USDA United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Maryland Agricultural Experiment Station, Maryland Department of Agriculture, and Dorchester Soil Conservation District

# Soil Survey of Dorchester County, Maryland

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# Foreword

This soil survey contains information that can be used in land-planning programs in Dorchester County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

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 ensure 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.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations that affect various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. 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 Natural Resources Conservation Service or the Cooperative Extension Service.

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State Conservationist
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# Soil Survey of Dorchester County, Maryland

Updated and revised survey by James E. Brewer, George P. Demas, and Donald Holbrook, Natural Resources Conservation Service

Original survey by F.Z. Hutton, Sr., A.P. Faust, R. Feuer, H.R. Frantz, F.J. Gladwin, A.H. Kodess, and J.E. McCuen, Soil Conservation Service

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

DORCHESTER COUNTY is in the central part of Maryland's Eastern shore (fig. 1). It is on the western edge of the Delmarva Peninsula, which extends between the Atlantic Ocean and Chesapeake Bay. The county has a total area of about 423,100 acres, or 660 square miles. This acreage includes 71,163 acres of open water. Dorchester County has the largest acreage of land and water among the 23 counties of Maryland. The county is almost completely surrounded by water. It has a total of 333 miles of boundaries, and only 20 miles of the boundaries are on land. Cambridge, the county seat and the largest city, is located along the Choptank River and is within 70 miles of both Ocean City and Baltimore. In 1990, the population of Dorchester County was 30,236.

Farming and forestry are the main land uses in Dorchester County. The sources of farm income are mainly field crops, such as soybeans, small grain, and corn, but also include poultry, vegetables, livestock, and forest products. Retail and wholesale trade; small manufacturers; service industries; commercial fishing, shellfishing, 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 50. It runs northwest and southeast from Cambridge to Vienna. The other major roads are Maryland Routes 14, 16, 331, 335, 336, and 392. A spur track of the Maryland and Delaware Railroad runs from Federalsburg, through Hurlock, and into Cambridge. The Cambridge-Dorchester County Airport is the only airport in the county.

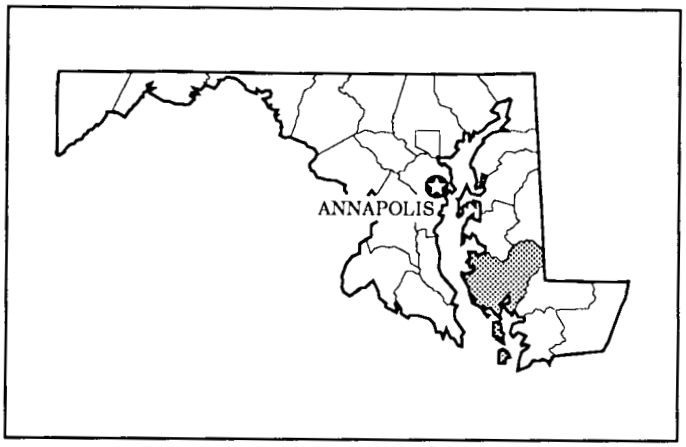


**Figure 1.—Location of Dorchester County in Maryland.**

The lower two-thirds of Dorchester County is made up of nearly level lowland flats that are characterized by windblown materials overlying alluvial and marine sediments. A significant part of this area is made up of tidal and nontidal wetlands. The upper one-third of the county is nearly level to strongly sloping land that has predominantly alluvial sediments.

The soils in the county have a wide range in textures, natural drainage classes, and other characteristics. The major concern in managing the soils for most uses is wetness.

This soil survey updates the survey of Dorchester

County published in 1963 *(14)*. It provides additional information and has larger maps, which show the soils in greater detail.

## General Nature of the County

The following paragraphs describe history and development; industry and transportation; physiography, relief, and drainage; water supply; agriculture; natural resources; and climate.

### History and Development

Dr. Thomas A. Flowers, local historian, helped write this section.

Dorchester County was named for the fourth Earl of Dorset, Sir Edward Sackville. The county was established in 1669. It originally was twice its present size. In 1790, the county had a population of 15,875. By 1990, the population had increased to 30,236. Cambridge, the county seat, was established in 1686 and had an active deep-water seaport until the 1980's.

The first settlers in the survey area were Native Americans, specifically descendants of the Delaware Nation (Lenni Lenape) and members of the Nause-Waiwash and Nanticoke tribes. They moved to the area between 3500 B.C. and 500 A.D. They were hunter-gatherers. They ate fish and game, berries, wild fruits, and roots. Farming became important during the later period of their settlement.

Corn, squash, and beans were the most important farm products to the Native Americans of the survey area. These original farmers, however, did not plow the fields, as the early English settlers did. They used pointed sticks to make holes in the ground. Seeds and bits of fish, used as fertilizer, were dropped in the holes. This farming method is similar to the present-day method of no-till planting, in which farmers open a furrow in the crop field, drop in seed, and apply fertilizer. Tobacco was also widely used by the Native Americans, often as part of ceremonies and rituals. Although farming for the Nanticoke Indians was very primitive compared to today's standards, it had become an important part of their lives by the time the English settlers arrived.

The first English settlers arrived in the mid-1600's and were generally trappers and traders. Early English settlements in Dorchester County resulted from land grants issued by Lord Baltimore. Many of these settlements were along riverbanks, where soils were well drained and where the water source provided easy access for travel and the transportation of goods. In the late 1800's, many German and Swiss families also settled in Dorchester County.

The word "plantation" was widely used to describe the type of land grants in Dorchester County and on the Eastern shore. A plantation was not a large area of land planted in crops. Plantations were small fields that had been cleared and were surrounded by acres of timberland or uncultivated land. A "gentleman planter" may have owned a number of these small, cleared fields called plantations. The place where the settler actually lived was referred to as the home plantation.

The system of land grant distribution was the basis for the development of agriculture in the Maryland colony. The early settlers were anxious to profit by the tobacco trade and did not immediately invest in grain production. During the early years of Dorchester County, tobacco was the only product that could be used as a stable medium of exchange. It was the farmer's important money crop. All members of the farming family, including children, worked. Each farm needed to be self-sufficient. Indentured servants and slaves were important for the labor required in agriculture.

By the end of the 18th century, tobacco farming was no longer profitable because the market was unstable and the soils were depleted of nutrients. Farmers in Dorchester County gained new wealth when the railroad extended its lines from Wilmington to the Eastern shore. A waiting market was created for fresh fruits, vegetables, watermelons, sweet corn, and berries. In addition to the opening up of county markets because of the railroad, steamboats making daily stops at waterfronts all over the county opened up markets in Baltimore and Washington D.C.

Because of the availability of timber and the need for water transportation, every plantation had a boat-building center, where servants and the settler's family became experienced in shipbuilding. Yankee crews made regular visits to Dorchester to purchase pine masts for use in northern shipyards. Canals were dug through the marshes so that timber could float out to waiting ships along rivers. The marshland was also used for agricultural purposes, such as harvesting hay and raising horses, hogs, and cattle. Tonging and dredging for oysters and clams in winter supplemented income from agriculture. These operations increased the need for boat construction.

At the turn of the 20th century, oystering had reached its peak. The city of Cambridge had its golden era during this period. Its harbor was filled with ships. At least 20 packing houses along the creek made the city a boomtown. Banks, lumber companies, hotels, and livery stables were established.

During this period, agriculture was beginning to change. Tomatoes were the major crop, and canning houses operated even in small rural communities. A packing company located in Cambridge became one of the largest food processors in the country and produced C rations for American soldiers during World War II. The

canning and food processing industry suffered in the early 1950's, partly as a result of the increase in regulations and the loss of government contracts. The major crops eventually became corn, soybeans, and small grains. When farmers in the northern part of Dorchester County started irrigating cropland, the cucumber and pickle industry started growing.

## Industry and Transportation

Many of the industries in Dorchester County are closely related to agriculture and to the natural resources of the area. The county has packing houses for truck crops, oysters, and shellfish and facilities for processing poultry and seafood. It has markets for fresh fish, oysters, clams, and crabs. Most of the corn and soybeans grown in the county are processed into feed for poultry. In addition to crop production, many of the farms are also involved in poultry and swine production. The county has light-industry plants that manufacture electronic components, power chains, conveyor belts, and specialty gases and perform printing and binding services. Woodland production is an important industry, and three sawmills currently operate in Dorchester County. The products of this industry include lumber, barrels, treated wood, wood chips, poles, and pilings.

The county is served by the Maryland and Delaware Railroad and by modern highways that cross the county in nearly all directions. U.S. Highway 50 runs east and west, and State Highway 16 runs north and south. Ten freight companies service the county, and charter air service is available at the Cambridge-Dorchester County Airport. Pleasure crafts and workboats extensively use the waterways and harbors.

## Physiography, Relief, and Drainage

The physiographic region that includes Dorchester County is the Mid-Atlantic Coastal Plain. The county is underlain by a wedge-shaped mass of sediments, approximately 3,500 feet thick, consisting mainly of sands, silts, clays, and gravel. Beneath these sediments is crystalline rock that dips, or increases in depth, towards the southeast. The sediments were mainly deposited in a fluvial, marine, or shallow water environment. A thin layer of windblown sand or silt is on the land surface. The deposits of windblown sand occur mainly in the northern part of the county, and the deposits of windblown silt occur in the southern part. In some areas both kinds of deposits have been reworked by moving water.

Although some areas in the northern part of the county are rolling or hilly, the relief of the county is generally slight. The highest point in the county, located halfway between East New Market and Brookview, is 57 feet above sea level. The lowest parts of the county are the tidal marshes, which are at or just above sea level. In most of the county, elevations are less than 25 feet. Large areas in the southern part of the county are barely above sea level.

The county can be divided according to elevation into three regions. These regions are: 1) flood plains, tidal marshes, and swamps; 2) the Pamlico Terrace, at elevations between 0 and 25 feet above sea level; and 3) the Talbot and Wicomico Terraces, at elevations between 25 and 57 feet. The terraces were formed by meltwaters of the continental ice sheet. Sea level along Chesapeake Bay was much higher in the geologic past than it is today. Although the escarpments of these terraces are very subtle in Dorchester County, they are prominent in other counties on the Eastern shore *(10)*.

The most recent deposits are Holocene sediments. They make up areas on flood plains, in tidal marshes, and in swamps (fig. 2). The soils in these areas are very poorly drained or poorly drained and have a large amount of organic matter and variable mineral textures. Because they are at very low elevations or in very low landscape positions, they are inundated during periods of rainfall or tidal events. The flood plains in the county generally are within the upper reaches of rivers, creeks, and streams. The marshes are common along major tidal rivers and along the edges of the many necks in the county. The swamps are also along major tidal rivers but are in less brackish waters. Many of the marshes in the survey area developed over mineral soils that were previously above sea level. Due to the melting of the most recent continental ice sheet, the mineral soils are now below sea level. The highly organic marsh soils formed on top of these mineral soils.

The lowland flats of the Pamlico Terrace are at elevations between 0 and 25 feet. They are characteristically broad, level areas that are dissected by tidal streams. These areas are composed of loess or alluvial materials overlying the Kent Island Formation. The loess consists of windblown silt that was removed from the flood plain of the ancient Susquehanna River, which is presently the basin of Chesapeake Bay *(4)*. The soils generally are very poorly drained to moderately well drained.

Most of the northeastern part of the county is included with the Talbot Terrace, and a small part above 45 feet in elevation is included with the Wicomico Terrace. This region consists mainly of the Parsonsburg Sand Formation overlying the Beaverdam and Pensauken Sand Formations. The soils in the region are generally moderately well drained to excessively drained. The coarser soil textures result from windblown deposits overlying the sandy fluvial and marine deposits.

The survey area drains entirely into Chesapeake Bay.

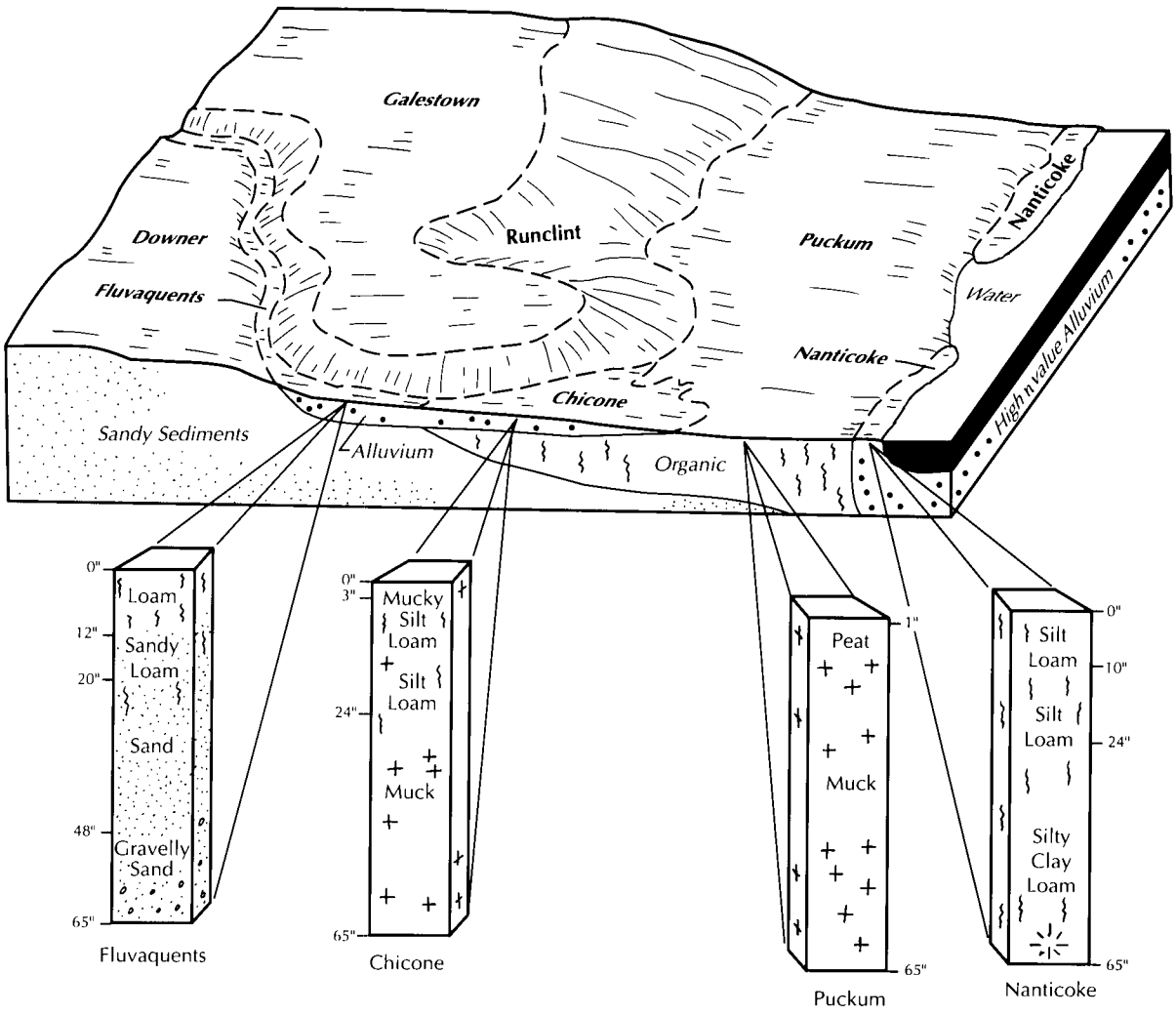


**Figure 2.—Typical profiles and landscape pattern of soils on flood plains adjacent to upland soils.**

The Nanticoke River, on the eastern border of the county, and the Choptank River, on the northwestern border of the county, are the two main outlets. Marshyhope Creek, a tributary of the Nanticoke River, provides drainage in the northeastern corner of the county. The Blackwater, Little Blackwater, Transquaking, and Chicamacomico Rivers drain the middle part of the county into Fishing Bay, which drains into Chesapeake Bay.

Surface drainage in the survey area ranges from poor in the southern part of the county to good in the northeastern part. The southern half of the county has large expanses of marshland and lowland flats, where there is little or no surface drainage. This area is also affected regularly by tides. At the higher elevations in the northeastern part of the county, the influence of tides is greatly reduced. Only small areas along the major rivers are tidal. Surface drainage is only a problem in scattered areas of flood plains and depressions.

Only 17 percent of the acreage in the county consists of areas that do not have impeded drainage. About 50 percent of the county requires some form of drainage for most uses. About 21 percent of the acreage in the county is tidal marshes or freshwater swamps. About 17 percent of the county is areas of open water.

## Water Supply

Dorchester County is underlain by a series of geologic strata containing layers of water-bearing sand and gravel. These layers, referred to as aquifers, contain an abundance of water for agricultural, domestic, and industrial wells and are the only source of drinking water

in the county. Generally, the layers dip, or occur at increasing depths, from west to east through the county.

The Columbia aquifer is contained in the surficial Beaverdam and Pensauken Formations. It occurs between the surface and a depth of about 100 feet. It is part of the Pleistocene deposits in the survey area. This aquifer has a very high rate of permeability. It yields up to 1,500 gallons per minute. The water is of fairly good quality and has low levels of iron and total dissolved solids. Because of the aquifer's proximity to the surface, it may have locally higher levels of nitrates as the result of poultry production, onsite sewage disposal, and applications of agricultural fertilizer.

The Choptank and Calvert Formations in Dorchester County are contained in the Miocene deposits. Although these formations have three individual aquifers, namely the Frederica, Federalsburg, and Cheswold aquifers, in many areas the aquifers are interconnected and act as a single unit. The yields of these aquifers are sufficient for the support of single-family wells but may not be adequate if large volumes of water are required. The aquifers occur at a depth of 200 to 300 feet. The water is generally soft but contains higher amounts of iron than the Columbia aquifer. The aquifers occurring in the Miocene and Pleistocene deposits are the main source of drinking water in areas north of Route 50 in Dorchester County *(6)*.

The Piney Point Formation of Eocene age contains the Piney Point aquifer. This aquifer is the main source of water for the city of Cambridge. It is also used extensively for drinking water in areas south of Route 50. This aquifer normally occurs at depths between 300 and 400 feet. Although the transmissivity of this aquifer in the Cambridge area is high (yields are as much as 1,120 gallons per minute), water levels have decreased throughout the entire area in the last 20 years. In some areas the water quality is so good that no treatment is required for domestic or industrial use. Near the Choptank River and other tidal areas in the southern part of the county, the water can have high levels of hydrogen sulfides and may require treatment prior to use.

The Aquia aquifer is named for the Aquia Formation of Paleocene age. This formation is characterized by green quartz sands that have moderate amounts of glauconite. The aquifer occurs at depths between 500 and 650 feet. The water is soft and has a low level of iron. It is suitable for domestic use and does not require pretreatment. This aquifer is often used in the area of the Neck District as a source of drinking water.

Most of the major rivers and streams in Dorchester County cannot provide adequate supplies of domestic or irrigation water because of low yields, poor quality, or high levels of salinity. Recently, only a few ponds, mill ponds, and the upper reaches of Marshyhope Creek have provided suitable surface water for cropland irrigation.

## Agriculture

Agriculture in Dorchester County is favored by a fairly long growing season, well-distributed rainfall, responsive soils, and a temperate climate. In 1992, about 33 percent of the total acreage of land was farmland. About 105,000 acres were used as cropland, and 10,218 acres of the cropland was irrigated.

The following paragraphs contain information about farms, crops, and poultry and livestock productions in Dorchester County. The statistics are from the 1992 Census of Agriculture *(19)*.

Farms in the survey area have decreased in number but increased in size. In 1992, the county had 347 farms, a decrease of nearly 40 percent since 1960. The size of the average farm was 357 acres in 1992 and only 215 acres in 1960.

In 1992, poultry and poultry products made up most of the income derived from the sale of livestock and livestock products. Chicken broiler and roaster production was an important farm enterprise on 79 farms in the county. In 1992, the number of broilers and roasters that were sold totalled more than 19 million units. In 1960, this number was only 1.5 million. In 1992, Dorchester County was ranked third in the state for number of hogs and pigs. The number totalled 15,519 units. In 1960, this number was only 2,824.

The production of corn, soybeans, small grain, and vegetables in Dorchester County is very important to Maryland's agricultural community (fig. 3). Although the acreage of grain corn, barley, and tomatoes has decreased since 1960, the acreage of wheat and soybeans has almost doubled during that same time period. Table 1 gives the acreage of the most important crops grown in the county in 1992.

## Natural Resources

The natural resources of Dorchester County are abundant and diverse. The survey area provides resources for agriculture, silviculture, wildlife habitat, and construction materials.

