sweetgum-----	80 80	Loblolly pine, sweetgum.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Common trees	Site index	
SaA, SaB, SaC2, SaD2, SaD3, SfA, SfB, SfC2, SfC3, Sfd3, SgB, SgC2, SgC3, SgD3----- Sassafras	3o	Slight	Slight	Slight	Slight	White oak----- Yellow-poplar----- Virginia pine-----	70 80 70	Loblolly pine, eastern white pine, yellow-poplar.
WoA, WoB, WsA, WsB- Woodstown	2w	Slight	Moderate	Slight	Slight	White oak----- Yellow-poplar----- Sweetgum----- Northern red oak----	80 90 90 80	Loblolly pine, yellow-poplar, eastern white pine, sweetgum.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ax----- Axis	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Be*. Beaches					
Bs----- Bibb	Severe: floods, wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Bt----- Bibb Variant	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
BuA*: Butlertown-----	Moderate: percs slowly.	Slight-----	Moderate: percs slowly.	Slight-----	Slight.
Mattapex-----	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, percs slowly.	Slight-----	Slight.
BuB2*: Butlertown-----	Moderate: percs slowly.	Slight-----	Moderate: slope, percs slowly.	Slight-----	Slight.
Mattapex-----	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: slope, wetness, percs slowly.	Slight-----	Slight.
BuC2*: Butlertown-----	Moderate: percs slowly.	Slight-----	Severe: slope.	Slight-----	Slight.
Mattapex-----	Moderate: wetness, percs slowly.	Moderate: wetness.	Severe: slope.	Slight-----	Slight.
CeB2----- Colts Neck	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
CeC2----- Colts Neck	Slight-----	Slight-----	Severe: slope.	Slight-----	Slight.
CgC2, CgC3----- Colts Neck	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Slight-----	Moderate: small stones.
CgD2, CgD3----- Colts Neck	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight-----	Moderate: slope, small stones.
CnE*: Colts Neck-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Sassafras-----	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Em----- Elkton	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
Fa, Fh----- Fallsington	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
FmB----- Fort Mott	Slight-----	Slight-----	Moderate: slope.	Slight-----	Moderate: droughty.
FmC2----- Fort Mott	Slight-----	Slight-----	Severe: slope.	Slight-----	Moderate: droughty.
GaB----- Galestown	Slight-----	Slight-----	Moderate: slope.	Slight-----	Moderate: droughty.
GaD----- Galestown	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight-----	Moderate: droughty.
GaE----- Galestown	Severe: slope.	Severe: slope.	Severe: slope, too sandy.	Moderate: slope.	Severe: slope.
Ih----- Ipswich	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, excess salt, floods.
Ik----- Iuka	Severe: floods.	Moderate: wetness.	Moderate: wetness.	Slight-----	Slight.
KmA----- Keyport	Moderate: percs slowly.	Moderate: wetness.	Moderate: percs slowly.	Slight-----	Slight.
KmB2----- Keyport	Moderate: percs slowly.	Moderate: wetness.	Moderate: percs slowly, slope.	Slight-----	Slight.
KpA----- Keyport	Moderate: percs slowly.	Moderate: wetness.	Moderate: percs slowly.	Slight-----	Slight.
KpB2----- Keyport	Moderate: percs slowly.	Moderate: wetness.	Moderate: percs slowly, slope.	Slight-----	Slight.
KpC2----- Keyport	Moderate: percs slowly.	Moderate: wetness.	Severe: slope.	Slight-----	Slight.
Ks----- Kingsland	Severe: excess humus, floods, wetness.	Severe: excess humus, floods, wetness.	Severe: excess humus, floods, wetness.	Severe: excess humus, floods, wetness.	Severe: excess humus, wetness, floods.
MfB----- Matapeake	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
MnA----- Matapeake	Slight-----	Slight-----	Slight-----	Slight-----	Slight.
MnB----- Matapeake	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
MnC2, MnC3----- Matapeake	Slight-----	Slight-----	Severe: slope.	Slight-----	Slight.
MnD2----- Matapeake	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight-----	Moderate: slope.
MpA----- Mattapex	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, percs slowly.	Slight-----	Slight.
MpB----- Mattapex	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: slope, wetness, percs slowly.	Slight-----	Slight.
MtA----- Mattapex	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, percs slowly.	Slight-----	Slight.
MtB----- Mattapex	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: slope, wetness, percs slowly.	Slight-----	Slight.
MtC2----- Mattapex	Moderate: wetness, percs slowly.	Moderate: wetness.	Severe: slope.	Slight-----	Slight.
MwD*: Mattapex-----	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness.	Severe: slope.	Slight-----	Moderate: slope.
Woodstown-----	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Slight-----	Moderate: slope.
MxA*: Mattapex-----	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, percs slowly.	Slight-----	Slight.
Matapeake-----	Slight-----	Slight-----	Slight-----	Slight-----	Slight.
Butlertown-----	Moderate: percs slowly.	Slight-----	Moderate: percs slowly.	Slight-----	Slight.
MxB*: Mattapex-----	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: slope, wetness, percs slowly.	Slight-----	Slight.
Matapeake-----	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
Butlertown-----	Moderate: percs slowly.	Slight-----	Moderate: slope, percs slowly.	Slight-----	Slight.
MzA----- Mattapex Variant	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight-----	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
MzB----- Mattapex Variant	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight----- wetness.	Slight. wetness.
Oh----- Othello	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
Pt*. Pits					
SaA----- Sassafras	Slight-----	Slight-----	Slight-----	Slight-----	Slight.
SaB----- Sassafras	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
SaC2----- Sassafras	Slight-----	Slight-----	Severe: slope.	Slight-----	Slight.
SaD2, SaD3----- Sassafras	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight-----	Moderate: slope.
SfA----- Sassafras	Slight-----	Slight-----	Slight-----	Slight-----	Slight.
SfB----- Sassafras	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
SfC2, SfC3----- Sassafras	Slight-----	Slight-----	Severe: slope.	Slight-----	Slight.
SfD3----- Sassafras	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight-----	Moderate: slope.
SgB----- Sassafras	Moderate: small stones.	Moderate: small stones.	Moderate: slope, small stones.	Slight-----	Moderate: small stones.
SgC2, SgC3----- Sassafras	Moderate: small stones.	Moderate: small stones.	Severe: slope, stones.	Slight-----	Moderate: small stones.
SgD3----- Sassafras	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight-----	Moderate: slope, small stones.
We----- Westbrook	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess salt.
WoA----- Woodstown	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight-----	Slight.
WoB----- Woodstown	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Slight-----	Slight.
WsA----- Woodstown	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight-----	Slight.
WsB----- Woodstown	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Slight-----	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Ax----- Axis	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Be*. Beaches										
Bs----- Bibb	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Bt----- Bibb Variant	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
BuA*: Butlertown-----	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Mattapex-----	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
BuB2*, BuC2*: Butlertown-----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Mattapex-----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CeB2----- Colts Neck	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CeC2, CgC2, CgC3, CgD2, CgD3----- Colts Neck	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CnE*: Colts Neck-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Sassafras-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Em----- Elkton	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
Fa, Fh----- Fallsington	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
FmB, FmC2----- Fort Mott	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Very poor.
GaB----- Galestown	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
GaD----- Galestown	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
GaE----- Galestown	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
Ih----- Ipswich	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Ik----- Iuka	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
KmA, KmB2, KpA, KpB2, KpC2----- Keyport	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Ks----- Kingsland	Very poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
MfB----- Matapeake	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MnA----- Matapeake	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MnB, MnC2----- Matapeake	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MnC3----- Matapeake	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
MnD2----- Matapeake	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MpA----- Mattapex	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
MpB----- Mattapex	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MtA----- Mattapex	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
MtB, MtC2----- Mattapex	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MWD*: Mattapex-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
Woodstown-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
MxA*: Mattapex-----	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Matapeake-----	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Butlertown-----	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
MxB*: Mattapex-----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Matapeake-----	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Butlertown-----	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MzA----- Mattapex Variant	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
MzB----- Mattapex Variant	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Oh----- Othello	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Pt#. Pits										
SaA, SaB----- Sassafras	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SaC2, SaD2, SaD3--- Sassafras	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
SfA, SfB----- Sassafras	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SfC2, SfC3, SfD3--- Sassafras	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
SgB----- Sassafras	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SgC2, SgC3, SgD3--- Sassafras	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
We----- Westbrook	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
WoA----- Woodstown	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
WoB----- Woodstown	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
WsA----- Woodstown	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
WsB----- Woodstown	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ax----- Axis	Severe: wetness, floods.	Severe: wetness, depth to rock, large stones.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Be* Beaches						
Bs----- Bibb	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: wetness, floods, frost action.	Severe: wetness, floods.
Bt----- Bibb Variant	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness, frost action.	Severe: floods, wetness.
BuA*, BuB2*: Butlertown-----	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: frost action, low strength.	Slight.
Mattapex-----	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength, frost action.	Slight.
BuC2*: Butlertown-----	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Severe: frost action, low strength.	Slight.
Mattapex-----	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Severe: low strength, frost action.	Slight.
CeB2----- Colts Neck	Moderate: cemented pan.	Slight-----	Moderate: cemented pan.	Slight-----	Moderate: frost action.	Slight.
CeC2----- Colts Neck	Moderate: cemented pan.	Slight-----	Moderate: cemented pan.	Moderate: slope.	Moderate: frost action.	Slight.
CgC2, CgC3----- Colts Neck	Moderate: cemented pan.	Slight-----	Moderate: cemented pan.	Moderate: slope.	Moderate: frost action.	Moderate: small stones.
CgD2, CgD3----- Colts Neck	Moderate: slope, cemented pan.	Moderate: slope.	Moderate: slope, cemented pan.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, small stones.
CnE*: Colts Neck-----	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Sassafras-----	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Em----- Elkton	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action, low strength.	Severe: wetness.
Fa, Fh----- Fallsington	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
FmB----- Fort Mott	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Moderate: frost action.	Moderate: droughty.
FmC2----- Fort Mott	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Moderate: frost action.	Moderate: droughty.
GaB----- Galestown	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: droughty.
GaD----- Galestown	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
GaE----- Galestown	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
Ih----- Ipswich	Severe: wetness, floods, excess humus.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: floods, wetness, low strength.	Severe: wetness, low strength, floods.	Severe: wetness, excess salt, floods.
Ik----- Iuka	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: frost action.	Moderate: wetness.
KmA, KmB2, KpA, KpB2, KpC2----- Keyport	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: frost action, low strength.	Slight.
Ks----- Kingsland	Severe: excess humus, floods, wetness.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: floods, wetness, low strength.	Severe: floods, wetness, excess humus.
MfB, MnA, MnB----- Matapeake	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: low strength, frost action.	Slight.
MnC2, MnC3----- Matapeake	Slight-----	Slight-----	Slight-----	Moderate: slope.	Moderate: low strength, frost action.	Slight.
MnD2----- Matapeake	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength, frost action.	Moderate: slope.
MpA, MpB, MtA, MtB----- Mattapex	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength, frost action.	Slight.
MtC2----- Mattapex	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Severe: low strength, frost action.	Slight.
MWD*: Mattapex-----	Severe: wetness.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
Woodstown-----	Severe: wetness, cutbanks cave.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Severe: frost action.	Moderate: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
MxA*, MxB*: Mattapex-----	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength, frost action.	Slight.
Matapeake-----	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: low strength, frost action.	Slight.
Butlertown-----	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: frost action, low strength.	Slight.
MzA, MzB----- Mattapex Variant	Severe: wetness.	Moderate: wetness.	Severe: wetness, shrink-swell.	Moderate: wetness.	Severe: low strength, frost action.	Slight.
Oh----- Othello	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action, low strength.	Severe: wetness.
Pt*. Pits						
SaA, SaB----- Sassafras	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Moderate: frost action.	Slight.
SaC2----- Sassafras	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Moderate: frost action.	Slight.
SaD2, SaD3----- Sassafras	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
SfA, SfB----- Sassafras	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Moderate: frost action.	Slight.
SfC2, SfC3----- Sassafras	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Moderate: frost action.	Slight.
SfD3----- Sassafras	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
SgB----- Sassafras	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Moderate: frost action.	Moderate: small stones.
SgC2, SgC3----- Sassafras	Severe: cutbanks cave.	Slight-----	Slight-----	Moderate: slope.	Moderate: frost action.	Moderate: small stones.
SgD3----- Sassafras	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, small stones.
We----- Westbrook	Severe: wetness, floods, excess humus.	Severe: wetness, floods, low strength.	Severe: wetness, floods.	Severe: floods, low strength.	Severe: wetness, low strength, floods.	Severe: wetness, floods, excess salt.
WoA, WoB, WsA, WsB----- Woodstown	Severe: wetness, cutbanks cave.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: frost action.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ax----- Axis	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness.
Be*. Beaches					
Bs----- Bibb	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
Bt----- Bibb Variant	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
BuA*: Butlertown-----	Severe: percs slowly, wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: wetness.
Mattapex-----	Severe: percs slowly, wetness.	Moderate: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness.	Fair: wetness.
BuB2*: Butlertown-----	Severe: percs slowly, wetness.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness.	Fair: wetness.
Mattapex-----	Severe: percs slowly, wetness.	Moderate: slope, wetness, seepage.	Severe: wetness, seepage.	Severe: wetness.	Fair: wetness.
BuC2*: Butlertown-----	Severe: percs slowly, wetness.	Severe: slope.	Moderate: wetness.	Moderate: wetness.	Fair: wetness.
Mattapex-----	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness, seepage.	Severe: wetness.	Fair: wetness.
CeB2----- Colts Neck	Slight-----	Moderate: slope, seepage.	Severe: seepage.	Slight-----	Good.
CeC2----- Colts Neck	Slight-----	Severe: slope.	Severe: seepage.	Slight-----	Good.
CgC2, CgC3----- Colts Neck	Slight-----	Severe: slope.	Severe: seepage.	Slight-----	Fair: small stones.
CgD2, CgD3----- Colts Neck	Moderate: slope.	Severe: slope.	Severe: seepage.	Moderate: slope.	Fair: slope, small stones.
CnE*: Colts Neck-----	Severe: slope.	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CnE*: Sassafras-----	Severe: slope.	Severe: slope.	Severe: slope, seepage.	Severe: slope.	Poor: slope.
Em----- Elkton	Severe: percs slowly, wetness.	Slight-----	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey.
Fa, Fh----- Fallsington	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness.
FmB----- Fort Mott	Slight-----	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
FmC2----- Fort Mott	Slight-----	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
GaB----- Galestown	Slight-----	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Fair: too sandy.
GaD----- Galestown	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy, slope.
GaE----- Galestown	Severe: slope.	Severe: slope, seepage.	Severe: seepage, slope.	Severe: slope, seepage.	Poor: slope.
Ih----- Ipswich	Severe: wetness, floods.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods.	Poor: excess humus, wetness, hard to pack.
Ik----- Iuka	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Fair: wetness.
KmA----- Keyport	Severe: percs slowly, wetness.	Slight-----	Moderate: too clayey, wetness.	Moderate: wetness.	Poor: too clayey.
KmB2----- Keyport	Severe: percs slowly, wetness.	Moderate: slope.	Moderate: too clayey, wetness.	Moderate: wetness.	Poor: too clayey.
KpA----- Keyport	Severe: percs slowly, wetness.	Slight-----	Moderate: too clayey, wetness.	Moderate: wetness.	Poor: too clayey.
KpB2----- Keyport	Severe: percs slowly, wetness.	Moderate: slope.	Moderate: too clayey, wetness.	Moderate: wetness.	Poor: too clayey.
KpC2----- Keyport	Severe: percs slowly, wetness.	Severe: slope.	Moderate: too clayey, wetness.	Moderate: wetness.	Poor: too clayey.
Ks----- Kingsland	Severe: floods, wetness.	Severe: floods, wetness, excess humus.	Severe: excess humus, floods, wetness.	Severe: floods, seepage, wetness.	Poor: excess humus, wetness, hard to pack.
MfB----- Matapeake	Moderate: percs slowly.	Moderate: slope, seepage.	Severe: seepage.	Slight-----	Good.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MnA----- Matapeake	Moderate: percs slowly.	Moderate: seepage.	Severe: seepage.	Slight-----	Good.
MnB----- Matapeake	Moderate: percs slowly.	Moderate: slope, seepage.	Severe: seepage.	Slight-----	Good.
MnC2, MnC3----- Matapeake	Moderate: percs slowly.	Severe: slope.	Severe: seepage.	Slight-----	Good.
MnD2----- Matapeake	Moderate: slope, percs slowly.	Severe: slope.	Severe: seepage.	Moderate: slope.	Fair: slope.
MpA----- Mattapex	Severe: percs slowly, wetness.	Moderate: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness.	Fair: wetness.
MpB----- Mattapex	Severe: percs slowly, wetness..	Moderate: slope, wetness, seepage.	Severe: wetness, seepage.	Severe: wetness.	Fair: wetness.
MtA----- Mattapex	Severe: percs slowly, wetness.	Moderate: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness.	Fair: wetness.
MtB----- Mattapex	Severe: percs slowly, wetness.	Moderate: slope, wetness, seepage.	Severe: wetness, seepage.	Severe: wetness.	Fair: wetness.
MtC2----- Mattapex	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness, seepage.	Severe: wetness.	Fair: wetness.
MwD*: Mattapex-----	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness, seepage.	Severe: wetness.	Fair: slope, wetness.
Woodstown-----	Severe: wetness.	Severe: slope, seepage, wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Fair: slope, wetness.
MxA*: Mattapex-----	Severe: percs slowly, wetness.	Moderate: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness.	Fair: wetness.
Matapeake-----	Moderate: percs slowly.	Moderate: seepage.	Severe: seepage.	Slight-----	Good.
Butlertown-----	Severe: percs slowly, wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: wetness.
MxB*: Mattapex-----	Severe: percs slowly, wetness.	Moderate: slope, wetness, seepage.	Severe: wetness, seepage.	Severe: wetness.	Fair: wetness.
Matapeake-----	Moderate: percs slowly.	Moderate: slope, seepage.	Severe: seepage.	Slight-----	Good.
Butlertown-----	Severe: percs slowly, wetness.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness.	Fair: wetness.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MzA----- Mattapex Variant	Severe: percs slowly, wetness.	Slight-----	Severe: wetness, too clayey.	Severe: wetness.	Fair: too clayey, wetness.
MzB----- Mattapex Variant	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Fair: too clayey, wetness.
Oh----- Othello	Severe: percs slowly, wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness.	Poor: wetness.
Pt*. Pits					
SaA----- Sassafras	Slight-----	Severe: seepage.	Severe: seepage.	Slight-----	Good.
SaB----- Sassafras	Slight-----	Severe: seepage.	Severe: seepage.	Slight-----	Good.
SaC2----- Sassafras	Slight-----	Severe: slope, seepage.	Severe: seepage.	Slight-----	Good.
SaD2, SaD3----- Sassafras	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Moderate: slope.	Fair: slope.
SfA----- Sassafras	Slight-----	Severe: seepage.	Severe: seepage.	Slight-----	Good.
SfB----- Sassafras	Slight-----	Severe: seepage.	Severe: seepage.	Slight-----	Good.
SfC2, SfC3----- Sassafras	Slight-----	Severe: slope, seepage.	Severe: seepage.	Slight-----	Good.
SfD3----- Sassafras	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Moderate: slope.	Fair: slope.
SgB----- Sassafras	Slight-----	Severe: seepage.	Severe: seepage.	Slight-----	Good.
SgC2, SgC3----- Sassafras	Slight-----	Severe: slope, seepage.	Severe: seepage.	Slight-----	Good.
SgD3----- Sassafras	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Moderate: slope.	Fair: slope.
We----- Westbrook	Severe: wetness, floods.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods.	Poor: excess humus, wetness, hard to pack.
WoA, WoB, WsA, WsB-- Woodstown	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness, seepage.	Severe: wetness.	Fair: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ax----- Axis	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Be*. Beaches				
Bs----- Bibb	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Bt----- Bibb Variant	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
BuA*, BuB2*, BuC2*: Butlertown-----	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Mattapex-----	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
CeB2----- Colts Neck	Good-----	Improbable: excess fines.	Improbable: excess fines.	Good.
CeC2----- Colts Neck	Good-----	Improbable: excess fines.	Improbable: excess fines.	Good.
CgC2, CgC3, CgD2, CgD3----- Colts Neck	Good-----	Probable-----	Probable-----	Poor: small stones.
CnE*: Colts Neck-----	Fair: slope.	Probable-----	Probable-----	Poor: slope, small stones.
Sassafras-----	Fair: slope.	Probable-----	Probable-----	Poor: slope, small stones.
Em----- Elkton	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.
Fa, Fh----- Fallsington	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: wetness.
FmB, FmC2----- Fort Mott	Good-----	Probable-----	Improbable: too sandy.	Fair: too sandy.
GaB, GaD----- Galestown	Good-----	Probable-----	Improbable: too sandy.	Fair: too sandy.
GaE----- Galestown	Fair: slope.	Probable-----	Improbable: too sandy.	Poor: slope.
Ih----- Ipswich	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess salt, excess humus.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ik----- Iuka	Fair: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
KmA, KmB2, KpA, KpB2, KpC2----- Keyport	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, area reclaim, too clayey.
Ks----- Kingsland	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess humus.
MfB, MnA, MnB, MnC2, MnC3----- Matapeake	Fair: low strength.	Probable-----	Improbable: too sandy.	Good.
MnD2----- Matapeake	Fair: low strength.	Probable-----	Improbable: too sandy.	Fair: slope.
MpA, MpB, MtA, MtB, MtC2----- Mattapex	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
MwD*: Mattapex-----	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Woodstown-----	Fair: wetness.	Probable-----	Improbable: too sandy.	Fair: slope, thin layer.
MxA*, MxB*: Mattapex-----	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Matapeake-----	Fair: low strength.	Probable-----	Improbable: too sandy.	Good.
Butlertown-----	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
MzA, MzB----- Mattapex Variant	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
Oh----- Othello	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Pt*. Pits				
SaA, SaB----- Sassafras	Good-----	Probable-----	Probable-----	Good.
SaC2----- Sassafras	Good-----	Probable-----	Probable-----	Fair: thin layer.
SaD2, SaD3----- Sassafras	Good-----	Probable-----	Probable-----	Fair: slope, thin layer.
SfA, SfB----- Sassafras	Good-----	Probable-----	Probable-----	Good.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
SfC2, SfC3 Sassafras	Good	Probable	Probable	Fair: thin layer.
SfD3 Sassafras	Good	Probable	Probable	Fair: slope, thin layer.
SgB, SgC2, SgC3, SgD3 Sassafras	Good	Probable	Probable	Poor: small stones.
We Westbrook	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess salt, excess humus.
WoA, WoB, WsA, WsB Woodstown	Fair: wetness.	Probable	Improbable: too sandy.	Fair: thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
Ax----- Axis	Moderate: seepage.	Severe: ponding.	Moderate: salty water, slow refill.	Floods, excess salt.	Wetness, floods.	Wetness.
Be*. Beaches						
Bs----- Bibb	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Floods, frost action.	Wetness, floods.	Wetness.
Bt----- Bibb Variant	Moderate: seepage.	Severe: piping, ponding.	Moderate: slow refill.	Floods, frost action.	Floods, wetness.	Wetness.
BuA*: Butlertown-----	Moderate: seepage.	Severe: piping.	Severe: no water.	Not needed-----	Percs slowly, erodes easily.	Erodes easily, percs slowly.
Mattapex-----	Moderate: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Frost action---	Wetness, erodes easily.	Erodes easily.
BuB2*, BuC2*: Butlertown-----	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Not needed-----	Percs slowly, slope, erodes easily.	Erodes easily, percs slowly.
Mattapex-----	Moderate: seepage,	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Slope, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily.
CeB2, CeC2----- Colts Neck	Severe-----	Severe: piping, seepage.	Severe: no water.	Not needed-----	Slope, cemented pan.	Cemented pan.
CgC2, CgC3, CgD2, CgD3----- Colts Neck	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Not needed-----	Slope, cemented pan.	Slope, cemented pan.
CnE*: Colts Neck-----	Severe: seepage, slope.	Severe: piping, seepage.	Severe: no water.	Not needed-----	Slope, cemented pan.	Slope, cemented pan.
Sassafras-----	Severe: slope, seepage.	Severe: piping, seepage.	Severe: no water.	Not needed-----	Slope-----	Slope.
Em----- Elkton	Slight-----	Severe: wetness, piping.	Severe: slow refill.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Wetness, percs slowly.
Fa, Fh----- Fallsington	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness-----	Wetness.
FmB, FmC2----- Fort Mott	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Not needed-----	Droughty, fast intake, soil blowing.	Droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
GaB----- Galestown	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Not needed-----	Fast intake, droughty, soil blowing.	Droughty.
GaD, GaE----- Galestown	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Not needed-----	Fast intake, droughty, soil blowing.	Droughty, slope.
Ih----- Ipswich	Severe: seepage.	Severe: excess humus, ponding, excess salt.	Severe: salty water.	Floods, excess salt.	Wetness, floods, excess salt.	Wetness, excess salt.
Ik----- Iuka	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Floods, frost action.	Wetness.	Favorable.
KmA----- Keyport	Slight-----	Moderate: hard to pack.	Severe: no water.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Percs slowly, erodes easily.
KmB2----- Keyport	Moderate: slope.	Moderate: hard to pack.	Severe: no water.	Percs slowly, slope, frost action.	Wetness, percs slowly, slope.	Percs slowly, erodes easily.
KpA----- Keyport	Slight-----	Moderate: hard to pack.	Severe: no water.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Percs slowly, erodes easily.
KpB2, KpC2----- Keyport	Moderate: slope.	Moderate: hard to pack.	Severe: no water.	Percs slowly, slope, frost action.	Wetness, percs slowly, erodes easily.	Percs slowly, slope, erodes easily.
Ks----- Kingsland	Severe: seepage.	Severe: excess humus, seepage, ponding.	Slight-----	Floods-----	Floods, wetness.	Wetness.
MfB, MnA, MnB, MnC2, MnC3----- Matapeake	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Not needed-----	Erodes easily, slope.	Erodes easily, slope.
MnD2----- Matapeake	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Not needed-----	Erodes easily, slope.	Erodes easily, slope.
MpA, MpB, MtA, MtB, MtC2----- Mattapex	Moderate: seepage, slope.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Slope, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily.
MwD*: Mattapex-----	Severe: slope.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Slope, frost action.	Wetness, percs slowly, erodes easily.	Slope, erodes easily.
Woodstown-----	Severe: seepage, slope.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Slope-----	Slope, erodes easily.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
MxA*: Mattapex-----	Moderate: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Frost action.	Wetness, percs slowly, erodes easily.	Erodes easily.
Matapeake-----	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Not needed-----	Erodes easily, slope.	Erodes easily.
Butlertown-----	Moderate: seepage.	Severe: piping.	Severe: no water.	Not needed-----	Percs slowly, slope, erodes easily.	Erodes easily, percs slowly.
MxB*: Mattapex-----	Moderate: seepage, slope.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Slope, frost action.	Percs slowly, erodes easily.	Erodes easily.
Matapeake-----	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Not needed-----	Erodes easily, slope.	Erodes easily.
Butlertown-----	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Not needed-----	Percs slowly, slope, erodes easily.	Erodes easily, percs slowly.
MzA----- Mattapex Variant	Slight-----	Moderate: hard to pack.	Moderate: deep to water.	Frost action, percs slowly.	Wetness, percs slowly, erodes easily.	Erodes easily, percs slowly.
MzB----- Mattapex Variant	Moderate: slope.	Moderate: hard to pack.	Moderate: deep to water.	Slope, percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, percs slowly.
Oh----- Othello	Moderate: seepage.	Severe: seepage, piping, wetness.	Severe: cutbank cave.	Frost action---	Wetness, percs slowly.	Wetness, erodes easily.
Pt*. Pits						
SaA----- Sassafras	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Not needed-----	Favorable-----	Favorable.
SaB, SaC2----- Sassafras	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Not needed-----	Slope-----	Favorable.
SaD2, SaD3----- Sassafras	Severe: slope, seepage.	Severe: piping, seepage.	Severe: no water.	Not needed-----	Slope-----	Slope.
SfA----- Sassafras	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Not needed-----	Slope-----	Favorable.
SfB, SfC2, SfC3----- Sassafras	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Not needed-----	Slope-----	Favorable.
SfD3----- Sassafras	Severe: slope, seepage.	Severe: piping, seepage.	Severe: no water.	Not needed-----	Slope-----	Slope.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Grassed waterways
SgB----- Sassafras	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Not needed----	Slope-----	Favorable.
SgC2, SgC3----- Sassafras	Severe: seepage.	Severe: piping, seepage.	Severe: no water.	Not needed----	Slope-----	Favorable.
SgD3----- Sassafras	Severe: slope, seepage.	Severe: piping, seepage.	Severe: no water.	Not needed----	Slope-----	Slope.
We----- Westbrook	Severe: seepage.	Severe: excess humus, ponding, excess salt.	Severe: salty water.	Floods, excess salt.	Floods, wetness, excess salt.	Wetness, excess salt.
WoA, WoB, WsA, WsB----- Woodstown	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness-----	Favorable.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Ax----- Axis	0-20	Mucky silt loam--	CL, CL-ML	A-4	0	100	100	80-95	60-80	16-28	4-10
	20-40	Sandy loam, loam, silt loam.	CL-ML, SC, SM-SC, CL	A-4	0	100	100	75-95	45-75	16-28	4-10
	40-80	Sandy loam, loam, sandy clay loam.	ML, CL-ML, SM, SM-SC	A-4	0	100	100	75-95	45-65	12-25	NP-7
Be* Beaches											
Bs----- Bibb	0-35	Silt loam-----	SM, SM-SC, ML, CL-ML	A-2, A-4	0-5	95-100	90-100	60-90	30-60	<25	NP-7
	35-66	Sandy loam, loam, silt loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	0-10	60-100	50-100	40-100	30-90	<30	NP-7
Bt----- Bibb Variant	0-12	Silt loam-----	ML, CL-ML	A-4	0-5	95-100	90-100	80-100	55-100	<25	5-10
	12-28	Hemic material, muck.	OL, Pt	---	0-5	---	---	---	---	---	---
	28-79	Silt loam, silty clay loam, sandy loam.	ML, SM, CL-ML	A-4, A-2	0-10	95-100	90-100	80-100	30-90	<25	NP-10
BuA*, BuB2*, BuC2*: Butlertown-----	0-10	Silt loam-----	ML, CL-ML	A-4	0	100	95-100	90-100	85-100	22-35	2-8
	10-31	Silt loam, silty clay loam, very fine sandy loam.	ML, CL	A-4, A-6	0	100	95-100	90-100	85-100	33-40	9-16
	31-55	Silt loam, very fine sandy loam.	CL, CL-ML	A-4, A-6	0	90-100	90-100	75-100	70-100	22-38	6-16
	55-75	Silt loam, very fine sand, loam.	ML, CL, SM, SC	A-2, A-4	0	90-100	85-100	50-100	30-90	<30	NP-10
Mattapex-----	0-11	Silt loam-----	ML, CL, SM, SC	A-4, A-6	0	100	100	70-100	45-90	18-33	3-12
	11-35	Silty clay loam, silt loam.	CL	A-4, A-6, A-7	0	100	100	90-100	55-95	24-45	7-21
	35-60	Fine sandy loam, loam, loamy sand.	SM, SC, CL, ML	A-2, A-4, A-6	0	95-100	90-100	45-100	15-75	<40	NP-18
CeB2----- Colts Neck	0-9	Loam-----	SM, ML, CL	A-2, A-4	0	95-100	95-100	50-100	25-90	<25	NP-10
	9-36	Sandy loam, sandy clay loam, loam.	SM, ML, CL	A-2, A-4, A-6	0	95-100	85-100	50-90	25-55	30-40	5-15
	36-52	Loamy sand, sand, sandy loam.	SM, SC, SP-SM	A-2, A-4, A-1	0	65-100	55-100	30-60	5-40	<15	NP-10
CeC2----- Colts Neck	0-9	Loam-----	SM, ML, CL	A-2, A-4	0	95-100	95-100	50-100	25-90	<25	NP-10
	9-36	Sandy loam, sandy clay loam, loam.	SM, ML, CL	A-2, A-4, A-6	0	95-100	85-100	50-90	25-55	30-40	5-15
	36-52	Loamy sand, sand, sandy loam.	SM, SC, SP, SM	A-2, A-4, A-1	0	65-100	55-100	30-60	5-40	<15	NP-10
CgC2, CgC3, CgD2, CgD3----- Colts Neck	0-9	Gravelly loam----	SC, SM, ML SM-SG	A-2, A-4, A-6	0	70-90	55-75	40-70	20-60	30-41	5-17
	9-36	Sandy loam, sandy clay loam, gravelly loam.	SM, SC, ML, CL	A-2, A-4, A-6	0	65-100	60-100	35-90	20-75	29-41	5-17
	36-52	Loamy sand, sand, gravelly sandy loam.	SM, SC, SP, SM	A-1, A-2, A-4	0	60-100	55-100	30-60	5-40	<15	NP-10

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
CnE*: Colts Neck-----	0-9	Gravelly loam----	SM, SC, ML	A-2, A-4, A-6	0	70-90	55-75	40-70	20-60	30-40	5-15
	9-36	Sandy loam, sandy clay loam, gravelly loam.	SM, SC, ML, CL	A-2, A-4, A-6	0	65-100	60-100	35-90	20-75	30-40	5-15
	36-52	Loamy sand, sand, gravelly sandy loam.	SM, SC	A-1, A-2, A-4	0	60-100	55-100	30-60	6-40	<15	NP-10
Sassafras-----	0-20	Gravelly loam----	SM, CL, ML	A-1, A-2, A-4	0	80-85	65-75	45-70	20-55	<32	NP-10
	20-38	Loam, sandy clay loam, sandy loam.	SM-SC, CL, ML	A-2, A-4, A-6	0	85-100	65-100	50-95	30-75	20-33	5-15
	38-60	Gravelly sandy loam, loamy sand, sand.	SC, SM	A-1, A-2, A-4	0	70-100	55-100	30-75	6-50	<26	NP-8
Em----- Elkton	0-20	Silt loam-----	SM, SC, ML, CL	A-4, A-6	0	100	100	70-100	35-100	<35	NP-14
	20-69	Silty clay, clay loam, clay.	CL, CH	A-6, A-7	0	100	100	85-100	70-95	31-62	11-33
Fa----- Fallsington	0-15	Sandy loam-----	SM, CL-ML, ML	A-2, A-4	0	100	85-100	65-90	30-70	<19	NP-5
	15-33	Sandy loam, loam, sandy clay loam.	SM, SC, CL, ML	A-2, A-4, A-6	0	100	85-100	65-85	30-55	<30	NP-12
	33-60	Loamy sand, sand, sandy loam.	SM	A-2, A-3	0	85-100	55-100	50-65	6-35	---	NP
Fh----- Fallsington	0-15	Loam-----	SM, CL-ML, ML	A-2, A-4	0	100	85-100	65-90	30-70	<19	NP-5
	15-33	Sandy loam, loam, sandy clay loam.	SM, SC, CL, ML	A-2, A-4, A-6	0	100	85-100	65-85	30-55	<30	NP-12
	33-60	Loamy sand, sand, sandy loam.	SM	A-2, A-3	0	85-100	55-100	50-65	5-35	---	NP
FmB, FmC2----- Fort Mott	0-26	Loamy sand-----	SM	A-2	0	95-100	95-100	50-90	10-25	---	NP
	26-49	Sandy loam, sandy clay loam.	SM, SC, SM-SC	A-2, A-4, A-6	0	95-100	95-100	50-90	25-45	15-35	NP-15
	49-65	Stratified sand to loamy sand.	SM, SC	A-1, A-2, A-3	0	90-100	65-100	40-80	5-35	<40	NP-12
GaB----- Galestown	0-35	Loamy sand-----	SP-SM, SM, SP	A-1, A-2, A-3	0	95-100	75-100	45-70	4-20	---	NP
	35-60	Sand, loamy sand, gravelly sand.	SP, SP-SM	A-1, A-3, A-2	0	95-100	55-100	30-75	4-10	---	NP
GaD----- Galestown	0-35	Loamy sand-----	SP-SM, SM, SP	A-1, A-2, A-3	0	95-100	75-100	45-70	4-20	---	NP
	35-60	Sand, loamy sand, gravelly sand.	SP, SP-SM	A-1, A-3, A-2	0	95-100	55-100	30-75	4-10	---	NP
GaE----- Galestown	0-35	Loamy sand-----	SP-SM, SM, SP	A-1, A-2, A-3	0	95-100	75-100	45-70	4-20	---	NP
	35-60	Sand, loamy sand, gravelly sand.	SP, SP-SM	A-1, A-3, A-2	0	95-100	55-100	30-75	4-10	---	NP
Ih----- Ipswich	0-47	Hemic material---	Pt	A-8	0	---	---	---	---	---	NP
	47-55	Hemic material---	Pt	A-8	0	---	---	---	---	---	NP
	55-79	Sapric material, hemic material.	Pt	A-8	0	---	---	---	---	---	NP