Potential prime farmland in the county makes up almost 60,000 acres. The soils in these areas are well drained or moderately well drained and are level or gently sloping. An additional 30,000 acres have the potential to be prime farmland if limitations affecting plant growth are overcome. These limitations include a high water table and droughtiness. They can be overcome by such measures as adequate drainage and dependable irrigation (fig. 4).

Woodland covers 141,000 acres, or about 37 percent of the county. Most of the woodland is privately owned, but substantial tracts occur in protected habitat areas.

**Figure 3.—Tomatoes on the well drained Downer sandy loam, 0 to 2 percent slopes.**

The commercial woodland consists dominantly of good-quality loblolly pine. The remaining woodland consists of upland oaks, sweetgum, blackgum, Virginia pine, holly, beech, or red maple, depending on soil wetness.

The county has 1,700 miles of tidal shoreline and almost 72,000 acres of open water. This acreage does not include the large expanses of Chesapeake Bay. Because the range of the survey area covers deep open water, tidal marshes, and uplands, the survey area provides habitat for a variety and abundance of wildlife. Canadian geese inhabit the fields and ponds during winter. Ducks, game birds and other birds, deer, rabbits, and squirrels frequently use the fields and woodland for food and cover. The marshy areas provide food and cover for muskrats, nutria, raccoons, nesting ducks, sika deer, and many other animals. These areas also act as a natural buffer to protect the shorelines from erosion. The open waters provide habitat for crabs, oysters, clams, fish, and turtles. Blackwater National Wildlife Refuge, LeCompte Wildlife Refuge, Linkwood Wildlife Management Area, Fishing Bay Wildlife Management Area, and Taylors Island Wildlife Management Area provide more than 49,000 acres of protected habitat for wildlife, including endangered species, such as the bald eagle and the Delmarva Fox Squirrel.

The northern part of Dorchester County has many sand and gravel deposits, which are used locally for building purposes and road construction. Clean sand and pea-sized gravel from these deposits are used extensively as backfill in trenches for septic tank absorption fields. Many of the abandoned borrow areas of these deposits provide suitable habitat for wildlife.

## Climate

The climate data in tables 2, 3, and 4 was recorded at the climate station in Vienna, Maryland. The information

on thunderstorms, relative humidity, percent sunshine, and winds was estimated from data recorded at the first order station at Washington National Airport.

Table 2 gives data on temperature and precipitation for the survey area as recorded at Vienna in the period 1961 to 1990. Table 3 shows probable dates of the first freeze in fall and the last freeze in spring. Table 4 provides data on length of the growing season.

In winter, the average temperature is 37.3 degrees F and the average daily minimum temperature is 28.2 degrees. The lowest temperature on record, which occurred at Vienna on January 29, 1961, is -6 degrees. In summer, the average temperature is 75.8 degrees and the average daily maximum temperature is 86.7 degrees. The highest recorded temperature, which occurred at Vienna on June 23, 1988, is 102 degrees.

Growing degree days are shown in table 2. 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

**Figure 4.—A vegetated intermittent stream. Fallsington sandy loam is separated from Downer sandy loam, 2 to 5 percent slopes, in the background Fort Mott loamy sand, 2 to 5 percent slopes, is in the foreground.**

(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 43.38 inches. Of this, about 23.09 inches, or 53 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 7.00 inches at Vienna on September 27, 1985. Thunderstorms occur on about 28 days each year, and most occur in July.

The average seasonal snowfall is 10.6 inches. The greatest snow depth at any one time during the period of record was 21 inches on February 19, 1979. On the average, 5 days of the year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 19 inches on February 19, 1979.

The average relative humidity in mid-afternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 74 percent. The sun shines 63 percent of the time in summer and 47 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 11.0 miles per hour, in March.

## How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas, their location, and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted color, texture, size, and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from local and regional farm records and from local and regional field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they

cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

This survey area was mapped at two levels of detail. At the more detailed level, map units are narrowly defined. Map unit boundaries were plotted and verified at closely spaced intervals. At the less detailed level, map units are broadly defined. Boundaries were plotted and verified at wider intervals. In the legend for the detailed soil maps, narrowly defined units are indicated by symbols in which the first letter is uppercase and the second is lowercase. For broadly defined units, the first and second letters are uppercase.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

## Survey Procedures

This survey updates the soil survey of Dorchester County published in 1963 *(14)*. It provides additional data and soil interpretations and larger maps, which show the soils in greater detail. The soils in this survey are described to a greater depth than in the previous survey. Many of the soil series and map unit names have been changed because of new information and changes in the national system for soil classification. Though some soil boundaries have been readjusted, many are essentially the same as those in the original survey.

The general procedures followed in making the survey are described in the "National Soil Survey Handbook" of the Natural Resources Conservation Service *(12)*. The previous soil survey of Dorchester County, the geology map of Dorchester County, and other references were used to prepare the manuscript and to plan the soil transects.

Before fieldwork began, color infrared aerial photographs, which were taken in March and April of 1981, 1982, and 1983 at a scale of 1:15840, were studied. These aerial photographs provided information that was significant in determining the location of certain soil boundaries in woodland areas. They were also used to locate representative areas for transects and sampling sites. All of the profile descriptions from the 1963 report representing the modal or central concept of the soil series were investigated and described using new terminology and nomenclature. They were used as a starting point for evaluating the old map units. A reconnaissance was made by vehicle before the landscape was traversed on foot. The field transects were used to identify any changes needed in the central concept of the series and to determine map unit composition. Some areas required remapping, particularly the tidal marshes, swamps, alluvial flood plains, and lowland flats. In the previous soil survey, many of these areas were mapped with less detail and at a less accurate soil classification level. Soil boundaries were determined on the basis of soil examinations, observations, and photo interpretation.

Some of the soil series in the 1963 survey could not be used. New information on soil temperature, particle-size distribution, and water tables indicated the need for the establishment of new series. Many of the new series and some of the older, still used series were sampled for chemical and physical analyses and for analyses of engineering properties. Full characterization analyses were made by the Soil Survey Laboratory in Lincoln, Nebraska. Particle-size distribution, mineralogy analyses, and special studies related to soils of tidal marshes were made by the Pedology Research Laboratory, Department of Agronomy, University of Maryland. A description of the laboratory procedures can be obtained on request from the laboratories. The results of the analyses and studies can be obtained from the laboratories or from the state office of the Natural Resources Conservation Service.

# Formation of the Soils

This section describes the factors of soil formation in relation to the soils in Dorchester County and explains the morphology of the soils and the processes of soil formation.

## Factors of Soil Formation

A soil is a three-dimensional natural body consisting of mineral and organic materials that can support plant growth. The nature of any soil at a given site is the result of the interaction of five general factors—parent material, climate, plants and animals, relief, and time. Climate and plants and animals affect parent material, which is modified by relief over a period of time. The relative influence of each factor varies from place to place. In some areas one factor dominates in the formation of a soil and determines most of its properties. Local variations among the soils in Dorchester County mainly result from differences in parent material, relief, and time.

### Parent Material

Parent material is the raw material that is acted on by soil-forming processes. It largely determines soil texture, which affects other properties, such as natural soil drainage and permeability. Parent material influences the mineralogy and physical and chemical composition of the soil and, to some extent, the rate at which soil formation takes place.

The soils in Dorchester County formed in many different kinds of parent material. Many of the soils formed in unconsolidated mineral sediments deposited by wind or water. These sediments were deposited on coastal plains and alluvial deltas. Because they were deposited in fluvial and marine environments, the sediments are referred to as fluviomarine. Other soils formed in a thin mantle of windblown sand or loess (silty material) overlying the fluviomarine sediments or in recent alluvium deposited by streams. Some of the windblown deposits have been reworked by past alluvial action. Soils in Dorchester County are unique because many of them developed from organic parent material overlying various mineral sediments.

The fluviomarine sediments in the northern part of the county are orange to reddish brown, white, and pale green sands and gravelly sands that have a high content of quartz and feldspathic minerals. These sediments, which make up the Pensauken and Beaverdam Sand Formations, are late Miocene and Pliocene in age and were deposited by the deltaic influence of the ancient Susquehanna and Delaware River systems *(10)*. They have been reworked during a marginal marine environment that was common to the entire Eastern shore. The high content of feldspar in this material provides an excellent source for silt- and clay-size particles through weathering. Evidence of these sediments is in the subsoil and substratum of Sassafras, Fallsington, and Woodstown soils.

Windblown (eolian) medium sands of late Pleistocene and early Holocene age, which make up the Parsonsburg Sand Formation, overlie most of the fluviomarine sediments *(9)*. This parent material, which has a lower content of feldspar than the underlying deposits, is a veneer deposit, forming a thin mantle over broad areas in the northern and central parts of the county. This material is light colored. It generally is less than 4 feet thick in most areas of the county but ranges to more than 14 feet thick east of Marshyhope Creek. The material caps many of the terraces along the major streams in the eastern part of the county. It makes up the nearly level and gently undulating areas on broad uplands and steep slopes along incised drainageways. Soils that formed in the thinner deposits of this material are Downer, Hammonton, Hurlock, and Ingleside soils. Evesboro, Fort Mott, Galestown, and Runclint soils formed in the thicker deposits.

Underlying most of the central and southern parts of the county, generally at elevations below 25 feet, are deposits of interstratified silt, clay, and fine and very fine sand. These deposits make up the Kent Island Formation. This formation is Pleistocene in age and may have originated in an estuary, the ancient and much larger Chesapeake Bay. According to one theory, the deposits may have been part of the bay's bottom prior to the formation of the modern bay *(10)*. Most of the sediments in this area were planed off by bay currents, and the result was a southwest-facing scarp that had its lower edge

about 20 feet above sea level *(10)*. This terrace-scarp was once well defined but is no longer highly visible in Dorchester County because of geologic erosion and surface dissection *(10)*.

In many areas a relatively thin deposit (less than 3 feet thick) of loess lies on top of the sediments of the Kent Island Formation. During the Pleistocene epoch, sea level was more than 300 feet lower because of the increased sizes of the polar and subpolar ice caps. The Susquehanna River flowed southeasterly within the channel at the bottom of the present-day Chesapeake Bay. At the end of the Pleistocene epoch, when the glaciers started to melt and the oceans were warming, the river transported silty sediment. During periods of flooding, this sediment was deposited outside of the channel onto the ancient river's flood plain, which is currently the bottom of the bay. Strong northwest winds blew across the open flood plain, picking up the silt particles and depositing them on land adjacent to the bay *(4)*. Matapeake, Mattapex, and Othello soils formed in this loess overlying the sandier old estuarine and fluviomarine sediments. Because these soils developed from the same parent material, the differences between them are attributed to the other soil-forming factors.

Recent alluvium is soil material that is deposited by floodwaters in and along present-day streams. The texture of the soil material varies depending on the speed of the floodwater, the duration of flooding, and the distance from the streambank. Soils that formed in recent alluvium can be highly stratified. The soil horizons are weakly expressed because the soil-forming processes are interrupted by each new deposition. The source of the alluvium generally is material eroded from other soils farther upstream in the watershed. Fluvaquents formed in sandy alluvium on long, narrow flood plains throughout the county. Chicone soils formed in recent silty alluvium overlying an older organic soil, which was buried by the alluvium, on the wider flood plains in the county. The Nanticoke soils along Marshyhope Creek formed in silty and clayey sediments on estuarine marshes and mud flats, which are flooded by predominantly fresh tidal waters.

Organic soils formed in decomposed plant material that accumulated on the surface of marshes or swamps at a rate that corresponded with the rise in sea level. The sea level has been rising in the survey area since the last period of glaciation. Many of the organic soils were influenced by saltwater and by tidal action. Marshes naturally age as they become filled with organic material derived from algae, sedges, rushes, and other water-tolerant plants. Other organic soils formed in decomposed woody plant material that accumulated in submerged river valleys that formed into swamps. The plant residue in these marshes and swamps accumulates because the permanently wet condition of the soils prevents oxidation and slows decomposition. Freshly exposed organic material commonly is reddish brown or black, depending upon the amount of decomposition that has occurred.

Most of the organic soils in Dorchester County are along rivers, creeks, and ponds in the southern part of the county. Honga soils formed in organic deposits overlying mineral sediments, which were upland soils before the sea level rose. Areas of these marshes are known as submerged upland tidal marshes *(3)*. Bestpitch and Transquaking soils formed in organic deposits overlying silty and clayey mineral sediments that were deposited in still estuarine tidal creeks. The mineral material settled out in these waters and consequently is very fluid. Puckum soils formed along Marshyhope Creek and the Nanticoke River in the thick woody organic deposits that formed into swampland.

### 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 elements. The climate of Dorchester County is humid and temperate. There are no significant differences in elevation across the county and no obstructions to the movement of winds, clouds, and rainstorms. Masses of air generally move through the county from a northerly or westerly direction, and they are warmed by the air that moves in periodically from the south and southwest. The annual precipitation is about 45 inches, and the mean annual air temperature is about 56 degrees F. Rainfall is almost uniformly distributed throughout the year but is at its highest level in August. During the growing season, the period from April through October, the average amount of rainfall is about 27 inches.

Because of this humid, temperate climate, most of the soils in the county are strongly weathered and leached. In most areas the soil material has weathered to a considerable depth because it has been exposed to climatic forces over a long period of time. Soils that are not strongly weathered, such as Evesboro and Runclint soils, formed mainly from quartz-rich materials that are resistant to weathering.

Most of the soils have been leached of a majority of their natural soluble salts and basic ions. As a result of this leaching, the soils in Dorchester County are mainly naturally strongly acid to extremely acid. Some soils in tidal marshes, such as Bestpitch, Transquaking, and Honga soils, are different because they receive additions of salts when they are inundated by brackish water.

Weathering and leaching have resulted in a low natural supply of plant nutrients in most of the soils. Some soils have a moderate supply of plant nutrients. Productivity on many of the soils that are low in plant nutrients can be

greatly increased if the soils are properly managed. Because of the leaching of clay from the surface and subsurface layers and the clay formation, the subsoil in most of the soils is enriched in clay. Alternating periods of wetting and drying cause prismatic or blocky structure in the clay-enriched subsoil, such as in the subsoil of Elkton, Keyport, and Kentuck soils. The alternating periods of wetting and drying, especially where there is organic material, also are responsible for the segregation and translocation of iron in many soils.

The soils in Dorchester County are not only affected by the present-day climate but are also affected by the various climatic conditions that have occurred during soil formation. Microflora occurring in organic matter in underlying sediments were dated by radiocarbon and indicate that the climate has been drier and cooler during the last 13,000 to 30,000 years *(9)*. Gravel lines, which occur in some soils, may indicate periods of accelerated erosion and deposition under a wetter climate.

Detailed climatic information is provided in the section "General Nature of the County."

**Plants and Animals**

Living organisms, including vegetation, bacteria, fungi, animals, and humans, impact soil formation. The vegetation under which a soil forms influences such soil properties as color, structure, reaction, and content and distribution of organic matter. Plants extract water from the soil, recycle nutrients, and add organic matter to the soil. Decomposition of this organic matter darkens the surface layer. Gases derived from root respiration combine with water to form acids, which influence the weathering of minerals.

When Dorchester County was first settled, the native vegetation consisted mainly of hardwood forests. Oak was the dominant species in most parts of the county. Loblolly pine, Virginia pine, yellow-poplar, holly, gum, and red maple were also common. Hardwoods primarily grew on the better drained soils, such as Downer, Ingleside, and Sassafras soils. Blackgum, red maple, and willow oak primarily grew on the poorly drained soils, such as Othello, Hurlock, and Elkton soils. The windthrow of trees on these poorly drained soils resulted in the mixing of the soil's upper horizons, which disrupted the normal development of the soil profile.

Because litter from pine trees is acidic, it contributes to the dispersion of clay particles. The dispersed clay particles can move downward and form clearly expressed subsoil horizons, such as those in Matapeake, Hambrook, and Woodstown soils.

Many of the metabolic processes carried out by bacteria, fungi, and other micro-organisms release organic acids, which affect soil development. These organisms decompose organic matter and release nutrients to growing plants. They influence the development of soil structure. Soil properties, such as drainage, temperature, and reaction, influence the type of micro-organisms living in the soil. Fungi are generally more active in the more acid soils, and bacteria are more active in the less acid soils.

Earthworms, insects, and small burrowing animals mix the soil and create small channels, which influence soil aeration and the percolation of water. This mixing of the soil, if extensive, can inhibit soil development to some extent. Earthworms help to incorporate crop residue and other organic matter into the soil. The organic material helps to improve soil tilth.

Human activities have significantly influenced soil formation. Clearing areas of forests for cultivation, introducing new kinds of crops and other plants, and improving natural drainage have affected the development of soils and will continue to affect their development. Cultivation, which mixes the upper horizons and forms a plow layer, has accelerated erosion on sloping soils, affected soil structure and compaction, and lowered the content of organic matter. The drainage of wet soils has increased the decomposition rate of organic matter in the surface layer. Manure, chemical fertilizer, and pesticides that have been applied in cultivated and urban areas have chemically altered the soil. The addition of lime to increase soil reaction in areas of cropland has changed many areas of Downer, Hammonton, and Ingleside soils from acidic to basic. The introduction of fairly pure stands of pine affects soil development by resulting in greater acidic conditions and changes in content of organic matter. The introduction of nutria (fur-bearing mammals similar to muskrats) into marshes has severely changed some areas of Bestpitch and Transquaking soils because organic horizons have been destroyed.

**Relief**

Dorchester County is entirely within the Atlantic Coastal Plain. Most areas are nearly level. Although slopes are generally less than 2 percent, in a few places the slope is between 15 and 30 percent. The steeper areas are mainly along the drainageways in the northern part of the county and make up less than 1 percent of the county.

Local differences in elevation are rarely more than a few feet. There are only a few areas where the differences are as much as 20 feet in 1 mile. The highest elevations are in the northern and northeastern parts of the county, and the highest point is 57 feet above sea level. The salt marshes in the southern part of the county are at sea level. Most of the county is below 25 feet in elevation.

The relief, or topographic position of a soil, influences soil formation mainly through its effect on depth to the

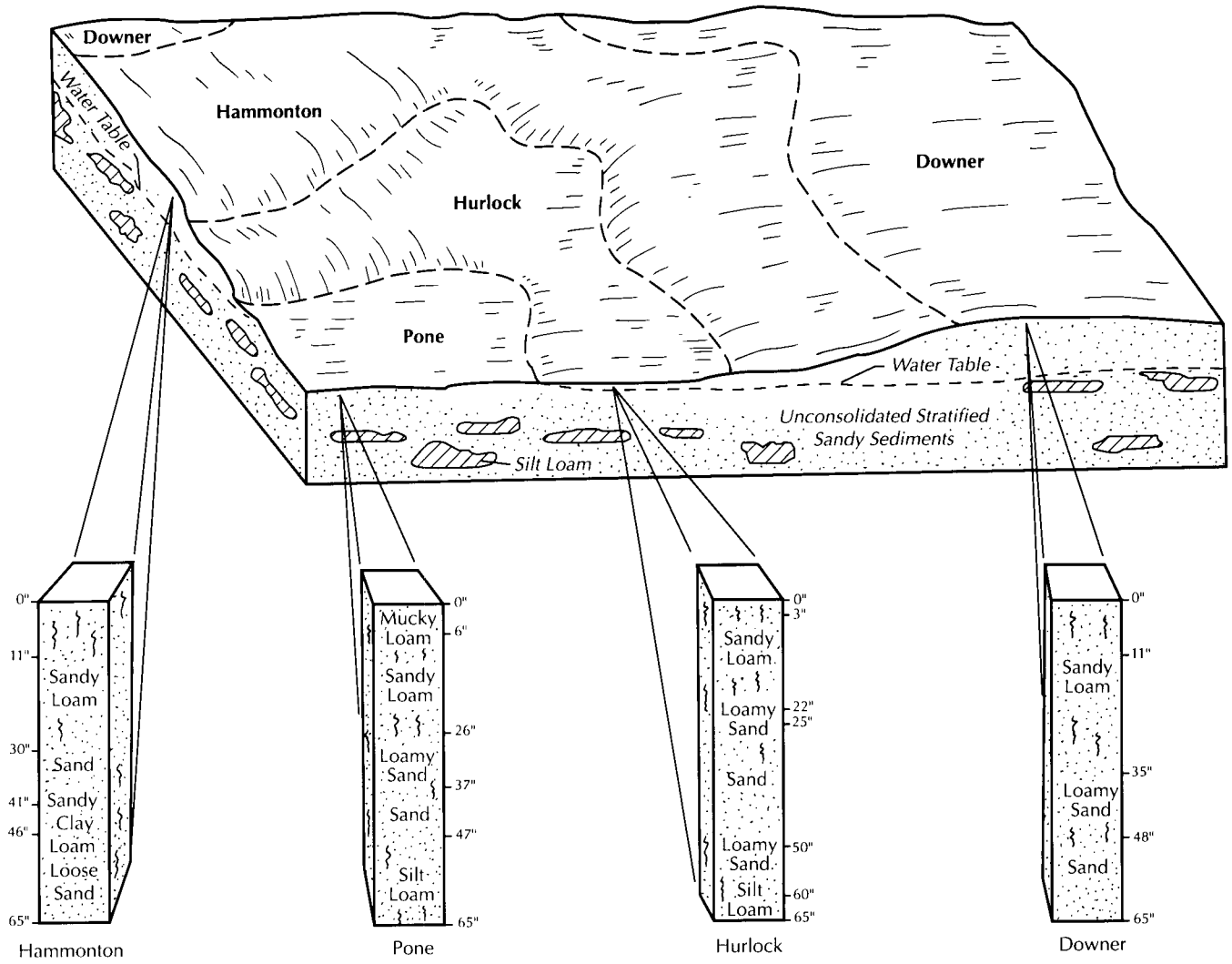


**Figure 5.—An idealized diagram that illustrates the general relationship of the soils in the Downer drainage catena.**

high water table, surface and subsurface drainage, the rate of water percolation, and erosion.