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth In	USDA texture	Classification		Frag-ments > 3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
Ik----- Iuka	0-10	Silt loam-----	SM, SM-SC, ML, CL-ML	A-4	0	95-100	90-100	70-95	45-75	<30	NP-7
	10-27	Fine sandy loam, loam, sandy loam.	SM, SM-SC, ML, CL-ML	A-4	0	95-100	85-100	65-100	35-75	<30	NP-7
	27-50	Sandy loam, fine sandy loam, loam.	SM, ML	A-2, A-4	0	95-100	90-100	70-100	25-60	<30	NP-7
KmA, KmB2----- Keyport	0-18	Fine sandy loam	SM, SC	A-2, A-4	0	85-100	85-100	60-95	30-40	20-40	5-12
	18-60	Silty clay loam, clay loam, clay.	ML, CL, MH, CH	A-4, A-6, A-7	0	90-100	90-100	75-100	60-100	25-85	10-40
KpA, KpB2, KpC2-- Keyport	0-18	Silt loam-----	ML, CL	A-4, A-7	0	95-100	95-100	70-100	50-100	20-40	5-15
	18-60	Silty clay loam, clay loam, clay.	ML, CL, MH, CH	A-4, A-6, A-7	0	90-100	90-100	75-100	60-100	25-85	9-40
Ks----- Kingsland	0-80	Mucky peat-----	Pt	A-8	0-5	---	---	---	---	---	---
MfB----- Matapeake	0-14	Fine sandy loam	ML, SM, CL	A-4	0	100	100	80-100	45-80	20-33	3-9
	14-36	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6	0	100	100	80-100	60-90	27-35	10-15
	36-70	Sandy loam, loamy sand, sand.	SM, SP-SM	A-2, A-4	0	95-100	90-100	55-70	5-40	<19	NP-3
MnA, MnB, MnC2, MnC3, MnD2----- Matapeake	0-14	Silt loam-----	ML, SM, CL	A-4	0	100	100	80-100	45-80	20-33	3-9
	14-36	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6	0	100	100	80-100	60-90	27-35	10-15
	36-70	Sandy loam, loamy sand, sand.	SM, SP-SM	A-2, A-4	0	95-100	90-100	55-70	5-40	<19	NP-3
MpA, MpB----- Mattapex	0-11	Fine sandy loam	ML, CL, SM, SC	A-4, A-6	0	100	100	70-100	45-90	18-33	3-12
	11-35	Silty clay loam, silt loam.	CL	A-4, A-6, A-7	0	100	100	90-100	55-95	24-45	7-21
	35-60	Fine sandy loam, loam, loamy sand.	SM, SC, CL, ML	A-2, A-4, A-6	0	95-100	90-100	45-100	15-75	<40	NP-18
MtA, MtB----- Mattapex	0-11	Silt loam-----	ML, CL, SM, SC	A-4, A-6	0	100	100	70-100	45-90	18-33	3-12
	11-35	Silty clay loam, silt loam.	CL	A-4, A-6, A-7	0	100	100	90-100	55-95	24-45	7-21
	35-60	Fine sandy loam, loam, loamy sand.	SM, SC, CL, ML	A-2, A-4, A-6	0	95-100	90-100	45-100	15-75	<40	NP-18
MtC2----- Mattapex	0-15	Silt loam-----	ML, CL, SM, SC	A-4, A-6	0	100	100	70-100	45-90	18-33	3-12
	15-36	Silty clay loam, silt loam.	CL	A-4, A-6, A-7	0	100	100	90-100	55-95	24-45	7-21
	36-60	Fine sandy loam, loam, loamy sand.	SM, SC, CL, ML	A-2, A-4, A-6	0	95-100	90-100	45-100	15-75	<40	NP-18
MwD*: Mattapex-----	0-11	Silt loam-----	ML, CL, SM, SC	A-4, A-6	0	100	100	70-100	45-90	18-33	3-12
	11-35	Silty clay loam, silt loam.	CL	A-4, A-6, A-7	0	100	100	90-100	55-95	24-45	7-21
	35-60	Fine sandy loam, loam, loamy sand.	SM, SC, CL, ML	A-2, A-4, A-6	0	95-100	90-100	45-100	15-75	<40	NP-18