The survey area slopes mainly toward the south but also slopes toward the west. The nearly level relief in most of the county contributes to the slow drainage of many of the soils. Water flows very slowly over the soil surface into the main channels, especially from nearly level areas of the finer textured soils, such as Keyport and Elkton soils. Because water also moves slowly through many of the soils, the artificial drainage of these soils is difficult.

The influence of the level to sloping, broad, slightly depressional relief is especially important where the water table affects soil development. In the northern part of the county, Downer soils are commonly higher on the landscape than Hammonton soils. Downer soils do not have a water table within a depth of 72 inches in most years, but Hammonton soils have a high water table between depths of 20 and 40 inches in most years. Hurlock and Pone soils are lower on the landscape than Hammonton soils and have a high water table near or above the surface. In addition, Pone soils occur in depressional areas and have a large accumulation of organic matter in the surface layer. Downer, Hammonton, Hurlock, and Pone soils developed in the same kinds of parent material over similar periods of time. They are different because the water table (saturation) affects the development of a soil. The relationship of these soils to one another on the landscape is referred to as a drainage sequence or catena (fig. 5). The Matapeake, Mattapex,

Othello, and Kentuck soils in the southern part of the county have a similar relationship.

The nearly level relief and low elevations have influenced the development of some of the soils adjacent to tidal marshes. Some areas of Othello and Elkton soils are occasionally flooded by salt water during storm tides, and this influence will increase as sea level rises. These soils are slowly developing into Sunken soils. Sunken soils, which are flooded by salt water more frequently than Othello and Elkton soils, are slowly developing into Honga soils in a tidal marsh landscape. As sea level continues to rise, more areas of these soils will be changed in this way.

Relief also influences the type of parent material in which a soil forms. In areas of Chicone soils, which are on flood plains in areas of old swamps, more recent mineral material is continually deposited over the organic layers. In areas of Bestpitch and Honga soils, which are in tidal marshes, organic soil materials are continually deposited over the mineral materials.

### Time

The length of time that parent material has been in place and exposed to the weathering process, climate, and plants and animals influences the nature of the soil that forms.

Because many of the soils in Dorchester County developed in unconsolidated sediments, the parent materials were preweathered to some extent before they were deposited. Many easily weathered minerals were removed from these materials long before the soils formed. Nevertheless, the soils still reflect the amount of time that they have been exposed to the soil-forming processes.

The oldest sediments in the survey area were deposited between 25 million and 2 million years ago during the Miocene and Pliocene epochs. Other sediments in the county were deposited between 2 million and 10 thousand years ago during the Pleistocene epoch, and they covered many of the older sediments. During these epochs, many of the sediments have been exposed and reworked by geologic processes. During the last 20,000 years, the landscapes in the county have been stable enough for the processes of soil formation to take place.

The youngest soils in the county, including Nanticoke, Chicone, Honga, and Puckum soils, formed in recent deposits on flood plains, marshes, and swamps. Radiocarbon dating of a tree branch found in an area of Honga soils places the age of the organic deposits and some of the mineral deposits at less than 700 years *(5)*. Organic and alluvial materials are still accumulating in marshes, in swamps, and on flood plains.

## Morphology of the Soils

The morphological features of soil are the result of the soil-forming factors. They are expressed in the development of different layers, or horizons, which make up a soil profile. The soil profile extends from the surface down to material that is little altered by the soil-forming processes.

Most soils have three major horizons—the A, B, and C horizons. Some soils, particularly those in forests and marshes, also have an O horizon at the surface. Numbers or lowercase letters indicate subdivisions of the major horizons. The Bt horizon, for example, has accumulated clay from the overlying horizons and is the most developed part of a B horizon. Matapeake soils have a Bt horizon.

The O horizon is an organic layer. It consists of organic material, such as twigs, leaves, dead roots, or humified organic matter, mixed with a small amount of mineral material. Many of the forested areas in the county have a thin O horizon. Soils in tidal marshes, such as Honga, Bestpitch, and Transquaking soils, have a thick O horizon. Some of the O horizons, as in Transquaking soils, are more than 51 inches thick.

The A horizon is a mineral surface layer. It is darkened by humified organic matter. In cultivated areas, the material in this horizon is mixed with material from the underlying horizons and the result is a plow layer, or an Ap horizon. The amount of humus or organic matter in the horizon varies in different soils and ranges from very low to very high. Galestown and Evesboro soils have a weak A horizon that contains a little amount of organic matter. Pone and Kentuck soils have a prominent A horizon that may contain as much as 10 percent organic matter.

The E horizon, which commonly occurs in well developed, undisturbed soils, is a mineral subsurface layer. It is characterized by intense leaching, or eluviation, of clay and iron. An E horizon occurs if considerable leaching has taken place and organic matter has not darkened the material. This horizon is normally lighter in color that any other horizon in the profile. In cultivated areas, the material of this horizon is commonly mixed with the overlying A horizon and an E horizon may not occur.

The B horizon is a mineral subsoil layer and normally underlies an Ap or E horizon. It is characterized by the accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer. In some soils, such as Hambrook and Sassafras soils, the B horizon formed through alteration of the original material and through accumulation or illuviation. The alteration can result from weathering of the parent material; the release of iron, which results in rusty colors; and the development

of a soil structure in place of the structure of the original unconsolidated sediments. The B horizon commonly has blocky or prismatic structure. It generally is firmer and lighter in color than the A horizon and is darker than the C and E horizons. Almost all of the soils in Dorchester County have a B horizon.

The C horizon is a mineral substratum layer below an A or B horizon. It consists of material that is little altered by the soil-forming processes, but it may be modified by weathering. When the soil material of a C horizon is different than the parent material from which the overlying A and B horizons developed, the C horizon is labeled as a 2C horizon. Othello soils have a 2C horizon. All of the soils in Dorchester County have a C or 2C horizon. In some young soils, such as those that formed in recent alluvium, the C horizon extends to or nearly to the surface. These soils do not have an E or B horizon. Fluvaquents and Nanticoke soils are examples of these soils.

## Processes of Soil Formation

Soil forms through complex processes that can be grouped into four general categories—additions; removals, or losses; transfers (from one horizon to another); and transformations. These processes affect soil formation in differing degrees.

The accumulation and incorporation of organic matter in the surface layer is an example of an addition. This addition is responsible for the formation of the A horizon and is the main reason for the dark color of surface horizons in the mineral soils in Dorchester County. Heat from the sun and water from precipitation are also considered additions. These additions affect other processes in the soil by assisting with chemical and physical reactions.

Carbonates, soluble salts, and the soluble products of mineral weathering that are leached from the soil profile are examples of removals. In the soils of Dorchester County, some of these compounds were removed before the parent materials were deposited. Another example of a removal is erosion. On sloping soils most of the surface layer may be lost and redeposited at the bottom of the slope or in a waterway. The deposited materials are considered an addition.

The translocation of clay from the A and E horizons to the B horizon, which occurs in many soils in the county, is an example of a transfer. In this process, clay is dispersed in the upper horizons and subsequently moved with percolating water into the lower horizons, where it may be deposited by filtering or flocculation, or both. Thus the A or E horizon becomes a zone of eluviation, or loss, and the B horizon becomes a zone of illuviation, or gain. In Downer, Hammonton, Fort Mott, and Woodstown soils, the B horizon has more clay than the parent material and the A and E horizons have less clay. In the B horizon of most soils, thin clay films are in pores and on faces of peds. This clay has been transferred from the A and E horizons.

Another important example of a transfer is the leaching or diffusion of iron in the soil. This process takes place under saturated soil conditions in which there is no molecular oxygen. The naturally well drained soils in the county have a yellowish brown or reddish brown subsoil. The color results from finely divided iron oxide minerals (ferric iron) that coat the sand, silt, and clay particles. Under saturated conditions, as in the poorly drained soils in the county, the iron oxide minerals are chemically reduced to a more soluble form (ferrous iron). This form of iron is transported with water and can be transported completely out of the horizon. The remaining uncoated soil particles have a predominantly gray color. Normally, part of the iron is reoxidized and segregated into the form of stains, concretions, or bright yellow and red soft masses within the horizon. In the poorly drained Hurlock, Fallsington, Othello, and Elkton soils, this type of transfer has occurred throughout the profile. In Nanticoke soils and the mineral substratum of Bestpitch soils, this transfer has taken place but the reduced iron has not been removed from the horizons. The grayish blue colors in these soils indicate the occurrence of reduced ferrous iron, which is known as gleying. Other examples of transfers include the physical mixing of soil by animals, plants (such as trees tipping over), and humans. Nutrient recycling (bringing mineral elements to the soil surface) by plants is also considered a transfer.

The weathering of primary materials to clay minerals in the soil is an example of a transformation. It occurs by physical and chemical means, such as by the transformation of micas and feldspars to clays. This process can increase the content of clay during soil formation. Another kind of transformation occurs when clay is weathered from primary materials. Some iron generally is freed as a hydrated oxide. Depending on the degree of hydration, the oxide is generally red. Even a small amount of the oxide causes the subsoil to be reddish. Iron oxide colors the subsoil even in soils where there has not been enough accumulation of clay minerals to form a textural B horizon, as in Galestown soils.

The decomposition of organic matter in a soil is also considered a transformation. The organic soils in the county have varying degrees of decomposition. Honga and Bestpitch soils have a slight or moderate degree of decomposition in the organic layers, and Puckum soils have an extensive amount of decomposition in the organic materials.

# 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 map unit on the general soil map is a unique natural landscape or formation. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another 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.

## 1. Downer-Fort Mott

*Nearly level to strongly sloping, well drained soils that formed in sandy materials*

This map unit is in the northern and northeastern parts of the county, dominantly at elevations above 35 feet. It is on broad uplands and is dissected by widely spaced streams. In a few steeper areas that are adjacent to drainageways, slopes are as much as 30 percent. Most of the acreage has slopes of less than 2 percent. Slopes range from 0 to 10 percent.

This map unit makes up about 10 percent of the county. It is about 39 percent Downer soils, 27 percent Fort Mott soils, and 34 percent soils of minor extent. The minor soils include Galestown, Sassafras, and Ingleside soils on uplands, Woodstown and Hammonton soils in shallow depressions, Fallsington soils on low uplands and in depressions, and Fluvaquents on flood plains.

The nearly level to strongly sloping, well drained Downer soils are on broad uplands and long and short side slopes. They have a subsoil of sandy loam.

The nearly level and gently sloping, well drained Fort Mott soils are on broad uplands. They have a subsoil of sandy loam.

Almost all of this map unit is suited to and used for farmland. Only the sloping areas that are adjacent to streams and flood plains are wooded. The soils of this unit are well suited to corn, soybeans, small grains, truck crops, hay, and pasture. In some areas, they may require irrigation to supplement rainfall during droughty years. The soils have few limitations affecting woodland and are generally suitable for nonagricultural uses, except in the strongly sloping areas.

## 2. Runclint-Galestown-Fort Mott

*Nearly level and gently sloping, excessively drained to well drained soils that formed in sandy materials*

This map unit is in the northeastern part of the county, in areas extending north and south along Marshyhope Creek and Gales Creek. It is on uplands and stream terraces. Slopes range from 0 to 5 percent.

This map unit makes up about 4 percent of the county. It is about 27 percent Runclint soils, 26 percent Galestown soils, 13 percent Fort Mott soils, and 34 percent soils of minor extent. The minor soils include Hammonton and Ingleside soils in shallow depressions, Evesboro soils on stream terraces, Fluvaquents on flood plains, and Hurlock soils on low uplands and in swales.

The nearly level and gently sloping, excessively drained Runclint soils are on uplands and stream terraces. They have a subsoil of sand. They have a high water table between depths of 4 and 6 feet.

The nearly level and gently sloping, somewhat excessively drained Galestown soils are on uplands. They have a subsoil of loamy sand.

The nearly level and gently sloping, well drained Fort Mott soils are on broad uplands. They have a subsoil of sandy loam.

This map unit is almost entirely wooded east of Marshyhope Creek. The major species include planted loblolly pine, Virginia pine, and upland oaks. Cropland is the predominant land use west of Marshyhope Creek. The soils of this unit warm up early in spring and are well suited to truck crops, such as tomatoes, cucumbers, sweet corn, and watermelons. The standard rotation crops, namely small grain, soybeans, and corn, grow well

but irrigation may be required to supplement rainfall. The main limitations affecting most uses are the rapid permeability and droughtiness. The Runclint soils are also limited for most nonagricultural uses because of a high water table.

## 3. Puckum-Nanticoke

*Nearly level, very poorly drained soils that formed in organic materials and silty estuarine sediments*

This unit is in the northeastern and central parts of the county. It is in swamps on broad flood plains and on narrow tidal flats along Marshyhope Creek, the Nanticoke River, and the upper reaches of the Little Blackwater, Transquaking, and Chicamacomico Rivers. Slopes are 0 to 1 percent.

This map unit makes up about 3 percent of the county. It is 72 percent Puckum soils, 11 percent Nanticoke soils, and 17 percent soils of minor extent. The minor soils include Chicone soils and Fluvaquents on wooded flood plains and Pone soils on low uplands.

The nearly level, very poorly drained Puckum soils are on broad, wooded flood plains. They have mucky organic materials in the substratum.

The nearly level, very poorly drained Nanticoke soils are on narrow freshwater tidal flats and mud flats. They have a substratum of silty clay loam.

All of this map unit supports wetland vegetation. Because of tidal inundation, extreme wetness, and low strength, the soils generally are unsuitable for uses other than wildlife habitat or recreational areas. Because this unit consists of freshwater wetlands, it is extremely valuable in providing habitat for a large number of wetland animals; in providing a medium that filters nutrients, suspended materials, and pollutants and thus improves water quality; and in controlling floodwaters.

## 4. Hurlock-Hammonton-Ingleside

*Nearly level and gently sloping, well drained to poorly drained soils that formed in sandy materials*

This map unit is in the northeastern part of the county, at elevations between 20 and 35 feet. It is on broad uplands, on low uplands, and in shallow depressions and is dissected by widely spaced streams. Slopes range from 0 to 5 percent.

This map unit makes up about 12 percent of the county. It is about 25 percent Hurlock soils, 16 percent Hammonton soils, 14 percent Ingleside soils, 13 percent similar soils, and 32 percent soils of minor extent. The minor soils include Galestown and Fort Mott soils on uplands and Pone soils in depressions.

The nearly level, poorly drained Hurlock soils are on low uplands. They have a subsoil of sandy loam.

The nearly level, moderately well drained Hammonton soils are on broad uplands and in shallow depressions. They have a subsoil of sandy loam.

The nearly level and gently sloping, well drained Ingleside soils are on broad uplands. They have a subsoil of sandy loam. They have a high water table between depths of 4 and 6 feet.

About half of this map unit is used as cropland, and half is used as woodland. The common crops are corn, soybeans, and small grains. The Hurlock soils are mostly used as woodland. The dominant trees are loblolly pine, red maple, and sweetgum. Proper drainage is the main management concern for cropland in areas of the Hurlock soils. All of the soils in this unit are limited for nonagricultural uses because of a high water table.

## 5. Fallsington-Woodstown-Pone

*Nearly level and gently sloping, moderately well drained to very poorly drained soils that formed in loamy and sandy materials*

This map unit is in the central and northeastern parts of the county, in areas extending west and east. It is on uplands, on low uplands, and in depressions. Slopes range from 0 to 5 percent.

This map unit makes up about 6 percent of the county. It is about 41 percent Fallsington soils, 17 percent Woodstown soils, 13 percent Pone soils, and 29 percent soils of minor extent. The minor soils include Hurlock soils on low uplands and Ingleside and Fort Mott soils on uplands.

The nearly level, poorly drained Fallsington soils are on low uplands. They have a subsoil of sandy clay loam.

The nearly level and gently sloping, moderately well drained Woodstown soils are on uplands. They have a subsoil of sandy loam.

The nearly level, very poorly drained Pone soils are in broad and narrow depressions. They have a subsoil of sandy loam.

A high water table limits woodland management in areas of the Fallsington and Pone soils. Most areas of the Pone soils are in wooded wetlands. The major trees are red maple, sweetgum, willow oak, and water oak. These wooded areas provide excellent habitat for wetland animals and flood control for small streams. Many areas of the Fallsington soils are drained for cropland. The Woodstown soils have few limitations affecting cropland.

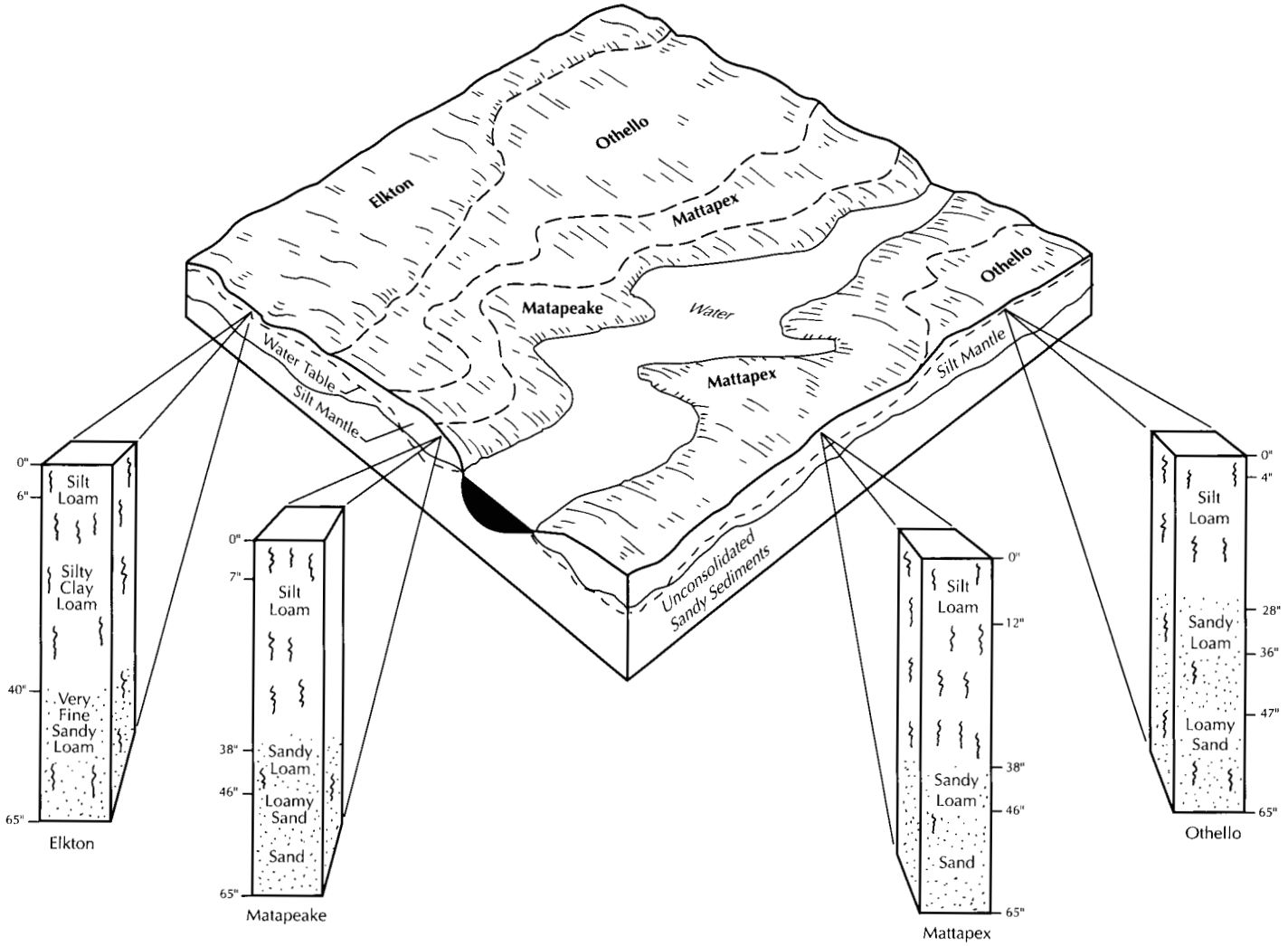


**Figure 6.—The relationship between general soil map units 6 and 7 on part of a neck landform.**

The high water table in the Fallsington, Woodstown, and Pone soils is a major limitation affecting nonagricultural uses.