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
MWD*: Woodstown-----	0-10	Fine sandy loam	SM, SC, ML, CL-ML	A-2, A-4, A-6	0	100	100	60-95	30-75	<34	NP-12
	10-38	Sandy clay loam, loam, sandy loam.	SM, CL-ML	A-2, A-4, A-6	0	100	70-100	45-90	25-60	<32	NP-12
	38-60	Sandy loam, loamy sand, gravelly sand.	SM, SP-SM	A-1, A-2, A-3	0	80-100	70-95	35-55	5-25	<26	NP-6
MxA*, MxB*: Mattapex-----	0-11	Silt loam-----	ML, CL, SM, SC	A-4, A-6	0	100	100	70-100	45-90	18-33	3-12
	11-38	Silty clay loam, silt loam.	CL	A-4, A-6, A-7	0	100	100	90-100	55-95	24-45	7-21
	38-60	Fine sandy loam, loam, loamy sand.	SM, SC, CL, ML	A-2, A-4, A-6	0	95-100	90-100	45-100	15-75	<40	NP-18
Matapeake-----	0-14	Silt loam-----	ML, SM, CL	A-4	0	100	100	80-100	45-80	20-33	3-9
	14-36	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6	0	100	100	80-100	60-90	27-35	10-15
	36-70	Sandy loam, loamy sand, sand.	SM, SP-SM	A-2, A-4	0	95-100	90-100	55-70	5-40	<19	NP-3
Butlertown-----	0-10	Silt loam-----	ML, CL-ML	A-4	0	100	95-100	90-100	85-100	22-35	2-8
	10-31	Silt loam, silty clay loam, very fine sandy loam.	ML, CL	A-4, A-6	0	100	95-100	90-100	85-100	33-40	9-16
	31-65	Silt loam, very fine sandy loam.	CL, CL-ML, SC	A-4, A-6, A-2	0	90-100	90-100	50-100	30-100	22-38	6-16
	65-75	Silt loam, very fine sand, loam.	ML, CL, SM, SC	A-2, A-4	0	90-100	85-100	50-100	30-90	<30	NP-10
MzA, MzB----- Mattapex Variant	0-11	Silt loam-----	ML, CL	A-4, A-6	0	100	100	90-100	55-90	18-33	3-12
	11-42	Silt loam, silty clay loam.	ML, CL	A-4, A-6, A-7	0	100	100	90-100	70-100	24-45	7-21
	42-65	Silty clay, silty clay loam, clay loam.	CL, CH	A-6, A-7	0	100	100	90-100	80-100	31-62	11-33
	65-70	Gravelly sandy loam, sandy loam, loamy sand.	SM	A-2, A-4	0	75-100	60-100	50-75	30-45	<40	NP-18
Oh----- Othello	0-8	Silt loam-----	ML, CL-ML, SM	A-4, A-6	0	100	100	70-100	40-95	23-37	NP-13
	8-40	Silty clay loam, silt loam.	CL, ML, CL-ML	A-6, A-4	0	100	100	90-100	70-100	27-40	6-19
	40-71	Sandy loam, loamy sand, sandy clay loam.	SM, SC, CL, ML	A-2, A-4, A-6, A-1	0	90-100	85-100	40-90	15-60	<39	NP-17
Pt* Pits											
SaA, SaB, SaC2, SaD2, SaD3----- Sassafras	0-20	Sandy loam-----	SM, ML, CL	A-2, A-4	0	85-100	80-100	50-95	25-65	12-32	NP-10
	20-38	Loam, sandy clay loam, sandy loam.	SM-SC, CL, ML	A-2, A-4, A-6	0	85-100	65-100	50-95	30-75	20-33	5-15
	38-60	Gravelly sandy loam, fine sandy loam, sand.	SP-SM, SC, SM	A-1, A-2, A-4	0	70-100	55-100	30-75	5-50	<26	NP-8