## 6. Othello-Elkton

*Nearly level, poorly drained soils that formed in silty materials over sandy materials*

This map unit is in the south-central part of the county, on the necks and peninsulas along Chesapeake Bay to the Nanticoke River where elevations are generally less than 10 feet above sea level (fig. 6). The unit is the most extensive in the county. It is on broad lowland flats and in depressions. Slopes range from 0 to 2 percent.

This map unit makes up about 28 percent of the county. It is about 39 percent Othello soils, 36 percent Elkton soils, and 25 percent soils of minor extent. The minor soils include Kentuck soils in depressions, Keyport and Mattapex soils on lowland flats, Sunken soils adjacent to tidal marshes, and Honga soils on tidal marshes.

The nearly level, poorly drained Othello soils have a subsoil of silt loam.

The nearly level, poorly drained Elkton soils have a subsoil of silty clay loam.

Most of this map unit is wooded. The dominant trees are loblolly pine, red maple, and sweetgum. The wooded areas are difficult to drain because of a lack of outlets. Drainage ditches and outlets need to be maintained in areas of cropland. The soils in this unit are limited for agricultural and nonagricultural uses because of a high water table.

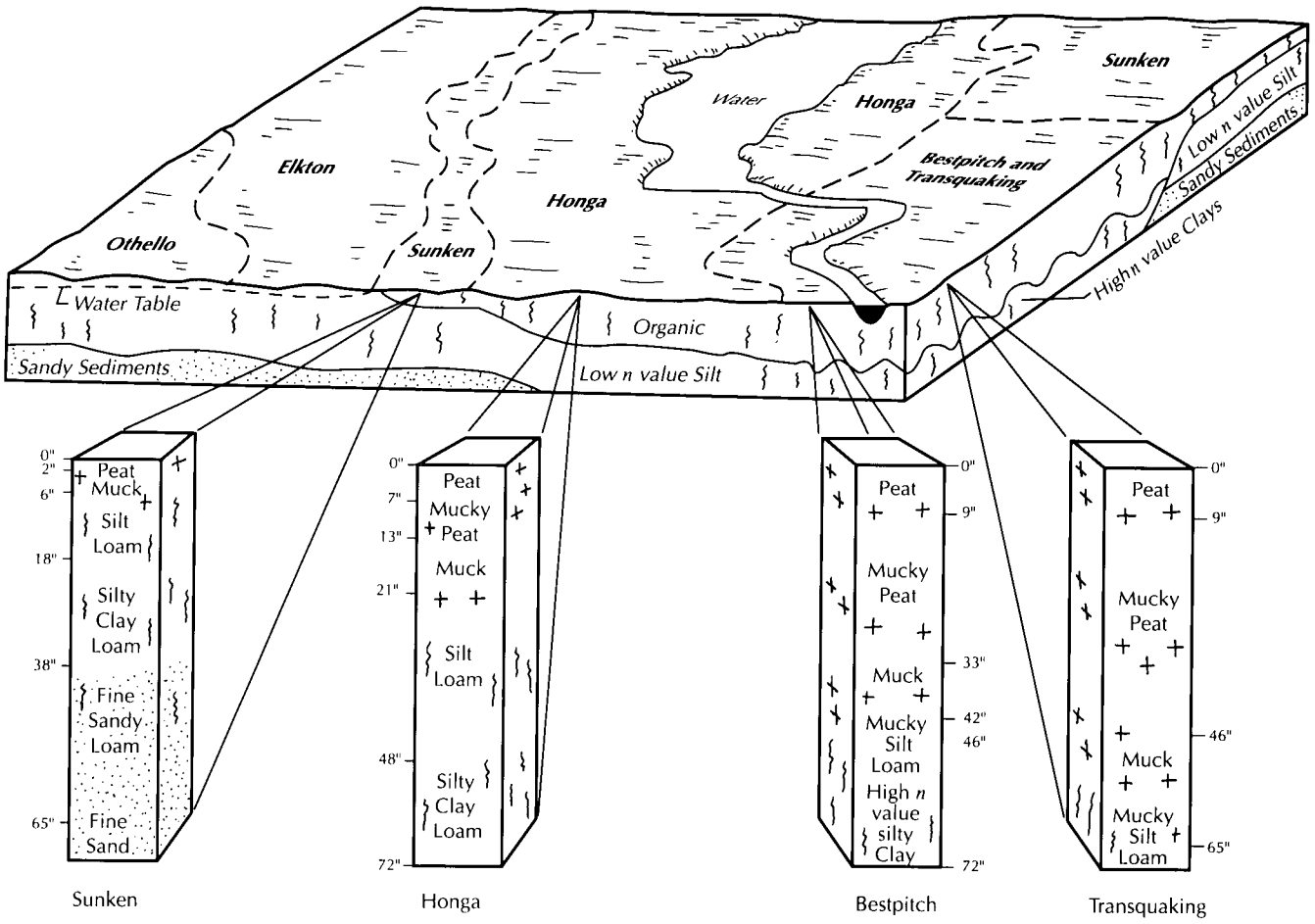


**Figure 7.—Typical pattern of soils and examples of profiles and underlying material in general soil map units 8 and 9.**

## 7. Matapeake-Mattapex

*Nearly level and gently sloping, well drained and moderately well drained soils that formed in silty materials over sandy materials*

This map unit is in the south-central part of the county, along the major drainageways. It is on lowland flats. Slopes range from 0 to 5 percent.

This map unit makes up about 4 percent of the county. It is about 33 percent Matapeake soils, 31 percent Mattapex soils, 6 percent similar soils, and 30 percent soils of minor extent. The minor soils include Othello and Elkton soils on lowland flats and in depressions and Ingleside soils on upland flats.

The nearly level and gently sloping, well drained Matapeake soils are on lowland flats. They have a subsoil of silt loam. They have a high water table between depths of 4 and 6 feet.

The nearly level and gently sloping, moderately well drained Mattapex soils are on lowland flats along open bodies of water. They have a subsoil of silt loam.

All of the soils in this map unit are well suited to woodland, but only a few areas are wooded. Areas of Othello and Elkton soils are used as wooded wetlands. This unit is mostly used as cropland. The common crops are corn, soybeans, and small grains. All of the soils are limited for nonagricultural uses because of a high water table.

## 8. Bestpitch-Transquaking

*Nearly level, very poorly drained soils that formed in organic materials over clayey estuarine sediments*

This map unit is in the south-central part of the county, mainly at sea level. It is in estuarine tidal marshes, which are inundated daily by brackish water. Slopes are 0 to 1 percent.

This map unit makes up about 9 percent of the county. It is about 41 percent Bestpitch soils, 32 percent Transquaking soils, and 27 percent soils of minor extent. The minor soils include Sunken soils on lowland flats that are inundated by brackish water during seasonal and storm-induced tidal events, Mattapex soils on lowland flats, and Honga soils on tidal marshes along submerged uplands (fig. 7).

The nearly level, very poorly drained Bestpitch and Transquaking soils have a subsurface layer of mucky peat.

All of this map unit supports brackish, tidal wetland vegetation. Because of tidal inundation, extreme wetness, excess salts, and low strength, the soils generally are unsuitable for uses other than wildlife habitat or recreational areas. Because this unit

**Figure 8.—An aerial view of general soil map unit 9. Honga peat is in the foreground, Sunken mucky silt loam is in the middle ground, and Elkton mucky silt loam, very wet, is in the background.**

consists of tidal wetlands, it is extremely valuable in providing habitat for a large number of wetland animals; in providing a medium that filters nutrients, suspended materials, and pollutants and thus improves water quality; and in controlling floodwaters.

## 9. Honga-Elkton-Sunken

*Nearly level, poorly drained and very poorly drained soils that formed in organic materials and silty materials over sandy materials*

This map unit is in the southernmost part of the county, dominantly below an elevation of 4 feet. It is in submerged upland tidal marshes and on lowland flats. These tidal marshes are inundated daily by brackish water. Some of the lowland flats are inundated by brackish water during seasonal and storm-induced tidal events (fig. 8).

This map unit makes up about 24 percent of the county. It is about 50 percent Honga soils, 23 percent Elkton soils, 18 percent Sunken soils, and 9 percent soils of minor extent. The minor soils include Othello, Keyport, and Mattapex soils on lowland flats and Kentuck soils in depressions.

The nearly level, very poorly drained Honga soils are in submerged upland tidal marshes. They have a subsurface layer of mucky peat.

The nearly level, poorly drained Elkton soils are on lowland flats. They have a subsoil of silty clay loam.

The nearly level, very poorly drained Sunken soils are on lowland flats. They have a subsoil of silty clay loam and very fine sandy loam.

Except for some small areas of minor soils, this map unit is not used for agriculture. Many of these small areas of minor soils are near small rural communities. Almost all of this unit supports wetland vegetation. Because of tidal inundation, extreme wetness, and excess salts, the soils generally are unsuitable for uses other than wildlife habitat or recreational areas. The Honga soils support tidal marsh grasses and sedges. Most areas of the Sunken and Elkton soils support woodland that has limited productivity because of extreme wetness and excess salts. The map unit is extremely valuable in providing habitat for a large number of wetland animals; in providing a medium that filters nutrients, suspended materials, and pollutants and thus improves water quality; and in controlling floodwaters.

# Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(15, 18)*. 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. Table 5 shows the results of a soil temperature study in the survey area. This study helped to determine the proper temperature regime of soils for family classification. Table 6 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs. Table 7 provides a detailed division of the classification terminology for the soils in Dorchester County.

ORDER. Eleven 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 Ultisol.

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 Udult (*Ud*, meaning humid, plus *ult*, from Ultisol).

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; type of saturation; 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 Hapludults (*Hapl*, meaning minimum horizonation, plus *udult*, the suborder of the Ultisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup 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 taxonomic class. 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 Hapludults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, mesic Typic Hapludults.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

# Soil Series and Detailed Soil Map Units

In this section each soil series recognized in the survey area is described. Each description is followed by the detailed soil map units, arranged in alphabetical order, that are associated with the series.

Characteristics of the soil and the material in which it formed are identified for each 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" *(17)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(15)* and in "Keys to Soil Taxonomy" *(18)*. Unless otherwise indicated, 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 delineated on the detailed maps at the back of this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given under the heading "Use and Management of the Soils."

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all of the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit 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, 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, slope, stoniness, salinity, 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, Downer sandy loam, 2 to 5 percent slopes, is a phase of the Downer series in Dorchester County.

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

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Klej-Hammonton complex is an example of a complex in Dorchester County.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas 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 or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Othello and Kentuck soils is an undifferentiated group in Dorchester County.

This survey includes *miscellaneous areas*. Such areas have little or no soil development and support little or no vegetation. Beaches is an example of a miscellaneous area in Dorchester County.

Table 8 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 or miscellaneous areas.

## 1—Beaches

### *Composition*

Beaches: 85 percent
Dissimilar inclusions: 15 percent

### *Setting*

*Landform:* Beaches
*Slope:* 1 to 5 percent
*Note:* This map unit supports little or no vegetation. Areas are partly covered with water during high tides and stormy periods. Most of the areas are on the western shorelines of the county. Typically, this unit occurs in long, narrow, smooth strips that range from 5 to 50 feet in width.

### *Component Description*

*Surface layer texture:* Sand
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Dominant parent material:* Sandy estuarine sediments or marine sediments, or both
*Flooding:* Frequent
*Kind of water table:* Apparent
*Salt affected:* Saline within a depth of 30 inches
*Available water capacity:* Very low

Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Honga and similar soils in submerged upland tidal marshes (5 percent of map unit)
- Bestpitch and similar soils in estuarine tidal marshes (5 percent of map unit)
- Unnamed sandy soils on small dunes supporting native grass (5 percent of map unit)

## Bestpitch Series

The Bestpitch series consists of very deep, very poorly drained soils. Permeability is rapid in the organic deposits and slow in the mineral sediments. These soils formed in moderately decomposed organic deposits derived from salt-tolerant herbaceous plants overlying clayey, mineral estuarine sediments having a high *n* value. They are located in brackish estuarine marshes along tidally influenced rivers and creeks of the Mid-Atlantic Coastal Plain. Slopes are 0 to 1 percent.

Bestpitch soils are similar to Transquaking soils and commonly are adjacent to Elkton, Honga, Mattapex, Othello, Sunken, and Transquaking soils. The Bestpitch soils differ from Transquaking soils because they have organic layers that are less than 51 inches thick. The Bestpitch soils differ from Honga and Sunken soils because they have mineral soil material with an *n* value of more than 0.7 underlying the organic layers. The Bestpitch soils differ from Elkton, Mattapex, and Othello soils because they formed in organic deposits overlying mineral sediments.

Typical pedon of Bestpitch peat in an area of Bestpitch and Transquaking soils; on a smooth slope of 0 percent, in an estuarine tidal marsh, about 5 miles southwest of Drawbridge, 700 feet east of Bestpitch Ferry, 300 feet east of the Transquaking River, 30 feet south of Griffith Neck Road:

Oi—0 to 9 inches; dark brown (7.5YR 3/2) peat, fibric soil material; fiber content is three-fourths of the soil volume after rubbing; 30 percent mineral soil material; common fine, medium, and coarse live roots; neutral; gradual smooth boundary.
Oe—9 to 33 inches; very dark brown (10YR 2/2) mucky

peat, hemic soil material; fiber content is one-third of the soil volume after rubbing; 30 percent mineral soil material; few fine and medium live roots; neutral; clear smooth boundary.

Oa—33 to 42 inches; very dark gray (10YR 3/1) muck, sapric soil material; fiber content is one-tenth of the soil volume after rubbing; 60 percent mineral soil material; neutral; clear smooth boundary.

Cg1—42 to 46 inches; very dark gray (5Y 3/1) silty clay; massive; friable; sticky; *n* value greater than 1.0, material flows easily between the fingers when squeezed; 10 percent masses of organic soil material; slightly acid; gradual smooth boundary.

Cg2—46 to 72 inches; dark gray (5Y 4/1) silty clay; massive; friable; sticky; *n* value greater than 1.0, material flows easily between the fingers when squeezed; 10 percent masses of organic soil material; slightly acid.

The thickness of the organic deposits ranges from 16 to 51 inches. These soils are slightly acid or neutral in the natural state. They can range from extremely acid to strongly acid upon drying. Thin layers of silt and very fine sand are common in the organic horizons. The total content of sulfur ranges from 0.75 to about 3.5 percent in individual layers within a depth of 40 inches. The conductivity of the saturation extract of the organic and mineral layers is typically more than 16 millimhos per centimeter but ranges to 8 millimhos per centimeter. The mineral horizons have an *n* value that is typically greater than 1.0 but that ranges to 0.7. Bulk densities of the mineral horizons are less than 1.00 gram per cubic centimeter.

The surface tier has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 3. It is typically fibric material but ranges to hemic material. The fiber content after rubbing is greater than one-half of the soil volume. The content of mineral material ranges from 20 to 70 percent.

The subsurface tier has hue of 5YR to 2.5Y, value of 2 or 3, and chroma of 0 to 4. It is typically hemic material but ranges to sapric material. The fiber content after rubbing ranges from one-eighth to three-fourths of the soil volume. The content of mineral material in the organic horizons ranges from 20 to 40 percent.

The bottom tier has hue of 7.5YR to 5Y, value of 2 to 4, and chroma of 1 or 2. It is typically sapric material, but the range includes silty clay and silty clay loam. The fiber content after rubbing is less than one-sixth of the soil volume. The content of mineral material in the organic horizons ranges from 20 to 75 percent. In some pedons the subsurface and bottom tiers include the mineral horizons.

The Cg horizon has hue of 10YR to 5GY, value of 3 or 4, and chroma of 0 to 2. It is typically silty clay but ranges from silt loam to silty clay. In some pedons thin sandy mineral layers less than 1 inch thick are stratified within the Cg horizon. The content of organic matter ranges from less than 5 percent to 20 percent. In some pedons thin organic layers or masses are stratified within the mineral horizons.

## Transquaking Series

The Transquaking series consists of very deep, very poorly drained soils. Permeability is rapid in the organic deposits and slow in the mineral material. These soils formed in moderately decomposed organic deposits derived from salt-tolerant herbaceous plants overlying clayey mineral estuarine sediments having a high *n* value. They are located in brackish estuarine marshes along tidally-influenced rivers and creeks of the Mid-Atlantic Coastal Plain. Slopes are 0 to 1 percent.

Transquaking soils are similar to Bestpitch soils and are commonly adjacent to Bestpitch, Elkton, Honga, Mattapex, Sunken, and Othello soils. The Transquaking soils differ from Bestpitch, Sunken, and Honga soils because they have organic layers that are more than 51 inches thick. The Transquaking soils differ from Elkton, Mattapex, and Othello soils because they formed in organic deposits.

Typical pedon of Transquaking peat in an area of Bestpitch and Transquaking soils; about 1.5 miles east of Bucktown, 2,000 feet south of De Coursey Bridge Road, 800 feet east of the confluence of the Transquaking River and Scotland Creek:

Oi—0 to 9 inches; very dark brown (10YR 2/2) peat, fibric soil material; fiber content is three-fourths of the soil volume after rubbing; 50 percent mineral soil material; many fine, medium, and coarse live roots; neutral; gradual smooth boundary.

Oe1—9 to 22 inches; black (10YR 2/1) mucky peat, hemic soil material; fiber content is one-half of the soil volume after rubbing; 30 percent mineral soil material; common fine and medium live roots; neutral; clear smooth boundary.

Oe2—22 to 46 inches; very dark gray (10YR 3/1) mucky peat, hemic soil material; fiber content is one-third of the soil volume after rubbing; 30 percent mineral soil material; neutral; clear smooth boundary.

Oa—46 to 65 inches; very dark gray (10YR 3/1) muck, sapric soil material; fiber content is one-tenth of the soil volume after rubbing; 40 percent mineral soil material; neutral; gradual smooth boundary.

Cg—65 to 80 inches; very dark gray (5Y 3/1) silty clay; massive; friable; sticky, plastic; *n* value greater than 1.0, material flows easily between the fingers when squeezed; 10 percent organic matter; neutral.

The thickness of the organic deposits ranges from 51 to 80 inches. These soils are slightly acid or neutral in the natural state. They can range from extremely acid to strongly acid upon drying. Thin layers of silt and very fine sand are common in the organic horizons. The total content of sulfur in the organic and mineral horizons ranges from 0.75 to 3.5 percent. The conductivity of the saturation extract of the organic and mineral layers is typically more than 16 millimhos per centimeter but ranges to 8 millimhos per centimeter. The mineral horizons typically have an *n* value of more than 1.0 and bulk densities of less than 1.00 gram per cubic centimeter.

The surface tier has hue of 5YR or 10YR, value of 2 to 4, and chroma of 1 to 3. It consists of fibric and hemic soil materials. The fiber content after rubbing is greater than one-half of the soil volume. The content of mineral material ranges from 20 to 70 percent.

The subsurface tier has hue of 5YR to 2.5Y, value of 2 to 5, and chroma of 1 to 4. It consists of hemic and sapric soil materials. The fiber content after rubbing ranges from one-eighth to three-fourths of the soil volume. The content of mineral material in the organic horizons ranges from 20 to 40 percent.

The bottom tier has hue of 10YR to 5Y, value of 2 to 4, and chroma of 1 or 2. It is typically sapric material. The fiber content after rubbing is less than one-sixth of the soil volume. The content of mineral material in the organic horizons ranges from 20 to 75 percent.

The Cg horizon has hue of 10YR to 5GY, value of 3 or 4, and chroma of 0 to 2. It is typically silty clay but ranges from silt loam to silty clay. In some pedons thin sandy mineral layers less than 1 inch thick are stratified within the Cg horizon. The content of organic matter ranges from less than 5 percent to 20 percent. In some pedons thin organic layers are stratified within the mineral horizons.

## 2—Bestpitch and Transquaking soils

### *Composition*

Bestpitch and similar soils: 45 percent
Transquaking and similar soils: 35 percent
Dissimilar inclusions: 20 percent

### *Setting*

*Landform* (fig. 9):
- Bestpitch—estuarine tidal marshes
- Transquaking—estuarine tidal marshes

*Slope:*
- Bestpitch—0 to 1 percent
- Transquaking—0 to 1 percent

*Note:* If this map unit is drained or the soil material is allowed to dry, the subsequent decrease in the soil reaction (pH) could eliminate the suitability of the soil for any use, including wildlife habitat.

### *Component Description*

**Bestpitch**

*Surface layer texture:* Peat
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Very poorly drained
*Dominant parent material:* Organic deposits over clayey estuarine sediments
*Flooding:* Frequent
*Kind of water table:* Apparent
*Ponding:* Very long in duration
*Salt affected:* Saline within a depth of 30 inches
*Available water capacity:* Very high
*Note:* The load-bearing capacity of this soil is low throughout the profile. The content of sulfur is high in the organic layers and moderate in the mineral substratum.

**Transquaking**

*Surface layer texture:* Peat
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Very poorly drained
*Dominant parent material:* Organic deposits over clayey estuarine sediments
*Flooding:* Frequent
*Kind of water table:* Apparent
*Ponding:* Very long in duration
*Salt affected:* Saline within a depth of 30 inches
*Available water capacity:* Very high
*Note:* The load-bearing capacity of this soil is low throughout the profile. The content of sulfur is high in the organic layers and moderate in the mineral substratum.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Honga and similar soils adjacent to upland areas (10 percent of map unit)
- Sunken and similar soils in areas supporting stunted pine vegetation (5 percent of map unit)
- Unnamed clayey soils that have an organic layer that is thinner than that of the Bestpitch and Transquaking soils and that occur along tidal creeks (3 percent of map unit)
- Open water areas consisting of salt pannes (2 percent of map unit)

**Figure 9.—Storm high-tide flooding from a marsh in an area of Bestpitch and Transquaking soils.**

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Chicone Series

The Chicone series consists of very deep, moderately permeable, very poorly drained soils. These soils formed in silty alluvial sediments overlying highly decomposed organic deposits. They are located on wide flood plains of the Mid-Atlantic Coastal Plain. Slopes are 0 to 1 percent.

The Chicone soils are similar to Puckum soils and are commonly adjacent to Fallsington, Hurlock, Pone, and Puckum soils. The Chicone soils differ from Puckum soils because they have a mineral surface overburden that is more than 16 inches thick. The Chicone soils differ from Fallsington, Hurlock, and Pone soils because they do not have an argillic horizon and have formed in organic deposits.

Typical pedon of Chicone mucky silt loam; on a smooth slope of 0 percent, about 2 miles northeast of Salem, 1,700 feet southeast of the intersection of Maiden Forest Road and Hawkeye Mays Mill Road, 500 feet east of Maiden Forest Road:

A—0 to 3 inches; very dark brown (10YR 2/2) mucky silt loam; weak fine granular structure; friable; slightly sticky; many very fine and fine and common medium roots; common very fine and fine pores; strongly acid; clear wavy boundary.

Cg1—3 to 15 inches; dark brown (7.5YR 3/2) silt loam, gray (10YR 6/2) dry; massive; friable; slightly sticky; common very fine and fine roots; few very fine and fine pores; common fine prominent strong brown

(7.5YR 4/6) irregularly shaped masses of iron accumulation in the matrix; strongly acid; gradual wavy boundary.
Cg2—15 to 24 inches; black (N 2/0) silt loam; massive; firm; slightly sticky, slightly plastic; common very fine roots; few very fine pores; strongly acid; clear wavy boundary.
Oa—24 to 65 inches; black (10YR 2/1) muck, sapric soil material; fiber content is less than one-tenth of the soil volume after rubbing; 20 percent, by weight, mineral soil material; strongly acid; clear smooth boundary.
Cg3—65 to 72 inches; gray (10YR 6/1) sand; single grain; loose; strongly acid.

The thickness of the mineral surface layers ranges from 16 to 40 inches. There are no diagnostic organic layers in the upper 16 inches. The thickness of the organic deposits ranges from 16 to 45 inches. Reaction ranges from extremely acid to strongly acid. A high water table ranges from 6 inches above the soil surface to 6 inches below the soil surface from November through June.

The A horizon has hue of 10YR or 7.5YR, value of 2 to 4, and chroma of 1 to 3. Where it has value of less than 3.5, this horizon is less than 10 inches thick. It is mucky silt loam, mucky loam, or silt loam.

The Cg horizon has hue of 10YR or 7.5YR, value of 2 to 5, and chroma of 0 to 2. It is silt loam or mucky silt loam. Thin layers of sandy loam or loam may occur in some pedons.

The O horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 0 or 1. It is sapric or hemic material. It ranges from 16 to more than 40 inches in thickness. The fiber content after rubbing ranges from one-tenth to one-half of the soil volume. The content of mineral material, by weight, ranges from 20 to 40 percent.

The 2Cg horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 0 to 2. The texture dominantly is sand or loamy sand. It may be silt loam or loam in some pedons. The content of rock fragments ranges from 0 to 20 percent, by volume.

## 3—Chicone mucky silt loam

### *Composition*

Chicone and similar soils: 75 percent
Dissimilar inclusions: 25 percent

### *Setting*

*Landform:* Flood plains
*Slope:* 0 to 1 percent

### *Component Description*

*Surface layer texture:* Mucky silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Very poorly drained
*Dominant parent material:* Silty alluvial sediments over organic deposits
*Flooding:* Frequent
*Kind of water table:* Apparent
*Ponding:* Long in duration
*Available water capacity:* Very high
*Note:* The load-bearing capacity of this soil is low throughout the profile.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Hurlock and similar soils in adjacent upland depressions and narrow drainageways (10 percent of map unit)
- Intermingled areas of Puckum and similar soils (5 percent of map unit)
- Othello and similar soils in the slightly higher landscape positions in the southern part of the county (5 percent of map unit)
- Fluvaquents and similar soils at the slightly higher elevations (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Downer Series

The Downer series consists of very deep, moderately rapidly permeable, well drained soils. These soils formed in sandy eolian deposits or fluviomarine sediments, or both. They are on uplands of the Mid-Atlantic Coastal Plain. Slopes range from 0 to 30 percent.

Downer soils are similar to Sassafras soils and are commonly adjacent to Galestown, Evesboro, Fort Mott, Hammonton, Sassafras, and Woodstown soils. The Downer soils differ from Sassafras soils because they have less clay in the B horizon. The Downer soils have more clay in the B horizon than Galestown and Evesboro soils. The Downer soils have thinner surface and subsurface layers than Fort Mott soils. The Downer soils do not have the redoximorphic features that are typical of the B horizon in Hammonton and Woodstown soils.

Typical pedon of Downer sandy loam, 0 to 2 percent slopes; 4,800 feet north of Williamsburg, 1,000 feet northwest of Williamsburg Road:

Ap—0 to 11 inches; dark brown (10YR 4/3) sandy loam; moderate fine granular structure; friable; slightly sticky, slightly plastic; many very fine and few fine and medium roots; many very fine and common fine random tubular pores; slightly acid; abrupt smooth boundary.

Bt1—11 to 26 inches; strong brown (7.5YR 4/6) sandy loam; moderate medium subangular blocky structure; friable; slightly sticky, plastic; common very fine and few fine roots; common very fine and fine and few medium random tubular pores; common distinct clay films on faces of peds; moderately acid; clear wavy boundary.

Bt2—26 to 35 inches; strong brown (7.5YR 5/6) sandy loam; moderate medium subangular blocky structure; friable; slightly plastic; common very fine and few fine roots; common very fine and fine random tubular pores; common faint clay films on faces of peds; moderately acid; gradual wavy boundary.

C1—35 to 48 inches; strong brown (7.5YR 5/6) loamy sand; massive; very friable; few very fine roots; common very fine and few fine irregular pores; strongly acid; gradual wavy boundary.

C2—48 to 72 inches; strong brown (7.5YR 5/8) sand; single grain; loose; strongly acid.

The thickness of the solum ranges from 20 to 38 inches in most pedons. In pedons having a BC horizon, the thickness of the solum ranges to 45 inches. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas. Inherently these soils have a low base status.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. It is commonly sandy loam and less commonly loamy sand.

Some pedons have an E or BE horizon. This horizon has hue of 10YR, value of 5 to 7, and chroma of 1 to 4. It is loamy sand or sandy loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is commonly sandy loam, but in some pedons it includes thin layers of sandy clay loam or loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 4 to 8. It dominantly is coarse sand to loamy sand or the gravelly analogues of these textures. The content of gravel ranges from 0 to 25 percent. Below a depth of 40 inches, the texture ranges from sand to sandy clay loam.

## 4C—Downer loamy sand, 5 to 10 percent slopes

### *Composition*

Downer and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### *Setting*

*Landform:* Uplands and side slopes
*Slope:* 5 to 10 percent

### *Component Description*

*Surface layer texture:* Loamy sand
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Dominant parent material:* Sandy eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Available water capacity:* Low
*Note:* Included in this unit in mapping in the towns of Cambridge, Hurlock, Secretary, and Vienna are areas of urban land. These areas consist of impervious materials and support little or no vegetation. Most of the areas are covered by concrete, asphalt, or buildings.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Intermingled areas of Sassafras and Fort Mott soils (10 percent of map unit)
- Hammonton, Ingleside, and similar soils on foot slopes (5 percent of map unit)
- Galestown and Evesboro soils on ridges and side slopes along drainageways (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## 5A—Downer sandy loam, 0 to 2 percent slopes

### *Composition*

Downer and similar soils: 75 percent
Dissimilar inclusions: 25 percent

### Setting

*Landform:* Upland flats
*Slope:* 0 to 2 percent

### Component Description

*Surface layer texture:* Sandy loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Dominant parent material:* Sandy eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Available water capacity:* Low
*Note:* Included in this unit in mapping in the towns of Cambridge, Hurlock, Secretary, and Vienna are areas of urban land. These areas consist of impervious materials and support little or no vegetation. Most of the areas are covered by concrete, asphalt, or buildings.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### Dissimilar Inclusions

- Intermingled areas of Fort Mott and similar soils (10 percent of map unit)
- Ingleside, Woodstown, and Hammonton soils in the slightly lower landscape positions (10 percent of map unit)
- Galestown and Evesboro soils on small ridges along drainageways (5 percent of map unit)

### Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## 5B—Downer sandy loam, 2 to 5 percent slopes

### Composition

Downer and similar soils: 75 percent
Dissimilar inclusions: 25 percent

### Setting

*Landform:* Upland flats and side slopes
*Slope:* 2 to 5 percent

### Component Description

*Surface layer texture:* Sandy loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Dominant parent material:* Sandy eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Available water capacity:* Low
*Note:* Included in this unit in mapping in the towns of Cambridge, Hurlock, Secretary, and Vienna are areas of urban land. These areas consist of impervious materials and support little or no vegetation. Most of the areas are covered by concrete, asphalt, or buildings.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### Dissimilar Inclusions

- Intermingled areas of Fort Mott and similar soils (10 percent of map unit)
- Ingleside, Woodstown, and Hammonton soils in the slightly lower landscape positions (10 percent of map unit)
- Galestown and Evesboro soils on small ridges along drainageways (5 percent of map unit)

### Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Elkton Series

The Elkton series consists of very deep, slowly permeable, poorly drained soils. These soils formed in eolian (silty) deposits overlying sandy fluviomarine sediments. They are on lowland flats and in small depressions of the Mid-Atlantic Coastal Plain. Slopes range from 0 to 2 percent.

Elkton soils are similar to Othello soils and are commonly adjacent to Bestpitch, Honga, Keyport, Othello, and Sunken soils. The Elkton soils have more clay in the B horizon than Othello soils. The Elkton soils differ from Keyport soils because they have redoximorphic features in the surface and subsurface layers. The Elkton soils differ from Honga and Bestpitch soils because they have a highly organic surface layer that is more than 16 inches thick. The Elkton soils differ from Sunken soils because they have a base saturation of less than 35 percent at a depth of 49 inches below the top of the argillic horizon.

Typical pedon of Elkton silt loam (fig. 11); about 6.0 miles west of Cambridge, 0.5 mile west of Lloyds, about 40 feet into the woods north of Route 343:

Oi/Oe—3 inches to 0; undecomposed and partially decomposed leaves and twigs from loblolly pine trees; abrupt smooth boundary.
A—0 to 1 inch; dark olive gray (5Y 3/2) silt loam; weak fine granular structure; very friable; slightly sticky, slightly plastic; many very fine, common fine and medium, and few coarse roots; many very fine and few fine and medium random tubular pores; very strongly acid; clear smooth boundary.
Eg—1 to 6 inches; gray (5Y 6/1) silt loam; weak medium subangular blocky structure parting to weak coarse granular; friable; slightly sticky, slightly plastic; common fine and few medium and coarse roots; many very fine and few fine and medium random tubular pores; extremely acid; clear wavy boundary.
BEg—6 to 10 inches; gray (5Y 5/1) silt loam; moderate coarse blocky and subangular blocky structure; firm; sticky, plastic; common fine and very fine roots; common very fine and few fine random tubular pores; few prominent clay films on faces of peds and lining soil pores and root channels; common coarse prominent yellowish brown (10YR 5/4) masses of iron accumulation throughout; extremely acid; gradual wavy boundary.
Btg1—10 to 24 inches; gray (5Y 6/1) silty clay loam; strong medium and coarse blocky structure; firm; sticky, plastic; few fine roots; common very fine and few fine random tubular pores; common prominent clay films on faces of peds and lining soil pores; common coarse prominent strong brown (7.5YR 5/8) masses of iron accumulation throughout; extremely acid; diffuse smooth boundary.
Btg2—24 to 40 inches; gray (N 5/0) silty clay loam; weak thick platy structure parting to strong coarse blocky; firm; very sticky, plastic; few fine roots; common very fine and few fine random tubular pores; common prominent clay films on faces of peds and lining soil pores; common coarse prominent strong brown (7.5YR 5/6) masses of iron accumulation throughout; very strongly acid; clear smooth boundary.
2BC—40 to 65 inches; gray (5Y 5/1) very fine sandy loam; massive; friable; slightly sticky, slightly plastic; common medium distinct yellowish brown (10YR 5/4) masses of iron accumulation throughout; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The content of gravel ranges from 0 to 5 percent in the 2BC horizon. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas. Inherently these soils have a low base status. A high water table ranges from 6 inches above the soil surface to 12 inches below the soil surface from December through November.

The A and E horizons have hue of 10YR to 5Y, value of 3 to 6, and chroma of 0 to 3. They are silt loam, mucky silt loam, or loam.

The Btg horizon has hue of 10YR to 5GY, value of 4 to 7, and chroma of 0 to 2. It is silty clay loam or silty clay but averages 27 to 35 percent clay in the particle-size control section.

The 2BCg horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 0 to 2. It ranges from fine sandy loam to clay loam. Some pedons have a 2Cg horizon. This horizon has colors similar to those of the 2BCg horizon. It is fine sand or loamy fine sand.

## 6—Elkton loam

### *Composition*

Elkton and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### *Setting*

*Landform:* Lowland flats, depressions, and swales
*Slope:* 0 to 2 percent
*Note:* In some areas this soil may be ponded for a short period after heavy rains.

### *Component Description*

*Surface layer texture:* Loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Dominant parent material:* Silty eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* High
*Note:* Included in this unit in mapping in the towns of Cambridge, Hurlock, Secretary, and Vienna are areas of urban land. These areas consist of impervious materials and support little or no vegetation. Most of the areas are covered by concrete, asphalt, or buildings.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Keyport and similar soils in the slightly higher landscape positions (10 percent of map unit)
- Intermingled areas of Othello and similar soils (5 percent of map unit)
- Intermingled areas of Fallsington and similar soils in the northern part of the county (5 percent of map unit)

### Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## 7—Elkton silt loam

### Composition

Elkton and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### Setting

*Landform:* Lowland flats, depressions, and swales
*Slope:* 0 to 2 percent
*Note:* In some areas this soil may be ponded for a short period after heavy rains.

### Component Description

*Surface layer texture:* Silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Dominant parent material:* Silty eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* High
*Note:* In some areas of this soil in the Neck District, the content of gravel ranges from 10 to 30 percent in the substratum. Included in this unit in mapping in the towns of Cambridge, Hurlock, Secretary, and Vienna are areas of urban land. These areas consist of impervious materials and support little or no vegetation. Most of the areas are covered by concrete, asphalt, or buildings.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### Dissimilar Inclusions

- Intermingled areas of Othello and similar soils (5 percent of map unit)
- Keyport and similar soils in the slightly higher landscape positions (5 percent of map unit)
- Kentuck and similar soils in the lower landscape positions (5 percent of map unit)
- Intermingled areas of Fallsington and similar soils in the central part of the county (5 percent of map unit)

### Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## 8—Elkton mucky silt loam, very wet

### Composition

Elkton and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### Setting

*Landform:* Lowland flats, depressions, and swales
*Slope:* 0 to 2 percent
*Note:* This soil is ponded for extended periods from November through June and after heavy rains during the rest of the year.

### Component Description

*Surface layer texture:* Mucky silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Dominant parent material:* Silty eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Ponding:* Long in duration
*Available water capacity:* High

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### Dissimilar Inclusions

- Kentuck and similar soils in the lower landscape positions (5 percent of map unit)
- Intermingled areas of Othello and similar soils (5 percent of map unit)
- Keyport and similar soils in the higher landscape positions (5 percent of map unit)
- Sunken and similar soils in areas supporting stunted pine vegetation that are adjacent to tidal marshes (5 percent of map unit)

### Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Evesboro Series

The Evesboro series consists of very deep, rapidly permeable, excessively drained soils. These soils formed

in sandy eolian deposits or sandy fluviomarine sediments, or both. They are on uplands and stream terraces of the Mid-Atlantic Coastal Plain. Slopes range from 5 to 30 percent.

Evesboro soils are similar to Runclint soils and are commonly adjacent to Galestown, Downer, Fort Mott, and Hammonton soils. The Evesboro soils have less clay in the B horizon than Downer, Fort Mott, and Galestown soils. The Evesboro soils differ from Runclint soils because they do not have redoximorphic features in the substratum. The Evesboro soils differ from Hammonton soils because they do not have redoximorphic features in the B horizon and have less clay in the B horizon.

Typical pedon of Evesboro sand, 5 to 10 percent slopes; about 3.25 miles east-northeast of Williamsburg, 0.5 mile east of Marshyhope Creek, 3,200 feet north of North Tara Road, in a wooded area:

Oi—2 inches to 0; partially decomposed needles and twigs from loblolly pine trees; abrupt smooth boundary.

A—0 to 4 inches; dark brown (10YR 4/3) sand; single grain; loose; common fine and medium roots; many very fine and few fine irregular pores; very strongly acid; clear smooth boundary.

E—4 to 10 inches; light yellowish brown (10YR 6/4) sand; massive; very friable; few medium and coarse roots; many very fine irregular pores; strongly acid; clear wavy boundary.

Bw—10 to 34 inches; yellowish brown (10YR 5/6) sand; massive; friable; few fine and medium roots; few fine irregular pores; very strongly acid; clear wavy boundary.

C1—34 to 60 inches; brownish yellow (10YR 6/6) sand; massive; very friable; very strongly acid; clear irregular boundary.

C2—60 to 72 inches; very pale brown (10YR 7/4) sand; single grain; loose; very strongly acid.

The thickness of the solum ranges from 24 to 48 inches. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas. Inherently these soils have a low base status. The content of gravel ranges from 0 to 20 percent in the subsoil and from 0 to 25 percent in the substratum.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 3 to 6.

The Bw horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is sand or loamy sand. In some areas the Bw horizon includes thin lamellae that have a total thickness of less than 6 inches.

Some pedons have a BC horizon. This horizon has the same colors and textures as the C horizon.

The C horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 3 to 6. It is sand or gravelly sand.