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
SfA, SfB, SfC2, SfC3, SfD3----- Sassafras	0-20	Loam-----	SM, ML, CL	A-2, A-4	0	85-100	80-100	50-95	25-65	12-32	NP-10
	20-38	Loam, sandy clay loam, sandy loam.	SM-SC, CL, ML	A-2, A-4, A-6	0	85-100	65-100	50-95	30-75	20-33	5-15
	38-60	Gravelly sandy loam, fine sandy loam, sand.	SP-SM, SC, SM, SM-SC	A-1, A-2, A-4	0	70-100	55-100	30-75	5-50	<26	NP-8
SgB, SgC2, SgC3, SgD3----- Sassafras	0-20	Gravelly loam---	SM, CL, ML	A-1, A-2, A-4	0	80-85	65-75	45-70	20-55	<32	NP-10
	20-38	Loam, sandy clay loam, sandy loam.	CL, ML, SM, SC	A-2, A-4, A-6	0	85-100	65-100	50-95	30-75	20-33	5-15
	38-60	Gravelly sandy loam, loamy sand, sand.	SP-SM, SC, SM, SM-SC	A-1, A-2, A-4	0	70-100	55-100	30-75	5-50	<26	NP-8
We----- Westbrook	0-43	Fibric material	Pt	---	0	---	---	---	---	---	NP
	43-79	Silt loam, very fine sandy loam.	ML, CL-ML,	A-4	0	95-100	95-100	95-100	85-100	<25	NP-5
WoA, WoB----- Woodstown	0-10	Sandy loam-----	SM, SC, ML, CL-ML	A-2, A-4, A-6	0	100	100	60-95	30-75	<34	NP-12
	10-38	Sandy clay loam, loam, sandy loam.	SM, CL-ML, SC	A-2, A-4, A-6	0	100	70-100	45-90	25-60	<32	NP-12
	38-60	Sandy loam, loamy sand, gravelly sand.	SM, SP-SM, SM-SC	A-1, A-2, A-3	0	80-100	70-95	35-55	5-25	<26	NP-6
WsA, WsB----- Woodstown	0-10	Loam-----	SM, SC, ML, CL-ML	A-2, A-4, A-6	0	100	100	60-95	30-75	<34	NP-12
	10-38	Sandy clay loam, loam, sandy loam.	SM, CL-ML, SC	A-2, A-4, A-6	0	100	70-100	45-90	25-60	<32	NP-12
	38-60	Sandy loam, loamy sand, gravelly sand.	SM, SP-SM, SM-SC	A-1, A-2, A-3	0	80-100	70-95	35-55	5-25	<26	NP-6