## 9C—Evesboro sand, 5 to 10 percent slopes

### *Composition*

Evesboro and similar soils: 75 percent
Dissimilar inclusions: 25 percent

### *Setting*

*Landform:* Stream terraces and side slopes
*Slope:* 5 to 10 percent

### *Component Description*

*Surface layer texture:* Sand
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Excessively drained
*Dominant parent material:* Sandy eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Available water capacity:* Low
*Note:* Included in this unit in mapping in the towns of Cambridge, Hurlock, Secretary, and Vienna are areas of urban land. These areas consist of impervious materials and support little or no vegetation. Most of the areas are covered by concrete, asphalt, or buildings.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Intermingled areas of Fort Mott and Galestown soils (15 percent of map unit)
- Klej, Runclint, and Hammonton soils on foot slopes and toe slopes (10 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## 9E—Evesboro sand, 15 to 30 percent slopes

### *Composition*

Evesboro and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### Setting

*Landform:* Stream terraces and side slopes
*Slope:* 15 to 30 percent

### Component Description

*Surface layer texture:* Sand
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Excessively drained
*Dominant parent material:* Sandy eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Available water capacity:* Low

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### Dissimilar Inclusions

- Intermingled areas of Fort Mott and Galestown soils (10 percent of map unit)
- Runclint and similar soils on foot slopes adjacent to drainageways (5 percent of map unit)
- Unnamed sandy soils that have a very gravelly substratum (5 percent of map unit)

### Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Fallsington Series

The Fallsington series consists of very deep, moderately permeable, poorly drained soils. These soils formed in loamy fluviomarine sediments. They are on low uplands of the Mid-Atlantic Coastal Plain. Slopes range from 0 to 2 percent.

Fallsington soils are similar to Hurlock soils and are commonly adjacent to Woodstown, Hurlock, Othello, and Pone soils. The Fallsington soils have more silt and clay in the subsoil than Hurlock and Pone soils. The Fallsington soils differ from Woodstown soils because they have redoximorphic features in the surface and subsurface layers. The Fallsington soils differ from Othello soils because they have more sand in the subsoil.

Typical pedon of Fallsington sandy loam; about 2.25 miles east-southeast of Cambridge, 3,000 feet south of Route 50, about 500 feet east of Cordtown Road:

A—0 to 2 inches; dark grayish brown (10YR 4/2) sandy loam; moderate fine granular structure; very friable; slightly sticky, slightly plastic; many very fine and fine and common medium roots; many very fine and fine and few medium irregular pores; strongly acid; abrupt smooth boundary.

Eg—2 to 7 inches; light brownish gray (10YR 6/2) sandy loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; many very fine, common fine and medium, and few coarse roots; many very fine and common fine and medium irregular pores; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation throughout; strongly acid; clear smooth boundary.

Btg1—7 to 15 inches; gray (10YR 6/1) sandy loam; moderate medium subangular blocky structure; friable; sticky, slightly plastic; many very fine and few fine roots; many very fine and common fine tubular pores; common distinct clay films on faces of peds and lining soil pores; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation throughout; common fine prominent strong brown (7.5YR 5/8) irregularly shaped masses of iron accumulation in the matrix; very strongly acid; gradual smooth boundary.

Btg2—15 to 26 inches; gray (10YR 6/1) sandy clay loam; moderate medium subangular blocky structure; friable; sticky, slightly plastic; common very fine and few fine roots; common very fine and fine tubular pores; common distinct clay films on faces of peds and lining soil pores; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation throughout; common fine prominent strong brown (7.5YR 5/8) irregularly shaped masses of iron accumulation in the matrix; very strongly acid; clear smooth boundary.

BCg—26 to 30 inches; light gray (10YR 7/1) sandy loam; weak medium subangular blocky structure; very friable; slightly sticky, slightly plastic; few very fine and fine roots; few very fine and fine irregular pores; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Cg1—30 to 36 inches; light gray (10YR 7/1) sand; single grain; loose; few very fine roots; extremely acid; gradual wavy boundary.

Cg2—36 to 52 inches; gray (10YR 5/1) loamy sand; single grain; loose; 30 percent pockets of sandy loam; common medium prominent strong brown (7.5YR 5/8) masses of iron accumulation throughout; extremely acid; clear wavy boundary.

2Cg3—52 to 56 inches; gray (2.5Y 6/0) very fine sandy loam; massive; friable; slightly sticky, slightly plastic; strongly acid; clear wavy boundary.

3Cg4—56 to 65 inches; gray (10YR 6/1) sand; single grain; loose; common medium distinct light yellowish brown (10YR 6/4) masses of iron accumulation throughout; extremely acid; clear smooth boundary.

4Ab—65 to 72 inches; dark grayish brown (2.5Y 4/2) very fine sandy loam; massive; very friable; slightly sticky, slightly plastic; 40 percent pockets of loamy sand; common fine distinct dark brown (10YR 3/3) highly decomposed organic material; extremely acid.

The thickness of the solum ranges from 24 to 40 inches. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas. Inherently these soils have a low base status. A high water table ranges from the surface to a depth of 12 inches from January through April.

The A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 or 2.

The Eg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 to 3.

The Btg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 0 to 2. It is sandy loam or sandy clay loam and has an average of 18 to 27 percent clay in the control section.

The Cg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 to 3. It is sand or loamy sand.

The 2Cg horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 0 to 2. It is fine sandy loam or very fine sandy loam. Some pedons do not have a 2Cg horizon.

The Ab horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 2 or 3. It is very fine sandy loam. Some pedons do not have an Ab horizon.

## 10—Fallsington sandy loam

### *Composition*

Fallsington and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### *Setting*

*Landform:* Low uplands, depressions, and swales
*Slope:* 0 to 2 percent

### *Component Description*

*Surface layer texture:* Sandy loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Dominant parent material:* Loamy fluviomarine sediments
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* Moderate
*Note:* Included in this unit in mapping in the towns of Cambridge, Hurlock, Secretary, and Vienna are areas of urban land. These areas consist of impervious materials and support little or no vegetation. Most of the areas are covered by concrete, asphalt, or buildings.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Intermingled areas of Hurlock and similar soils (5 percent of map unit)
- Othello and similar soils in the central part of the county (5 percent of map unit)
- Woodstown and similar soils in the higher landscape positions (5 percent of map unit)
- Pone, Chicone, and similar soils in the lower landscape positions adjacent to drainageways (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## 11—Fluvaquents

### *Composition*

Fluvaquents and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### *Setting*

*Landform:* Flood plains
*Slope:* 0 to 1 percent

### *Component Description*

*Surface layer texture:* Loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Dominant parent material:* Sandy alluvial sediments
*Flooding:* Frequent
*Kind of water table:* Apparent
*Available water capacity:* Low

Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Intermingled areas of Hurlock, Pone, and similar soils (10 percent of map unit)
- Puckum and Chicone soils on flood plains at the lower elevations (5 percent of map unit)
- Downer and similar soils in strongly sloping areas (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Fort Mott Series

The Fort Mott series consists of very deep, moderately rapidly permeable, well drained soils. These soils formed in sandy eolian deposits over sandy and loamy fluviomarine sediments. They are on uplands of the Mid-Atlantic Coastal Plain. Slopes range from 0 to 30 percent.

Fort Mott soils are similar to Downer soils and are commonly adjacent to Downer, Evesboro, Galestown, and Hammonton soils. The Fort Mott soils differ from Downer soils because they have thicker surface and subsurface layers that contain less clay. The Fort Mott soils have more clay in the B horizon than Galestown and Evesboro soils. The Fort Mott soils do not have the redoximorphic features that are typical of the B horizon in Hammonton soils.

Typical pedon of Fort Mott loamy sand, 2 to 5 percent slopes (fig. 12); 2.5 miles north of Hurlock, 1,500 feet northwest of the junction of Gravel Branch Road and Payne Road, 300 feet northeast of Gravel Branch Road:

Ap—0 to 10 inches; brown (10YR 4/3) loamy sand; moderate medium granular structure; very friable; many very fine, common fine, and few medium roots; many very fine and common fine and medium random tubular pores; neutral; abrupt smooth boundary.

E—10 to 24 inches; light yellowish brown (10YR 6/4) loamy sand; weak medium subangular blocky structure; very friable; common very fine and few fine roots; many very fine and common fine irregular pores; moderately acid; clear wavy boundary.

Bt1—24 to 28 inches; yellowish brown (10YR 5/4) sandy loam; moderate medium subangular blocky structure; friable; slightly sticky, slightly plastic; common very fine and few fine roots; many very fine and common fine random tubular pores; few faint clay films on faces of peds and clay bridging between sand grains; moderately acid; clear wavy boundary.

Bt2—28 to 36 inches; strong brown (7.5YR 4/6) sandy loam; moderate medium subangular blocky structure; friable; slightly sticky, slightly plastic; common very fine roots; many very fine and common fine random tubular pores; common faint clay films on faces of peds and clay bridging between sand grains; strongly acid; gradual wavy boundary.

C1—36 to 46 inches; strong brown (7.5YR 5/6) loamy sand; single grain; loose; few very fine roots; very strongly acid; gradual wavy boundary.

C2—46 to 65 inches; strong brown (7.5YR 5/8) loamy sand; single grain; loose; few very fine roots; very strongly acid; gradual wavy boundary.

C3—65 to 72 inches; strong brown (7.5YR 5/8) loamy sand; few medium distinct brownish yellow (10YR 6/6) mottles; single grain; loose; very strongly acid.

The thickness of the epipedon ranges from 22 to 36 inches. The thickness of the solum ranges from 36 to 60 inches. The content of gravel ranges from 0 to 5 percent in the A and B horizons and from 0 to 20 percent in the C horizon. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas. Inherently these soils have a low base status.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 6. It is loamy sand or sand.

The Bt horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. It is sandy loam, loam, or sandy clay loam. The content of clay ranges from 13 to 24 percent.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 8, and chroma of 3 to 8. It ranges from coarse sand to fine sandy loam.

## 12A—Fort Mott loamy sand, 0 to 2 percent slopes

### *Composition*

Fort Mott and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### *Setting*

*Landform:* Upland flats and knolls
*Slope:* 0 to 2 percent

### *Component Description*

*Surface layer texture:* Loamy sand
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Dominant parent material:* Sandy eolian deposits over fluviomarine sediments
*Flooding:* None
*Available water capacity:* Moderate
*Note:* Included in this unit in mapping in the towns of Cambridge, Hurlock, Secretary, and Vienna are areas of urban land. These areas consist of impervious materials and support little or no vegetation. Most of the areas are covered by concrete, asphalt, or buildings.

A typical soil description is included in this section (see

"Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Intermingled areas of Downer, Ingleside, and Galestown soils (5 percent of map unit)
- Evesboro and similar soils on ridges along drainageways (5 percent of map unit)
- Woodstown and Hammonton soils in the lower landscape positions (5 percent of map unit)
- Unnamed sandy soils that have a high water table between depths of 40 and 72 inches (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## 12B—Fort Mott loamy sand, 2 to 5 percent slopes

### *Composition*

Fort Mott and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### *Setting*

*Landform:* Upland flats, knolls, and side slopes
*Slope:* 2 to 5 percent

### *Component Description*

*Surface layer texture:* Loamy sand
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Dominant parent material:* Sandy eolian deposits over fluviomarine sediments
*Flooding:* None
*Available water capacity:* Low
*Note:* Included in this unit in mapping in the towns of Cambridge, Hurlock, Secretary, and Vienna are areas of urban land. These areas consist of impervious materials and support little or no vegetation. Most of the areas are covered by concrete, asphalt, or buildings.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Intermingled areas of Downer, Ingleside, and Galestown soils (5 percent of map unit)
- Evesboro and similar soils on ridges along drainageways (5 percent of map unit)
- Woodstown and Hammonton soils in the lower landscape positions (5 percent of map unit)
- Unnamed sandy soils that have a high water table between depths of 40 and 72 inches (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## 13E—Fort Mott, Evesboro, and Downer soils

### *Composition*

Fort Mott and similar soils: 35 percent
Evesboro and similar soils: 30 percent
Downer and similar soils: 20 percent
Dissimilar inclusions: 15 percent

### *Setting*

*Landform:*
- Fort Mott—uplands and side slopes
- Evesboro—uplands and side slopes
- Downer—uplands and side slopes

*Slope:*
- Fort Mott—15 to 30 percent
- Evesboro—15 to 30 percent
- Downer—15 to 30 percent

### *Component Description*

**Fort Mott**

*Surface layer texture:* Loamy sand
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Dominant parent material:* Sandy eolian deposits over fluviomarine sediments
*Flooding:* None
*Available water capacity:* Low

**Evesboro**

*Surface layer texture:* Sand
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Excessively drained
*Dominant parent material:* Sandy eolian deposits or fluviomarine sediments, or both

*Flooding:* None
*Available water capacity:* Low

**Downer**

*Surface layer texture:* Sandy loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Dominant parent material:* Sandy eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Available water capacity:* Moderate

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Intermingled areas of Sassafras and Galestown soils (10 percent of map unit)
- Runclint and similar soils on foot slopes and toe slopes (3 percent of map unit)
- Small areas of unnamed sandy soils that have slopes of more than 30 percent (2 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Galestown Series

The Galestown series consists of very deep, rapidly permeable, somewhat excessively drained soils. These soils formed in sandy eolian deposits or sandy fluviomarine sediments, or both. They are on uplands of the Mid-Atlantic Coastal Plain. Slopes range from 0 to 5 percent.

Galestown soils are similar to Evesboro soils and are commonly adjacent to Downer, Fort Mott, Runclint, and Sassafras soils. The Galestown soils have less clay in the B horizon than Downer, Fort Mott, and Sassafras soils. The Galestown soils have more clay in the B horizon than Evesboro soils. The Galestown soils do not have the redoximorphic features that are typical of the substratum of Runclint soils.

Typical pedon of Galestown loamy sand, 0 to 2 percent slopes (fig. 13); 1.5 miles northeast of Ennals, 1,000 feet northeast on Palmer Mill Road from the junction of Palmer Mill Road and Harpers Road, 15 feet north of the road, in a field:

Ap—0 to 11 inches; dark brown (10YR 4/3) loamy sand; moderate fine granular structure; very friable; many very fine, common fine, and few medium roots; many very fine and few fine irregular pores; moderately acid; abrupt smooth boundary.

Bt1—11 to 29 inches; yellowish brown (10YR 5/6) loamy sand; weak medium subangular blocky structure; very friable; common very fine and few fine roots; many very fine irregular pores; clay bridging between sand grains; moderately acid; clear wavy boundary.

Bt2—29 to 40 inches; strong brown (7.5YR 4/6) loamy sand; moderate medium subangular blocky structure; very friable; slightly plastic; common very fine and few fine roots; many very fine and few fine random and irregular tubular pores; many prominent clay films on faces of peds and clay bridging between sand grains; strongly acid; clear irregular boundary.

BC—40 to 51 inches; strong brown (7.5YR 5/6) sand; massive; very friable; few very fine roots; many very fine irregular pores; clay bridging between sand grains; very strongly acid; clear irregular boundary.

C1—51 to 58 inches; brownish yellow (10YR 6/6) sand; single grain; loose; few very fine roots; very strongly acid; clear wavy boundary.

C2—58 to 63 inches; brownish yellow (10YR 6/6) sand; single grain; loose; few thin strong brown lamellae; very strongly acid.

The thickness of the solum ranges from 30 to 51 inches. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas. Inherently these soils have a low base status. The content of gravel ranges from 0 to 20 percent in the subsoil and from 0 to 30 percent in the substratum.

The Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. In uncultivated areas, the A horizon, which is commonly less than 4 inches thick, has a value of 2 to 4 and chroma of 1 or 2. The A horizon is loamy sand or sand.

The E horizon, if it occurs, has hue of 10YR, value of 5 or 6, and chroma of 1 to 3. It is loamy sand or sand.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is loamy sand or the gravelly analogues of this texture. In some areas the Bt horizon includes thin lamellae that have a total thickness of more than 6 inches.

The BC horizon has colors and textures similar to those of the Bt horizon.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 2 to 6. It is sand or loamy sand or the gravelly analogues of these textures at depths above any lithological discontinuity. Below a depth of 65 inches, the texture is variable.

## 14A—Galestown loamy sand, 0 to 2 percent slopes

### Composition

Galestown and similar soils: 75 percent
Dissimilar inclusions: 25 percent

### Setting

*Landform:* Uplands
*Slope:* 0 to 2 percent

### Component Description

*Surface layer texture:* Loamy sand
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Somewhat excessively drained
*Dominant parent material:* Sandy eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Available water capacity:* Low
*Note:* Included in this unit in mapping in the towns of Cambridge, Hurlock, Secretary, and Vienna are areas of urban land. These areas consist of impervious materials and support little or no vegetation. Most of the areas are covered by concrete, asphalt, or buildings.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### Dissimilar Inclusions

- Intermingled areas of Downer, Ingleside, and Fort Mott soils (10 percent of map unit)
- Hammonton and similar soils in the slightly lower landscape positions (10 percent of map unit)
- Unnamed sandy soils that have a high water table between depths of 20 and 40 inches (5 percent of map unit)

### Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## 14B—Galestown loamy sand, 2 to 5 percent slopes

### Composition

Galestown and similar soils: 75 percent
Dissimilar inclusions: 25 percent

### Setting

*Landform:* Uplands and side slopes
*Slope:* 2 to 5 percent

### Component Description

*Surface layer texture:* Loamy sand
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Somewhat excessively drained
*Dominant parent material:* Sandy eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Available water capacity:* Low
*Note:* Included in this unit in mapping in the towns of Cambridge, Hurlock, Secretary, and Vienna are areas of urban land. These areas consist of impervious materials and support little or no vegetation. Most of the areas are covered by concrete, asphalt, or buildings.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### Dissimilar Inclusions

- Intermingled areas of Downer, Ingleside, and Fort Mott soils (10 percent of map unit)
- Hammonton and similar soils in the slightly lower landscape positions (5 percent of map unit)
- Unnamed sandy soils that have a high water table between depths of 20 and 40 inches (5 percent of map unit)
- Evesboro and similar soils in the slightly higher landscape positions and along ridgetops (5 percent of map unit)

### Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Hambrook Series

The Hambrook series consists of very deep, moderately permeable, well drained soils that have a high water table between depths of 4 and 6 feet. These soils formed in stratified loamy fluviomarine sediments on nearly level uplands and in shallow depressions of the Mid-Atlantic Coastal Plain. Slopes range from 0 to 5 percent.

Hambrook soils are similar to Sassafras soils and commonly are adjacent to Hammonton, Ingleside, Woodstown, Sassafras, and Matapeake soils. The

Hambrook soils have more silt and clay in the subsoil than Hammonton and Ingleside soils. The Hambrook soils have more sand in the subsoil than Matapeake soils. The Hambrook soils do not have the redoximorphic features that are typical of the subsoil in Woodstown soils. The Hambrook soils differ from Sassafras soils because they have redoximorphic features in the substratum.

Typical pedon of Hambrook loam, 0 to 2 percent slopes; in a highly limed area, about 2.75 miles southwest of Secretary, 5,000 feet north of Route 16 on Cedar Grove Road, 100 feet east, in a field:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) loam; weak fine granular structure; friable; slightly sticky, slightly plastic; many very fine and fine roots; many very fine and common fine and medium tubular pores; neutral; abrupt smooth boundary.

BE—10 to 14 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; common very fine and few fine roots; many very fine, common fine, and few medium tubular pores; neutral; clear wavy boundary.

Bt1—14 to 21 inches; yellowish brown (10YR 5/8) sandy clay loam; moderate medium subangular blocky structure; friable; sticky, plastic; common very fine and few fine roots; many very fine and fine, common medium, and few coarse tubular pores; many distinct clay films on faces of peds and lining soil pores; moderately acid; gradual wavy boundary.

Bt2—21 to 28 inches; yellowish brown (10YR 5/8) sandy loam; moderate medium subangular blocky structure; friable; slightly sticky, slightly plastic; common very fine and few fine roots; many very fine and fine, common medium, and few coarse tubular pores; many distinct clay films on faces of peds and lining soil pores; moderately acid; clear wavy boundary.

BC—28 to 40 inches; strong brown (7.5YR 5/8) loamy sand; weak medium subangular blocky structure; very friable; few very fine roots; many very fine and common fine irregular pores; common clay coatings on sand grains; common medium distinct light yellowish brown (10YR 6/4) irregularly shaped iron depletions in the lower part of the horizon; slightly acid; clear smooth boundary.

C—40 to 60 inches; brownish yellow (10YR 6/6) sand; massive; very friable; few very fine roots; few medium prominent strong brown (7.5YR 5/8) masses of iron accumulation throughout; common medium distinct pale brown (10YR 6/3) irregularly shaped iron depletions in the matrix; slightly acid; abrupt smooth boundary.

Cg1—60 to 65 inches; light gray (5Y 7/2) sand; massive; very friable; few very fine roots; common medium prominent strong brown (7.5YR 5/8) masses of iron accumulation throughout; slightly acid; abrupt smooth boundary.

2Cg2—65 to 72 inches; light gray (5Y 7/2) silt loam; massive; friable; sticky, plastic; slightly acid.

The thickness of the solum ranges from 20 to 40 inches. The content of fine gravel ranges from 0 to 20 percent in the substratum. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas. Inherently these soils have a low base status.