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay <2mm	Moist bulk density	Permeability	Available water capacity	*Soil reaction	Shrink-swell potential	Erosion factors	
								K	T
	In	Pct	G/cm ³	In/hr	In/in	pH			
Ax-----	0-20	15-25	---	0.6-2.0	0.13-0.15	6.1-7.3	Low-----	0.10	5
Axis	20-40	8-15	---	0.6-2.0	0.13-0.15	6.1-7.3	Low-----	0.10	
	40-80	8-25	---	0.6-2.0	0.13-0.15	6.1-7.3	Low-----	0.10	
Be**.									
Beaches									
Bs-----	0-35	2-18	---	0.6-2.0	0.12-0.18	4.5-5.5	Low-----	0.20	5
Bibb	35-66	2-18	---	0.6-2.0	0.12-0.20	4.5-5.5	Low-----	0.37	
Bt-----	0-12	---	0.6-0.8	0.2-0.6	0.24-0.26	6.1-7.3	Low-----	0.10	5
Bibb Variant	12-28	---	0.07-0.18	0.6-2.0	0.24-0.26	6.1-7.3	Low-----	0.10	
	28-79	---	0.6-1.0	0.2-2.0	0.24-0.26	6.1-7.3	Low-----	0.10	
BuA**, BuB2**, BuC2**:									
Butlertown-----	0-10	11-16	1.35-1.55	0.6-2.0	0.18-0.21	4.5-6.0	Low-----	0.43	3-2
	10-31	18-25	1.35-1.55	0.6-2.0	0.16-0.22	4.5-6.0	Low-----	0.43	
	31-65	18-25	1.60-1.80	0.06-0.2	0.10-0.14	4.5-6.0	Low-----	0.43	
	65-75	5-18	1.50-1.70	0.6-2.0	0.12-0.21	4.5-5.5	Low-----	0.43	
Mattapex-----	0-11	7-16	---	0.6-2.0	0.14-0.22	3.6-7.3	Low-----	0.37	3-2
	11-35	18-30	---	0.2-0.6	0.18-0.22	3.6-7.3	Low-----	0.43	
	35-60	8-15	---	0.6-6.0	0.14-0.18	3.6-7.3	Low-----	0.28	
CeB2-----	0-9	5-20	1.10-1.60	0.6-2.0	0.14-0.22	4.5-5.5	Low-----	0.28	4
Colts Neck	9-36	10-30	1.30-1.45	0.6-2.0	0.10-0.16	4.5-5.5	Low-----	0.28	
	36-60	3-15	1.30-1.45	2.0-20	0.10-0.14	4.5-5.5	Low-----	0.20	
CeC2-----	0-9	5-10	1.10-1.60	0.6-2.0	0.10-0.13	4.5-5.5	Low-----	0.28	4
Colts Neck	9-36	10-30	1.30-1.45	0.6-2.0	0.10-0.16	4.5-5.5	Low-----	0.28	
	36-60	3-15	1.30-1.45	2.0-20	0.10-0.14	4.5-5.5	Low-----	0.20	
CgC2, CgC3, CgD2, CgD3-----	0-9	10-30	1.10-1.60	0.6-2.0	0.08-0.17	4.5-5.5	Low-----	0.28	3
Colts Neck	9-36	10-30	1.30-1.45	0.6-2.0	0.10-0.16	4.5-5.5	Low-----	0.28	
	36-60	3-15	1.30-1.45	2.0-20	0.10-0.14	4.5-5.5	Low-----	0.28	
CnE**:									
Colts Neck-----	0-9	10-30	1.10-1.60	0.6-2.0	0.08-0.17	4.5-5.5	Low-----	0.28	3
	9-36	10-30	1.30-1.45	0.6-2.0	0.10-0.16	4.5-5.5	Low-----	0.28	
	36-60	3-15	1.30-1.45	2.0-20	0.10-0.14	4.5-5.5	Low-----	0.28	
Sassafras-----	0-20	---	---	0.6-6.0	0.10-0.12	3.6-5.5	Low-----	0.24	4
	20-38	---	---	0.6-2.0	0.11-0.16	3.6-5.5	Low-----	0.37	
	38-60	---	---	0.6-6.0	0.04-0.12	3.6-5.5	Low-----	0.17	
Em-----	0-20	11-30	---	0.6-2.0	0.15-0.22	3.6-5.5	Low-----	0.43	3
Elkton	20-69	35-55	---	<0.2	0.14-0.19	3.6-5.5	Moderate----	0.28	
	69-80	5-50	---	0.2-6.0	0.14-0.20	3.6-5.5	Moderate----	0.28	
Fa, Fh-----	0-15	---	---	0.6-6.0	0.15-0.24	3.6-5.5	Low-----	0.28	4
Fallsington	15-33	---	---	0.6-2.0	0.15-0.18	3.6-5.5	Low-----	0.37	
	33-60	---	---	2.0-6.0	0.06-0.16	3.6-5.5	Low-----	0.43	
FmB, FmC2-----	0-26	---	---	6.0-20	0.05-0.10	3.6-5.5	Low-----	0.20	4
Fort Mott	26-49	---	---	0.6-6.0	0.12-0.16	3.6-5.5	Low-----	0.32	
	49-65	---	---	6.0-20	0.05-0.10	3.6-5.5	Low-----	0.17	
GaB, GaD, GaE-----	0-35	4-10	1.50-1.70	>6.0	0.06-0.08	3.6-5.5	Low-----	0.17	5
Galestown	35-60	2-6	1.50-1.65	>6.0	0.04-0.08	3.6-5.5	Low-----	0.17	

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Moist bulk density	Permeability	Available water capacity		*Soil reaction	Shrink-swell potential	Erosion factors	
					In/hr	In/in			K	T
	In	Pct	G/cm ³			pH				
Ih----- Ipswich	0-47	---	0.10-0.30	0.6-2.0	0.18-0.35	6.1-7.3	-----	---	---	---
	47-55	---	0.10-0.30	0.6-6.0	0.18-0.35	6.1-7.3	-----	---	---	---
	55-79	---	0.10-0.30	0.6-2.0	0.18-0.35	6.1-7.3	-----	---	---	---
Ik----- Iuka	0-10	6-15	---	0.6-2.0	0.10-0.20	5.1-6.0	Low-----	0.24	5	
	10-27	8-18	---	0.6-2.0	0.10-0.20	4.5-5.5	Low-----	0.28		
	27-50	5-15	---	0.6-2.0	0.10-0.20	4.5-5.5	Low-----	0.20		
KmA, KmB2----- Keyport	0-18	---	---	0.6-2.0	0.12-0.18	3.6-5.0	Moderate---	0.43	3-2	
	18-60	---	---	<0.2	0.16-0.20	4.5-5.0	Moderate---	0.32		
KpA, KpB2, KpC2-- Keyport	0-18	---	---	0.2-0.6	0.18-0.24	3.6-5.0	Moderate---	0.43	3-2	
	18-60	---	---	0.06-0.2	0.16-0.20	4.5-5.0	Moderate---	0.32		
Ks----- Kingsland	0-80	---	---	6.0-20	0.45-0.50	4.5-7.3	Low-----	---	---	---
MfB, MnA, MnB, MnC2, MnC3, MnD2----- Matapeake	0-14	---	---	0.6-2.0	0.16-0.24	4.5-5.5	Low-----	0.37	3	
	14-36	---	---	0.6-2.0	0.18-0.24	4.5-5.5	Low-----	0.43		
	36-70	---	---	0.6-6.0	0.08-0.18	4.5-5.5	Low-----	0.28		
MpA, MpB, MtA, MtB----- Mattapex	0-11	7-16	---	0.6-2.0	0.14-0.22	3.6-7.3	Low-----	0.37	3-2	
	11-35	18-30	---	0.2-0.6	0.18-0.22	3.6-7.3	Low-----	0.43		
	35-60	8-15	---	0.6-6.0	0.14-0.18	3.6-7.3	Low-----	0.28		
MtC2----- Mattapex	0-15	7-16	---	0.6-2.0	0.14-0.22	3.6-7.3	Low-----	0.37	3-2	
	15-36	18-30	---	0.2-0.6	0.18-0.22	3.6-7.3	Low-----	0.43		
	36-60	8-15	---	0.6-6.0	0.14-0.18	3.6-7.3	Low-----	0.28		
MwD**: Mattapex-----	0-11	7-16	---	0.6-2.0	0.14-0.22	3.6-7.3	Low-----	0.37	3-2	
	11-35	18-30	---	0.2-0.6	0.18-0.22	3.6-7.3	Low-----	0.43		
	35-60	8-15	---	0.6-6.0	0.14-0.18	3.6-7.3	Low-----	0.28		
Woodstown-----	0-10	---	---	0.6-6.0	0.08-0.21	3.6-5.5	Low-----	0.28	4	
	10-38	---	---	0.6-2.0	0.10-0.16	3.6-5.5	Low-----	0.37		
	38-60	---	---	0.6-6.0	0.06-0.14	3.6-5.5	Low-----	0.28		
MxA**, MxB**: Mattapex-----	0-11	7-16	---	0.6-2.0	0.14-0.22	3.6-7.3	Low-----	0.37	3-2	
	11-38	18-30	---	0.2-0.6	0.18-0.22	3.6-7.3	Low-----	0.43		
	38-60	8-15	---	0.6-6.0	0.14-0.18	3.6-7.3	Low-----	0.28		
Matapeake-----	0-14	---	---	0.6-2.0	0.16-0.24	4.5-5.5	Low-----	0.37	3	
	14-36	---	---	0.6-2.0	0.18-0.24	4.5-5.5	Low-----	0.43		
	36-70	---	---	0.6-6.0	0.08-0.18	4.5-5.5	Low-----	0.28		
Butlertown-----	0-10	11-16	1.35-1.55	0.6-2.0	0.18-0.21	4.5-6.0	Low-----	0.43	3-2	
	10-31	18-25	1.35-1.55	0.6-2.0	0.16-0.22	4.5-6.0	Low-----	0.43		
	31-65	18-25	1.60-1.80	0.06-0.2	0.10-0.14	4.5-6.0	Low-----	0.43		
	65-75	5-18	1.50-1.70	0.6-2.0	0.12-0.21	4.5-5.5	Low-----	0.43		
MzA, MzB----- Mattapex Variant	0-11	10-25	---	0.6-2.0	0.17-0.21	5.1-6.5	Low-----	0.37	3	
	11-42	18-30	---	0.2-0.6	0.17-0.21	5.1-5.5	Low-----	0.43		
	42-65	28-45	---	<0.2	0.14-0.19	3.6-5.5	High-----	0.43		
	65-70	8-15	---	0.6-6.0	0.04-0.12	3.6-5.0	Low-----	0.28		
Oh----- Othello	0-8	15-28	---	0.6-2.0	0.16-0.24	4.5-5.5	Low-----	0.37	3	
	8-40	18-35	---	0.2-0.6	0.12-0.24	3.6-5.5	Low-----	0.43		
	40-71	4-27	---	0.2-6.0	0.06-0.16	3.6-5.5	Low-----	0.28		
Pt**. Pits										

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Moist bulk density	Permeability	Available water capacity	*Soil reaction	Shrink-swell potential	Erosion factors	
								K	T
	In	Pct	G/cm ³	In/hr	In/in	pH			
SaA, SaB, SaC2, SaD2, SaD3, SfA, SfB, SfC2, SfC3, SfD3 Sassafras	0-20	---	---	0.6-6.0	0.12-0.20	3.6-5.5	Low-----	0.28	4
	20-38	---	---	0.6-2.0	0.11-0.16	3.6-5.5	Low-----	0.37	
	38-60	---	---	0.6-2.0	0.04-0.12	3.6-5.5	Low-----	0.17	
SgB, SgC2, SgC3, SgD3 Sassafras	0-20	---	---	0.6-6.0	0.10-0.12	3.6-5.5	Low-----	0.24	4
	20-38	---	---	0.6-2.0	0.11-0.16	3.6-5.5	Low-----	0.37	
	38-60	---	---	0.6-2.0	0.04-0.12	3.6-5.5	Low-----	0.17	
We----- Westbrook	0-43	---	---	0.6-2.0	0.18-0.35	6.1-7.3	Low-----	---	---
	43-79	---	---	0.6-2.0	0.16-0.26	6.1-7.3	Low-----	0.64	
WoA, WoB, WsA, WsB----- Woodstown	0-10	---	---	0.6-6.0	0.08-0.21	4.5-5.5	Low-----	0.28	4
	10-38	---	---	0.6-2.0	0.10-0.16	4.5-5.5	Low-----	0.37	
	38-60	---	---	0.6-6.0	0.06-0.14	4.5-5.5	Low-----	0.28	

*The ranges in pH given in this column are for soils that have not been heavily and repeatedly limed. However, most of the soils in Kent County that have been farmed, especially those that are classified as prime farmland, have a range in pH of 6.1 to 7.3, and most of the other soils in the county have a pH of not lower than 4.0.

**See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

[The definitions of "flooding" and "water table" in the text explain terms such as "rare," "brief," "apparent," and "perched." The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
Ax*----- Axis	D	Frequent----	Very brief	Jan-Dec	+1-1.0	Apparent	Jan-Dec	Low-----	High-----	High.
Be. Beaches										
Bs----- Bibb	C	Frequent----	Brief-----	Dec-May	0.5-1.5	Apparent	Dec-Apr	High-----	High-----	Moderate.
Bt*----- Bibb Variant	D	Frequent----	Brief to very long.	Dec-May	+1-1.5	Apparent	Dec-Jun	High-----	High-----	Low.
BuA, BuB2, BuC2: Butlertown-----	C	None-----	---	---	2.0-4.0	Perched	Feb-Mar	High-----	Moderate	High.
Mattapex-----	C	None-----	---	---	1.5-2.5	Apparent	Jan-Apr	High-----	High-----	High.
CeB2, CeC2, CgC2, CgC3, CgD2, CgD3- Colts Neck	B	None-----	---	---	>6.0	---	---	Moderate	Low-----	High.
CnE: Colts Neck-----	B	None-----	---	---	>6.0	---	---	Moderate	Low-----	High.
Sassafras-----	B	None-----	---	---	>6.0	---	---	Moderate	Low-----	High.
Em----- Elkton	D	Rare-----	---	---	0-1.0	Apparent	Jan-Apr	High-----	High-----	High.
Fa, Fh----- Fallsington	D	None-----	---	---	0-1.0	Apparent	Dec-May	High-----	High-----	High.
FmB, FmC2----- Fort Mott	A	None-----	---	---	>6.0	---	---	Moderate	Low-----	High.
GaB, GaD, GaE----- Galestown	A	None-----	---	---	>6.0	---	---	Low-----	Low-----	High.
Ih*----- Ipswich	D	Frequent----	Very brief	Jan-Dec	+1-0.0	Apparent	Jan-Dec	Low-----	High-----	High.
Ik----- Iuka	C	Rare-----	Very brief to brief.	Dec-Apr	1.0-3.0	Apparent	Dec-Apr	High-----	Moderate	High.
KmA, KmB2, KpA, KpB2, KpC2----- Keyport	C	None-----	---	---	1.5-4.0	Perched	Jan-Apr	High-----	High-----	High.
Ks*----- Kingsland	A/D	Common-----	Very long	Jan-Dec	+2-0.5	Apparent	Jan-Dec	Low-----	Moderate	Moderate.
MfB, MnA, MnB, MnC2, MnC3, MnD2- Matapeake	B	None-----	---	---	>6.0	---	---	Moderate	Moderate	High.
MpA, MpB, MtA, MtB, MtC2----- Mattapex	C	None-----	---	---	1.5-2.5	Apparent	Jan-Apr	High-----	High-----	High.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
MWD:					<u>Ft</u>					
Mattapex-----	C	None-----	---	---	1.5-2.5	Apparent	Jan-Apr	High-----	High-----	High.
Woodstown-----	C	None-----	---	---	1.5-2.5	Apparent	Feb-Apr	High-----	Moderate	High.
MxA, MxB:										
Mattapex-----	C	None-----	---	---	1.5-2.5	Apparent	Jan-Apr	High-----	High-----	High.
Matapeake-----	B	None-----	---	---	>6.0	---	---	Moderate	Moderate	High.
Butlertown-----	C	None-----	---	---	2.0-4.0	Perched	Feb-Mar	High-----	Moderate	High.
MzA, MzB-----	C	None-----	---	---	1.5-2.5	Apparent	Jan-Apr	High-----	High-----	High.
Mattapex Variant										
Oh-----	D	None-----	---	---	0-1.0	Apparent	Jan-Apr	High-----	High-----	High.
Othello										
Pt. Pits										
SaA, SaB, SaC2, SaD2, SaD3, SfA, SfB, SfC2, SfC3, SfD3, SgB, SgC2, SgC3, SgD3-----	B	None-----	---	---	>6.0	---	---	Moderate	Low-----	High.
Sassafras										
We*-----	D	Frequent----	Very brief	Jan-Dec	+1-0.0	Apparent	Jan-Dec	Low-----	High-----	High.
Westbrook										
WoA, WoB, WsA, WsB-----	C	None-----	---	---	1.5-2.5	Apparent	Feb-Apr	High-----	Moderate	High.
Woodstown										