Depth to redoximorphic features ranges from 48 to 72 inches. Depth to a high water table also ranges from 48 to 72 inches from January through May.

The Ap or A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or 3. It is sandy loam or loam.

The E horizon generally only occurs in undisturbed areas. It has colors and textures similar to those of the BE horizon.

The BE horizon, if it occurs, has hue of 10YR, value of 5 or 6, and chroma of 4 to 6. It is sandy loam or loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 6 to 8. It is sandy loam, sandy clay loam, or loam.

The BC horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 to 8. It is loamy sand, sandy loam, or fine sandy loam.

The C horizon has hue of 10YR to 5Y, value of 6 or 7, and chroma of 1 to 6. It commonly is stratified. The texture is sand, loamy sand, or sandy loam in the fine-earth fraction. High- and low-chroma redoximorphic features commonly occur in most pedons in the lower part of this horizon.

The 2Cg horizon has hue of 10YR to 5Y, value of 6 or 7, and chroma of 1 or 2. It is very fine sandy loam, fine sandy loam, or silt loam. The horizon commonly occurs above a depth of 72 inches but may only occur below that depth in some pedons.

## 15A—Hambrook loam, 0 to 2 percent slopes

### *Composition*

Hambrook and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### *Setting*

*Landform:* Upland flats and shallow depressions
*Slope:* 0 to 2 percent
*Note:* This map unit dominantly occurs below 35 feet in elevation.

### *Component Description*

*Surface layer texture:* Loam

*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Dominant parent material:* Loamy fluviomarine sediments
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* Moderate

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Intermingled areas of Ingleside and similar soils (5 percent of map unit)
- Sassafras and Fort Mott soils in the slightly higher landscape positions (5 percent of map unit)
- Hammonton and Woodstown soils in the slightly lower landscape positions (5 percent of map unit)
- Intermingled areas of Matapeake and similar soils in the central part of the county (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## 15B—Hambrook loam, 2 to 5 percent slopes

### *Composition*

Hambrook and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### *Setting*

*Landform:* Upland flats and shallow depressions
*Slope:* 2 to 5 percent
*Note:* This map unit dominantly occurs below 35 feet in elevation.

### *Component Description*

*Surface layer texture:* Loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Dominant parent material:* Loamy fluviomarine sediments
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* Moderate

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Intermingled areas of Sassafras and Downer soils in the northern part of the county (5 percent of map unit)
- Hammonton and Woodstown soils in the slightly lower landscape positions (5 percent of map unit)
- Fort Mott and similar soils in the slightly higher landscape positions (5 percent of map unit)
- Intermingled areas of Matapeake and similar soils in the central part of the county (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Hammonton Series

The Hammonton series consists of very deep, moderately rapidly permeable, moderately well drained soils. These soils formed in sandy eolian or fluviomarine sediments, or both, containing some silts and clays. They are on uplands and in depressions of the Mid-Atlantic Coastal Plain. Slopes range from 0 to 5 percent.

Hammonton soils are similar to Woodstown soils and commonly are adjacent to Fort Mott, Hurlock, Woodstown, and Downer soils. The Hammonton soils have less clay in the B horizon than Woodstown soils. The Hammonton soils differ from Downer and Fort Mott soils because they have redoximorphic features in the B horizon. The Hammonton soils do not have the grayish matrix or redoximorphic features that are typical of the surface and subsurface layers of Hurlock soils.

Typical pedon of Hammonton sandy loam; 1.5 miles south of Finchville (the junction of Routes 313 and 392), 50 feet south of a farm, 30 feet east of Route 313:

Ap—0 to 11 inches; brown (10YR 5/3) sandy loam; moderate medium granular structure; friable; slightly sticky; common very fine roots; many very fine, common fine, and few medium irregular pores; neutral; abrupt smooth boundary.

Bt1—11 to 22 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; common very fine and few fine roots; many very fine and fine and common medium random tubular pores; clay bridging between sand grains; few medium distinct strong brown (7.5YR 5/6) masses of iron accumulation throughout; neutral; clear smooth boundary.

Bt2—22 to 30 inches; pale brown (10YR 6/3) sandy loam; moderate medium subangular blocky structure; friable; slightly sticky, slightly plastic; common very fine and few fine roots; many very fine and fine and few medium random tubular pores; common distinct

clay films on faces of peds and clay bridging between sand grains; common medium prominent strong brown (7.5YR 5/8) masses of iron accumulation throughout; many coarse distinct light gray (10YR 7/1) irregularly shaped iron depletions in the matrix; moderately acid; clear wavy boundary.

C—30 to 41 inches; yellow (10YR 7/6) sand; single grain; loose; few medium prominent strong brown (7.5YR 5/8) masses of iron accumulation throughout; common medium distinct pale brown (10YR 6/3) irregularly shaped iron depletions in the matrix; few medium distinct light gray (10YR 7/1) irregularly shaped iron depletions in the matrix; strongly acid; clear wavy boundary.

2Cg—41 to 46 inches; light gray (10YR 7/1) sandy clay loam; massive; friable; sticky, slightly plastic; common very fine and few fine random tubular pores; common coarse prominent yellowish red (5YR 5/8) masses of iron accumulation throughout; very strongly acid; abrupt wavy boundary.

3C—46 to 56 inches; yellow (10YR 7/6) sand; single grain; loose; few medium prominent yellowish brown (10YR 5/8) masses of iron accumulation throughout; common medium distinct light brownish gray (10YR 6/2) irregularly shaped iron depletions in the matrix; very strongly acid; clear wavy boundary.

4C—56 to 65 inches; yellow (10YR 7/6) gravelly sand; single grain; loose; 20 percent gravel; very strongly acid.

The thickness of the solum ranges from 20 to 40 inches. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas. Inherently these soils have a low base status. Depth to a high water table ranges from 18 to 42 inches from January through April. Depth to the stratified substratum is typically greater than 40 inches.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 to 6. It is sandy loam or loamy sand.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 to 6, and chroma of 3 to 6. It is sandy loam. Redoximorphic features occur within a depth of 24 inches from the top of the horizon.

The C horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 7. Stratified textures range from gravelly sand to sandy clay loam. The content of gravel ranges from 0 to 25 percent.

## 16—Hammonton sandy loam

### *Composition*

Hammonton and similar soils: 75 percent
Dissimilar inclusions: 25 percent

### *Setting*

*Landform:* Upland flats and shallow depressions
*Slope:* 0 to 2 percent

### *Component Description*

*Surface layer texture:* Sandy loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Dominant parent material:* Sandy eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* Moderate

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Downer and Ingleside soils in the slightly higher landscape positions (10 percent of map unit)
- Intermingled areas of Woodstown and Klej soils (5 percent of map unit)
- Hurlock and Fallsington soils in the lower landscape positions (5 percent of map unit)
- Pone and similar soils in depressions and drainageways (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Honga Series

The Honga series consists of very deep, slowly permeable, very poorly drained soils. These soils formed in moderately decomposed organic deposits derived from salt-tolerant herbaceous plants overlying silty mineral sediments that have a low *n* value. They are located in brackish submerged upland marshes along tidally influenced bays and rivers of the Mid-Atlantic Coastal Plain. Slopes are 0 to 1 percent.

Honga soils are similar to Bestpitch soils and commonly are adjacent to Elkton, Transquaking, Sunken, and Othello soils. The Honga soils differ from Bestpitch soils because they have mineral soil material with an *n* value of less than 0.7 underlying the organic layers. The Honga soils differ from Elkton, Othello, and Sunken soils because they have more than 16 inches of organic deposits overlying mineral sediments. The Honga soils

differ from Transquaking soils because they have organic soil material that is less than 51 inches thick.

Typical pedon of Honga peat (fig. 14); on a smooth slope of 0 percent, in a submerged upland tidal marsh, about 0.75 mile southeast of Hoopersville on Middle Hooper Island, 500 feet south-southwest of an old dirt lane, 30 feet west of the main ditch in the marsh:

Oi—0 to 7 inches; dark grayish brown (10YR 4/2) peat, fibric soil material; fiber content is three-fourths of the soil volume after rubbing; 30 percent mineral soil material; many fine, medium, and coarse live roots; neutral; clear smooth boundary.

Oe—7 to 13 inches; dark brown (10YR 3/3) mucky peat, hemic soil material; fiber content is one-half of the soil volume after rubbing; 30 percent mineral soil material; common fine and medium live roots; neutral; clear smooth boundary.

Oa—13 to 22 inches; black (10YR 2/1) muck, sapric soil material; fiber content is one-tenth of the soil volume after rubbing; 60 percent mineral soil material; neutral; clear smooth boundary.

Ag—22 to 24 inches; very dark gray (5Y 2.5/1) silt loam; massive; friable; sticky, plastic; *n* value of less than 0.7, material does not flow between the fingers when squeezed; neutral; gradual smooth boundary.

Eg—24 to 36 inches; gray (10YR 5/1) silt loam; massive; firm; sticky, plastic; *n* value of less than 0.7, material does not flow between the fingers when squeezed; neutral; gradual smooth boundary.

Btg1—36 to 48 inches; dark gray (5Y 4/1) silty clay loam; moderate coarse prismatic structure; very firm; sticky, plastic; *n* value of less than 0.7, material does not flow between the fingers when squeezed; common medium faint olive (5Y 5/3) masses of iron accumulation throughout; neutral; gradual smooth boundary.

Btg2—48 to 65 inches; gray (10YR 5/1) silty clay loam; moderate coarse prismatic structure; very firm; sticky, plastic; *n* value of less than 0.7, material does not flow between the fingers when squeezed; common medium prominent strong brown (7.5YR 5/8) and common medium distinct light yellowish brown (10YR 6/4) masses of iron accumulation throughout; neutral.

The thickness of the organic deposits ranges from 16 to 51 inches. These soils are slightly acid to neutral in the natural state. They can range from extremely acid to strongly acid upon drying. The total content of sulfur in the organic horizons ranges from 0.75 to 3.0 percent. The total content of sulfur in the mineral horizons ranges from 0.05 to 0.50 percent. The conductivity of the saturation extract of the organic horizons ranges to more than 16 millimhos per centimeter. The conductivity of the saturation extract of the mineral horizons is typically between 4 and 16 millimhos per centimeter but ranges to more than 16 millimhos per centimeter. The mineral horizons have an *n* value that is typically less than 0.7 but that ranges to 1.0.

The surface tier has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 to 3. It consists of fibric and hemic soil materials. The fiber content after rubbing is greater than one-half of the soil volume. The content of mineral material ranges from 20 to 70 percent.

The subsurface tier has hue of 5YR to 10YR, value of 2 to 5, and chroma of 1 to 4. It consists of hemic and sapric soil materials. The fiber content after rubbing ranges from one-eighth to three-fourths of the soil volume. The content of mineral material in the organic horizons ranges from 20 to 60 percent.

The bottom tier has hue of 10YR to 5Y, value of 2 or 2.5, and chroma of 1 or 2. It is typically sapric material but ranges from hemic to sapric material. The fiber content after rubbing ranges from one-tenth to one-half of the soil volume. The content of mineral material in the organic horizons ranges from 20 to 75 percent. In some pedons the subsurface and bottom tiers include the mineral horizons.

The Ag horizon has hue of 10YR to 5Y, value of 2.5 to 5, and chroma of 1 or 2. It is silt loam.

The Eg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. It is silt loam.

The Btg horizon has hue of 10YR to 5YR or is neutral in hue and has value of 4 to 6 and chroma of 0 to 2. It is silt loam or silty clay loam. The structure is commonly moderate, but, because of dispersion caused by the salts in this horizon, determining the structure can be difficult. Some pedons have BC and Cg horizons. These horizons range from loamy sand to sandy clay loam.

## 17—Honga peat

### *Composition*

Honga and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### *Setting*

*Landform:* Submerged upland tidal marshes
*Slope:* 0 to 1 percent
*Note:* If this map unit is drained or the soil material is allowed to dry, the subsequent decrease in the soil reaction (pH) could eliminate the suitability of the soil for any use, including wildlife habitat.

### *Component Description*

*Surface layer texture:* Peat
*Depth class:* Very deep (more than 60 inches)

*Drainage class:* Very poorly drained
*Dominant parent material:* Organic deposits over fluviomarine sediments
*Flooding:* Frequent
*Kind of water table:* Apparent
*Ponding:* Very long in duration
*Salt affected:* Saline within a depth of 30 inches
*Available water capacity:* Very high

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Bestpitch and Transquaking soils along large meandering creeks (5 percent of map unit)
- Unnamed silty soils that are adjacent to uplands and have an organic layer that is less than 16 inches thick (5 percent of map unit)
- Sunken and similar soils in areas supporting stunted pine vegetation (5 percent of map unit)
- Open water areas consisting of salt pannes (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Hurlock Series

The Hurlock series consists of very deep, moderately rapidly permeable, poorly drained soils. These soils formed in stratified sandy eolian or fluviomarine sediments, or both, containing some silts and clays. They are on low uplands, in broad depressions, and on narrow flood plains of the Mid-Atlantic Coastal Plain. Slopes range from 0 to 2 percent.

Hurlock soils are similar to Fallsington soils and commonly are adjacent to Hammonton, Ingleside, Fallsington, Klej, Pone, and Woodstown soils. The Hurlock soils have less clay in the subsoil than Fallsington soils. They differ from Hammonton, Ingleside, and Woodstown soils because they have a gray matrix or grayish redoximorphic features in the surface and subsurface layers. The Hurlock soils have more clay in the subsoil than Klej soils. The Hurlock soils do not have the 10-inch-thick, black, highly organic surface layer that is typical of Pone soils.

Typical pedon of Hurlock sandy loam; about 2.25 miles south of Secretary, 1,000 feet northwest of the intersection of Hicksburg Road and Red Hill Road:

Oi/Oe—3 inches to 0; undecomposed and moderately decomposed leaves, needles, and twigs from overstory and understory vegetation; abrupt smooth boundary.

A—0 to 3 inches; black (10YR 2/1) sandy loam; weak fine granular structure; very friable; slightly sticky, slightly plastic; many very fine, fine, and medium roots; common very fine and fine irregular pores; very strongly acid; abrupt smooth boundary.

Eg—3 to 10 inches; gray (10YR 6/1) sandy loam; weak fine subangular blocky structure; very friable; slightly sticky, slightly plastic; many fine and very fine and few coarse and medium roots; many very fine and common fine tubular pores; strongly acid; gradual smooth boundary.

Btg—10 to 22 inches; gray (10YR 6/1) sandy loam; moderate medium subangular blocky structure; friable; slightly sticky, slightly plastic; common very fine and fine and few medium roots; many very fine and common fine tubular pores; common faint and distinct clay films on faces of peds and clay bridging between sand grains; very strongly acid; gradual wavy boundary.

BC—22 to 25 inches; light brownish gray (10YR 6/2) loamy sand; weak medium subangular blocky structure; very friable; slightly sticky; common very fine and few medium and fine roots; many very fine irregular pores; faint clay bridging between sand grains; very strongly acid; clear smooth boundary.

Cg1—25 to 38 inches; light brownish gray (10YR 6/2) sand; single grain; loose; few very fine and fine roots; very strongly acid; clear wavy boundary.

Cg2—38 to 50 inches; light gray (10YR 7/1) sand; single grain; loose; few very fine roots; extremely acid; clear wavy boundary.

Cg3—50 to 60 inches; gray (10YR 5/1) loamy sand; massive; very friable; many coarse prominent strong brown (7.5YR 5/8) masses of iron accumulation throughout; common medium distinct light gray (10YR 7/1) irregularly shaped iron depletions in the matrix; very strongly acid; abrupt wavy boundary.

2Cg4—60 to 66 inches; gray (5Y 6/1) stratified silt loam and very fine sandy loam; massive; friable; slightly sticky, slightly plastic; common fine prominent strong brown (7.5YR 5/6) irregularly shaped masses of iron accumulation in the matrix; very strongly acid; abrupt wavy boundary.

3Ab—66 to 72 inches; very dark grayish brown (10YR 3/2) silt loam; massive; friable; slightly sticky, plastic; very strongly acid.

The thickness of the solum ranges from 20 to 40 inches. Depth to the stratified substratum is typically greater than 48 inches. The content of gravel ranges from 0 to 5 percent in the solum and from 0 to 15 percent in the

substratum. An apparent high water table ranges from the surface to a depth of 12 inches from December through May. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas. Inherently these soils have a low base status.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 2 to 6, and chroma of 1 or 2. It is sandy loam or loamy sand.

The Eg horizon has hue of 10YR to 5Y, value of 3 to 7, and chroma of 1 or 2. It is sandy loam or loamy sand. In some pedons the A and E horizons have been mixed by plowing.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2. It is commonly sandy loam but has thin layers of sandy clay loam or loam in some pedons.

The BC horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 0 to 3. It is loamy sand.

The Cg horizon has hue of 10YR to 5Y or is neutral in hue and has value of 4 to 7 and chroma of 0 to 2. It is sand or loamy sand in the fine-earth fraction.

The 2Cg horizon has hue of 10YR to 5Y or is neutral in hue and has value of 5 to 7 and chroma of 0 to 3. Stratified textures range from very fine sandy loam to silty clay loam. The stratified material commonly occurs as horizontal bands 2 to 6 inches thick. The horizon commonly occurs above a depth of 66 inches but may only occur below that depth in some pedons. Some pedons have a buried A horizon (having a high content of organic matter) below a depth of 60 inches.

## 18—Hurlock sandy loam

### *Composition*

Hurlock and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### *Setting*

*Landform:* Low uplands, depressions, and swales
*Slope:* 0 to 2 percent

### *Component Description*

*Surface layer texture:* Sandy loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Dominant parent material:* Sandy eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* Low

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Intermingled areas of Fallsington soils in the central part of the county (5 percent of map unit)
- Hammonton and Woodstown soils in the higher landscape positions (5 percent of map unit)
- Klej and similar soils in the slightly higher landscape positions (5 percent of map unit)
- Pone and similar soils in the lower landscape positions (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils" (fig. 10).

## Ingleside Series

The Ingleside series consists of very deep, well drained soils. Permeability is moderately rapid in the solum and moderately slow or slow in the 2C horizon. These soils formed in stratified sandy eolian or fluviomarine sediments, or both, containing some silts and clays. They are on uplands and in shallow depressions of the Mid-Atlantic Coastal Plain. Slopes range from 0 to 5 percent.

Ingleside soils are similar to Downer soils and commonly are adjacent to Downer, Fort Mott, Galestown, Hammonton, and Woodstown soils. The Ingleside soils differ from Downer, Fort Mott, and Galestown soils because they have redoximorphic features in the substratum. The Ingleside soils do not have the redoximorphic features that are typical of the subsoil in Hammonton and Woodstown soils.

Typical pedon of Ingleside sandy loam, 0 to 2 percent slopes; 1.25 miles southeast of Reids Grove, 0.5 mile northwest of the junction of Reid Road and Indiantown Road, about 1,000 feet behind the farmhouse, 45 feet northeast, in a field by the farm lane:

Ap—0 to 10 inches; dark brown (10YR 4/3) sandy loam; moderate fine granular structure; very friable; slightly sticky, slightly plastic; common very fine and few fine and medium roots; common very fine tubular pores; slightly acid; abrupt smooth boundary.

E—10 to 15 inches; brown (10YR 5/3) sandy loam; weak medium subangular blocky structure; very friable; slightly sticky, slightly plastic; common fine and very fine roots; many very fine, common fine, and few medium tubular pores; slightly acid; abrupt smooth boundary.

Bt1—15 to 24 inches; dark yellowish brown (10YR 4/6) sandy loam; moderate medium subangular blocky

**Figure 10.—No-till corn on the poorly drained Hurlock sandy loam.**

structure; friable; slightly sticky, slightly plastic; common very fine and fine roots; common very fine and fine tubular pores; common distinct clay films on faces of peds and clay bridging between sand grains; slightly acid; clear wavy boundary.

Bt2—24 to 33 inches; strong brown (7.5YR 4/6) sandy loam; moderate medium subangular blocky structure; friable; slightly sticky, slightly plastic; few very fine roots; common very fine and fine tubular pores; common prominent clay films on faces of peds and clay bridging between sand grains; slightly acid; clear wavy boundary.

BC—33 to 43 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; very friable; slightly sticky, slightly plastic; few very fine roots; common very fine and fine irregular pores; clay bridging between sand grains; slightly acid; gradual wavy boundary.

C1—43 to 48 inches; yellowish brown (10YR 5/8) loamy sand; single grain; loose; few very fine and fine irregular pores; moderately acid; clear wavy boundary.

C2—48 to 56 inches; light yellowish brown (10YR 6/4) loamy fine sand; single grain; loose; common medium prominent strong brown (7.5YR 5/8) masses of iron

accumulation throughout; common medium distinct light brownish gray (10YR 6/2) irregularly shaped iron depletions in the matrix; moderately acid; abrupt smooth boundary.