* In the "High water table--Depth" column, a plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

TABLE 17.--ENGINEERING INDEX TEST DATA

[Dashes indicate data were not available. NP means nonplastic]

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution										Liquid limit	Plasticity index	Moisture density	
			Percentage passing sieve--							Percentage smaller than--					Max. dry density	Optimum moisture
	AASHTO	Unified	2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm	Pct	Lb/ ft ³		
Butlertown sil:1 (S78MD-029-031)																
B2t-----16 to 34	A-6 (16)	CL	100	100	100	100	100	99	95	57	--	21	38	16	--	--
Bx-----34 to 50	A-6 (09)	CL	100	100	100	100	100	90	78	53	--	18	33	13	--	--
C-----50 to 60	A-2-6(01)	SC	100	100	98	92	92	54	35	27	--	15	28	13	--	--
Colts Neck gr-1:2 (S78MD-029-030)																
B21t-----6 to 29	A-2-7(01)	SC	100	100	100	99	96	57	32	29	--	24	41	17	--	--
B22t-----29 to 36	A-2-6(00)	SC	99	97	96	95	92	80	27	27	--	22	29	11	--	--
Elkton sil:3 (S78MD-029-006)																
B21tg-----9 to 20	A-6 (13)	CL	100	100	100	100	100	100	98	67	--	27	32	14	--	--
B22tg-----20 to 28	A-7-6(18)	CL	100	100	100	100	100	98	94	56	--	29	41	17	--	--
C1g-----45 to 69	A-7-6(23)	CL-CH	100	100	100	100	100	97	90	83	--	56	50	22	--	--
Keyport sil:4 (S76MD-029-015)																
B1-----9 to 18	A-4 (08)	CL	100	100	100	100	100	99	97	65	--	22	30	9	--	--
B21t-----18 to 23	A-4 (08)	CL	100	100	100	100	100	99	97	65	--	22	30	9	--	--
B22t-----23 to 34	A-7-6(22)	CL	100	100	100	100	100	100	97	77	--	45	45	20	--	--
B23t-----34 to 48	A-6 (14)	CL	100	100	100	100	100	100	96	69	--	35	35	14	--	--
C-----48 to 60	A-6 (15)	CL	100	100	100	100	100	100	97	68	--	33	36	15	--	--
Mattapex sil:5 (S77MD-029-029)																
B21-----12 to 19	A-4 (05)	CL	100	100	100	100	100	99	78	47	--	15	26	9	--	--
B22t-----19 to 33	A-4 (02)	CL	100	100	100	100	100	99	54	47	--	15	26	9	--	--
B3-----33 to 44	A-4 (01)	CL	100	100	100	100	100	99	54	36	--	16	23	8	--	--
2C1g-----44 to 55	A-6 (02)	SC	100	100	100	100	100	98	45	32	--	20	27	11	--	--
2C2g-----55 to 70	A-2-4(00)	SM	100	100	100	100	100	98	25	13	--	9	--	NP	--	--
Mattapex Variant:6 (S78MD-029-005)																
B21t-----11 to 27	A-4 (11)	ML	100	100	100	100	100	100	98	58	--	18	34	10	--	--
B22t-----27 to 42	A-6 (15)	CL	100	100	100	100	100	100	98	61	--	24	37	14	--	--
2A1b-----42 to 52	A-6 (17)	CL	100	100	100	100	100	96	93	80	--	44	40	17	--	--

See footnotes at end of table.

TABLE 17.--ENGINEERING INDEX TEST DATA--Continued

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution										Liquid limit	plasticity index	Moisture density		
			Percentage passing sieve--							Percentage smaller than--					Max. dry density	Optimum moisture	
	AASHTO	Unified	2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm	Pct	Lb/ ft ³			Pct
Othello sil:7 (S77MD-029-021)																	
B21tg-----8 to 21	A-4	(09)	CL	100	100	100	100	100	100	96	56	--	18	29	10	--	--
B22tg-----21 to 32	A-4	(05)	CL-ML	100	100	100	100	100	100	96	51	--	14	27	6	--	--
B3g-----32 to 40	A-4	(08)	CL	100	100	100	100	100	100	97	56	--	18	28	9	--	--
2C1g-----40 to 51	A-4	(01)	CL-ML	100	100	100	100	100	99	57	32	--	18	20	6	--	--
Sassafras sl:8 (S77MD-029-007)																	
B2t-----9 to 34	A-2-4	(00)	SC	100	100	100	100	99	74	31	21	--	12	22	8	--	--

¹Butlertown silt loam: 925 feet south on Route 448 from junction with Comegys Road, along fence row 220 feet east of Route 448.

²Colts Neck gravelly loam: In a field, 175 feet southeast of Route 291, 1,540 feet southwest of junction of Route 291 and Route 213.

³Elkton silt loam: In a cultivated field, about 2,000 feet south of Melitota crossroads and 700 feet west of Route 298.

⁴Keyport silt loam: In face of clay pit, 1,200 feet southwest of State Highway Administration Building and 1,150 feet south of Route 291.

⁵Mattapex silt loam: In woods, 1,500 feet north of Piney Neck Church and 200 feet east of Edesville-Piney Neck Road, 120 feet north of lane.

⁶Mattapex Variant silt loam: In a cultivated field, about 2,400 feet southwest of junction of Fish Hatchery Road and Handys Point Road.

⁷Othello silt loam: In a field, 925 feet north of Reese's Corner Road and 2,000 feet west of Route 20.

⁸Sassafras sandy loam: In a field, 1 1/4 miles east of Route 313 on Walnut Tree 10 School Road and 1,320 feet south of 10 School Road.

TABLE 18.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series]

Soil name	Family or higher taxonomic class
Axis-----	Coarse-loamy, mixed, nonacid, thermic Typic Sulfaquents
Bibb-----	Coarse-loamy, siliceous, acid, thermic Typic Fluvaquents
Bibb Variant-----	Fine-silty, mixed, nonacid, mesic Typic Hydraquents
Butlertown-----	Fine-silty, mixed, mesic Typic Fragiudults
Colts Neck-----	Fine-loamy, mixed, mesic Typic Rhodudults
*Elkton-----	Clayey, mixed, mesic Typic Ochraquults
Fallsington-----	Fine-loamy, siliceous, mesic Typic Ochraquults
Fort Mott-----	Loamy, siliceous, mesic Arenic Hapludults
Galestown-----	Sandy, siliceous, mesic Psammentic Hapludults
Ipswich-----	Euic, mesic Typic Sulfihemists
*Iuka-----	Coarse-loamy, siliceous, acid, thermic Aquic Udifluvents
Keyport-----	Clayey, mixed, mesic Aquic Hapludults
Kingsland-----	Euic, thermic Typic Medihemists
*Matapeake-----	Fine-loamy, mixed, mesic Typic Hapludults
*Mattapex-----	Fine-loamy, mixed, mesic Aquic Hapludults
Mattapex Variant-----	Fine-loamy, mixed, mesic Aquic Hapludults
Othello-----	Fine-silty, mixed, mesic Typic Ochraquults
Sassafras-----	Fine-loamy, siliceous, mesic Typic Hapludults
Westbrook-----	Euic, mesic Typic Sulfihemists
Woodstown-----	Fine-loamy, siliceous, mesic Aquic Hapludults

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