2C3—56 to 72 inches; pale brown (10YR 6/3) silt loam; massive; friable; slightly sticky, slightly plastic; common fine prominent strong brown (7.5YR 5/8) irregularly shaped masses of iron accumulation in the matrix; common medium faint gray (10YR 6/1) irregularly shaped iron depletions in the matrix; moderately acid.

The thickness of the solum ranges from 20 to 45 inches. The content of fine gravel ranges from 0 to 15 percent in the solum and from 0 to 25 percent in the C horizon. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas. Inherently these soils have a low base status.

The Ap or A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. It is sandy loam or loamy sand.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 3 to 6. It is sandy loam or loamy sand. In some pedons the A and E horizon have been mixed by plowing.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is commonly sandy loam but has thin layers of sandy clay loam or loam in some pedons.

The BC horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 6 to 8. It is loamy sand or sandy loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 4 to 8. It is sand, loamy sand, or loamy fine sand in the fine-earth fraction. Redoximorphic features occur in the lower part of the C horizon in most pedons.

The 2C horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 1 to 4. Stratified textures range from fine sandy loam to clay loam. The horizon commonly occurs above a depth of 72 inches but may only occur below that depth in some pedons. Redoximorphic features occur throughout the horizon.

## 19A—Ingleside sandy loam, 0 to 2 percent slopes

### *Composition*

Ingleside and similar soils: 75 percent
Dissimilar inclusions: 25 percent

### *Setting*

*Landform:* Upland flats and shallow depressions
*Slope:* 0 to 2 percent
*Note:* This map unit dominantly occurs below 35 feet in elevation.

### *Component Description*

*Surface layer texture:* Sandy loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Dominant parent material:* Sandy eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* Moderate
*Note:* Included in this unit in mapping in the towns of Cambridge, Hurlock, Secretary, and Vienna are areas of urban land. These areas consist of impervious materials and support little or no vegetation. Most of the areas are covered by concrete, asphalt, or buildings.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Downer, Sassafras, and Fort Mott soils in the slightly higher landscape positions (10 percent of map unit)
- Hammonton and Woodstown soils in the slightly lower landscape positions (10 percent of map unit)
- Galestown and Runclint soils on side slopes along drainageways (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## 19B—Ingleside sandy loam, 2 to 5 percent slopes

### *Composition*

Ingleside and similar soils: 75 percent
Dissimilar inclusions: 25 percent

### *Setting*

*Landform:* Upland flats and shallow depressions
*Slope:* 2 to 5 percent
*Note:* This map unit dominantly occurs below 35 feet in elevation.

### *Component Description*

*Surface layer texture:* Sandy loam

*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Dominant parent material:* Sandy eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* Moderate
*Note:* Included in this unit in mapping in the towns of Cambridge, Hurlock, Secretary, and Vienna are areas of urban land. These areas consist of impervious materials and support little or no vegetation. Most of the areas are covered by concrete, asphalt, or buildings.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Downer, Sassafras, and Fort Mott soils in the slightly higher landscape positions (10 percent of map unit)
- Hammonton and Woodstown soils in the slightly lower landscape positions (10 percent of map unit)
- Galestown and Runclint soils on side slopes along drainageways (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Keyport Series

The Keyport series consists of very deep, slowly permeable, moderately well drained soils. These soils formed in clayey eolian deposits or fluviomarine sediments, or both. They are on broad lowland flats and in shallow depressions of the Mid-Atlantic Coastal Plain. Slopes range from 0 to 2 percent.

Keyport soils are similar to Mattapex soils and commonly are adjacent to Mattapex, Elkton, and Othello soils. The Keyport soils have more clay in the B horizon than Mattapex and Othello soils. The Keyport soils do not have the grayish matrix or redoximorphic features that are typical of the surface layer in Elkton soils.

Typical pedon of Keyport silt loam; 8 miles west of Cambridge, 200 feet southwest of Route 343, about 90 feet south of Bar Neck Road, in a cultivated field:

Ap1—0 to 7 inches; grayish brown (2.5Y 5/2) silt loam; weak medium subangular blocky structure parting to moderate fine granular; friable; slightly sticky, slightly plastic; many very fine and common fine roots; many very fine and few fine tubular pores; moderately acid; abrupt smooth boundary.

Ap2—7 to 10 inches; grayish brown (2.5Y 5/2) silt loam; moderate fine platy structure; friable; slightly sticky, slightly plastic; common very fine and few fine and medium roots; many very fine and fine tubular pores; neutral; abrupt smooth boundary.

E/A—10 to 15 inches; light olive brown (2.5Y 5/4) silt loam; weak medium platy structure parting to weak medium subangular blocky; firm; sticky, plastic; common very fine and few fine roots; many very fine and common fine tubular pores; few fine prominent strong brown (7.5YR 5/6) masses of iron accumulation throughout; slightly acid; gradual wavy boundary.

Bt1—15 to 25 inches; light olive brown (2.5Y 5/4) silty clay loam; moderate medium prismatic structure; very firm; sticky, plastic; many very fine and few fine roots between peds; many very fine and common fine tubular pores; many clay films on faces of peds and in root channels or pores, or in both; common medium distinct strong brown (7.5YR 5/6) masses of iron accumulation throughout; few fine distinct gray (10YR 5/1) irregularly shaped and few medium distinct light gray or gray (5Y 6/1) irregularly shaped iron depletions in the matrix; very strongly acid; clear wavy boundary.

Btg—25 to 36 inches; grayish brown (2.5Y 5/2) silty clay loam; moderate medium prismatic structure; very firm; very sticky, plastic; common very fine roots; common very fine and few fine tubular pores; many clay films on faces of peds and in root channels or pores, or in both; common medium prominent strong brown (7.5Y 5/6) and common medium faint light olive brown (2.5Y 5/4) masses of iron accumulation throughout; very strongly acid; clear wavy boundary.

Bt2—36 to 43 inches; yellowish brown (10YR 5/6) silty clay loam; weak medium prismatic structure; firm; very sticky, plastic; common very fine roots; many very fine and few fine tubular pores; many clay films in root channels or pores, or both; many coarse prominent yellowish red (5YR 5/6) masses of iron accumulation throughout; common fine and medium prominent light brownish gray (2.5Y 6/2) irregularly shaped iron depletions in the matrix; very strongly acid; clear smooth boundary.

Bt3—43 to 48 inches; yellowish brown (10YR 5/4) silty clay loam; weak medium prismatic structure; firm; very sticky, plastic; common fine roots; many very fine and few fine tubular pores; many clay films on faces of peds and in root channels or pores, or in both; common coarse prominent yellowish red (5YR 5/6) masses of iron accumulation throughout; common

Figure 11.—Profile of Elkton silt loam. The dominant gray colors of this poorly drained soil are visible throughout the profile. Scale is in feet.

Figure 12.—Profile of Fort Mott loamy sand. The coarse surface and subsurface horizons are within a depth of 24 inches. Scale is in feet.

Figure 13.—Profile of Galestown loamy sand. The coarse subsoil is below a depth of 22 inches. Scale is in feet.

Figure 14.—Profile of Honga peat. Organic horizons are within a depth of 22 inches. Scale is in feet.

Figure 15.—Profile of Othello silt loam. The dominant gray colors of this poorly drained soil are visible throughout the profile. Scale is in feet.

Figure 16.—Profile of Kentuck mucky silt loam. The highly organic surface layer is above a depth of 11 inches. Scale is in feet.

Figure 17.—Profile of Runclint sand. Redoximorphic features are below a depth of 40 inches. Scale is in feet.

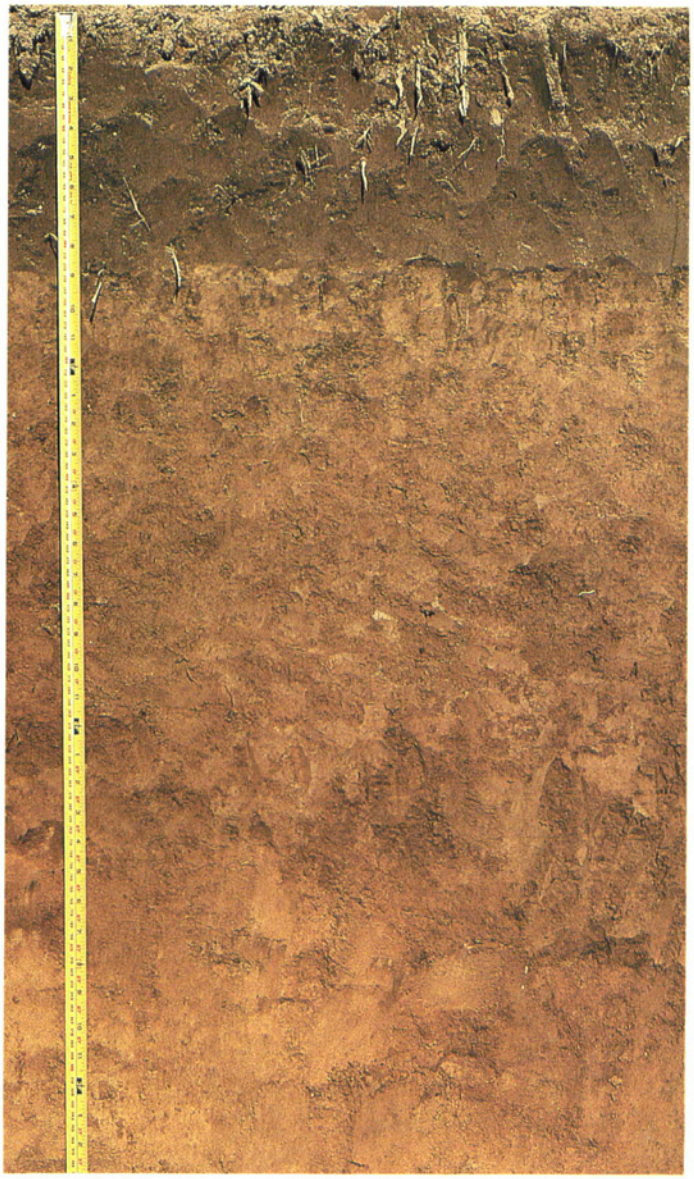

Figure 18.—Profile of Sassafras loam. The well developed subsoil is between depths of 14 and 28 inches. Scale is in inches.

fine and medium prominent light brownish gray (2.5Y 6/2) irregularly shaped iron depletions in the matrix; very strongly acid; abrupt smooth boundary.
Cg—48 to 70 inches; light gray (10YR 6/1) silt loam; massive; firm; sticky, plastic; few fine roots; common very fine and few fine tubular pores; few prominent clay films in root channels or pores, or both; many coarse faint light brownish gray (10YR 6/2) and common medium distinct dark yellowish brown (10YR 4/6) masses of iron accumulation throughout; strongly acid.

The thickness of the solum ranges from 40 to 50 inches. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas. Inherently these soils have a low base status. Depth to a high water table ranges from 18 to 48 inches from January through May.

The A horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 to 4.

The B horizon has hue of 10YR to 2.5Y, value of 5 to 7, and chroma of 0 to 6. It is silt loam or silty clay loam.

The C horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 0 to 5. The texture dominantly is silt loam or silty clay loam. In some pedons it is very fine sandy loam or fine sandy loam below a depth of 45 inches.

The Keyport soils in Dorchester County are taxadjuncts to the Keyport series because they do not have an average content of clay greater than 35 percent in the particle-size control section, as defined in the range for the series. This difference, however, does not significantly affect the use and management of the soils.

## 20—Keyport silt loam

### *Composition*

Keyport and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### *Setting*

*Landform:* Lowland flats, depressions, and swales
*Slope:* 0 to 2 percent

### *Component Description*

*Surface layer texture:* Silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Dominant parent material:* Clayey eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Perched
*Available water capacity:* High

*Note:* In some areas on Taylor's Island, this soil has slopes of 2 to 5 percent.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Intermingled areas of Mattapex and similar soils (5 percent of map unit)
- Othello and Elkton soils in the slightly lower landscape positions (5 percent of map unit)
- Kentuck and similar soils in depressions (5 percent of map unit)
- Matapeake and similar soils in the higher landscape positions (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Klej Series

The Klej series consists of very deep, rapidly permeable, somewhat poorly drained soils. These soils formed in sandy eolian or fluviomarine sediments, or both. They are on low uplands and in broad depressions of the Mid-Atlantic Coastal Plain. Slopes range from 0 to 2 percent.

Klej soils are similar to Hammonton soils and commonly are adjacent to Fallsington, Hammonton, Ingleside, Hurlock, Woodstown, and Pone soils. The Klej soils have less clay in the subsoil than these other soils.

Typical pedon of Klej loamy sand, 0 to 2 percent slopes, in an area of Klej-Hammonton complex; about 1 mile north of Finchville, 100 feet east of Route 313, in a field:

Ap—0 to 8 inches; very dark gray (10YR 3/1) loamy sand; weak fine granular structure; very friable; common very fine and fine roots; many very fine and fine irregular pores; slightly acid; abrupt smooth boundary.
Bw—8 to 22 inches; brown (10YR 5/3) loamy sand; single grain; loose; few very fine and fine roots; moderately acid; clear wavy boundary.
Cg1—22 to 50 inches; light gray (10YR 6/1) sand; single grain; loose; common fine prominent strong brown (7.5YR 5/8) irregularly shaped masses of iron accumulation in the matrix; strongly acid; clear wavy boundary.
Cg2—50 to 72 inches; light gray (2.5Y 6/1) sand; massive; very friable; common fine prominent light

yellowish brown (10YR 6/4) masses of iron accumulation throughout; very strongly acid.

The thickness of the solum ranges from 20 to 30 inches. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas. Inherently these soils have a low base status. The content of gravel ranges from 0 to 15 percent in the substratum. Depth to a high water table ranges from 12 to 18 inches from December through April.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 to 4.

The Bw horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 or 4.

The Cg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 0 to 4. It is dominantly sand. Below a depth of 40 inches, it ranges from stratified sand to sandy loam.

## 21—Klej-Hammonton complex

### *Composition*

Klej and similar soils: 45 percent
Hammonton and similar soils: 35 percent
Dissimilar inclusions: 20 percent

### *Setting*

*Landform:*
- Klej—low uplands
- Hammonton—low uplands

*Slope:*
- Klej—0 to 2 percent
- Hammonton—0 to 2 percent

*Note:* The Klej soil is generally slightly lower on the landscape than the Hammonton soil.

### *Component Description*

#### Klej

*Surface layer texture:* Loamy sand
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Somewhat poorly drained
*Dominant parent material:* Sandy eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* Low

#### Hammonton

*Surface layer texture:* Loamy sand
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Dominant parent material:* Sandy eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity*: Low

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Intermingled areas of Fallsington and Woodstown soils in the central part of the county (5 percent of map unit)
- Ingleside and similar soils in the higher landscape positions (5 percent of map unit)
- Hurlock and similar soils in the lower landscape positions (5 percent of map unit)
- Pone and similar soils in depressions (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Matapeake Series

The Matapeake series consists of very deep, moderately slowly permeable, well drained soils. These soils formed in loess (silty) deposits overlying sandy fluviomarine sediments. They are on lowland flats of the Mid-Atlantic Coastal Plain. Slopes range from 0 to 5 percent.

Matapeake soils are similar to Mattapex soils and are commonly adjacent to Mattapex and Othello soils. The Matapeake soils do not have the redoximorphic features that are typical of the solum in these other soils.

Typical pedon of Matapeake silt loam, wet substratum, 0 to 2 percent slopes; 1 mile south of Indianbone, 300 feet east of Bucktown Road, in line with the southernmost chicken house:

Ap—0 to 7 inches; brown (10YR 5/3) silt loam; moderate medium and fine granular structure; very friable; slightly sticky, slightly plastic; many very fine and common fine roots; many very fine, common fine, and few medium irregular pores; slightly acid; abrupt smooth boundary.

E—7 to 13 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; very friable; slightly sticky, slightly plastic; common very fine and few fine and medium roots; many very fine and few fine and medium random tubular pores; moderately acid; clear smooth boundary.

Bt1—13 to 30 inches; strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; friable; sticky, plastic; common very fine and few fine roots; many very fine and few fine and medium random tubular pores; common distinct clay films on faces of peds and lining soil pores; strongly acid; gradual smooth boundary.

Bt2—30 to 38 inches; yellowish brown (10YR 5/6) silt loam; weak coarse prismatic structure parting to moderate medium subangular blocky; friable; sticky, plastic; common very fine and few fine roots; many very fine and few fine and medium random tubular pores; many prominent clay films on faces of peds and lining soil pores; common fine distinct strong brown (7.5YR 5/6) masses of iron accumulation throughout; common medium distinct light yellowish brown (10YR 6/4) irregularly shaped iron depletions in the matrix; slightly acid; gradual smooth boundary.

2BC—38 to 46 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; very friable; slightly sticky, slightly plastic; few very fine roots; many very fine and few fine random tubular pores; few faint clay films on faces of peds and clay bridging between sand grains; few fine distinct strong brown (7.5YR 5/6) masses of iron accumulation throughout; common medium distinct light yellowish brown (2.5Y 6/4) irregularly shaped iron depletions in the matrix; strongly acid; clear smooth boundary.

2C1—46 to 55 inches; light yellowish brown (10YR 6/4) loamy sand; massive; very friable; few very fine roots; common very fine and few fine irregular pores; few fine prominent strong brown (7.5YR 5/6) masses of iron accumulation throughout; strongly acid; clear smooth boundary.

2C2—55 to 64 inches; pale brown (10YR 6/3) sand; single grain; loose; few fine prominent strong brown (7.5YR 5/6) masses of iron accumulation throughout; few medium distinct light gray (10YR 7/2) irregularly shaped iron depletions in the matrix; strongly acid; clear smooth boundary.

2Cg—64 to 72 inches; light gray (2.5Y 7/2) sand; single grain; loose; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation throughout; strongly acid.

The thickness of the solum ranges from 24 to 40 inches. This range excludes the 2BC horizon, which does not occur in all pedons. Depth to a high water table ranges from 48 to 72 inches from January through April. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas. Inherently these soils have a low base status.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 3 to 6. It is typically silt loam but is fine sandy loam in some pedons.

The E horizon has hue of 10YR or 2.5YR, value of 5 or 6, and chroma of 4 to 6. It is silt loam or fine sandy loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is silt loam or silty clay loam. In some pedons redoximorphic features form during short periods of time when water tension films occur on structural peds. The water table does not occur in this horizon.

The 2BC horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8. It is loam, sandy loam, or fine sandy loam.

The 2C horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 8. Redoximorphic features with chroma of 2 or less do not occur in all pedons. The texture ranges from sand to loamy fine sand. The content of pebbles ranges from 0 to 20 percent.

## 22A—Matapeake silt loam, wet substratum, 0 to 2 percent slopes

### *Composition*

Matapeake and similar soils: 75 percent
Dissimilar inclusions: 25 percent

### *Setting*

*Landform:* Lowland flats
*Slope:* 0 to 2 percent

### *Component Description*

*Surface layer texture:* Silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Dominant parent material:* Silty eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* High
*Note:* In some areas in the Neck District, the soil has 10 to 30 percent gravel in the substratum.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Intermingled areas of unnamed silty soils that are in the slightly higher landscape positions and that have a water table at a depth of more than 72 inches (10 percent of map unit)
- Mattapex and similar soils in the slightly lower landscape positions (5 percent of map unit)

• Othello and similar soils in the lower landscape positions (5 percent of map unit)
• Hambrook and similar soils in the central part of the county (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## 22B—Matapeake silt loam, wet substratum, 2 to 5 percent slopes

### *Composition*

Matapeake and similar soils: 75 percent
Dissimilar inclusions: 25 percent

### *Setting*

*Landform:* Lowland flats and side slopes
*Slope:* 2 to 5 percent

### *Component Description*

*Surface layer texture:* Silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Dominant parent material:* Silty eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* High
*Note:* In some areas in the Neck District, the soil has 10 to 30 percent gravel in the substratum.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

• Intermingled areas of unnamed silty soils that are in the slightly higher landscape positions and that have a water table at a depth of more than 72 inches (10 percent of map unit)
• Mattapex and similar soils in the slightly lower landscape positions (5 percent of map unit)
• Othello and similar soils in the lower landscape positions (5 percent of map unit)
• Hambrook and similar soils in the central part of the county (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Mattapex Series

The Mattapex series consists of very deep, moderately slowly permeable, moderately well drained soils. These soils formed in loess (silty) deposits overlying sandy fluviomarine sediments. They are on lowland flats of the Mid-Atlantic Coastal Plain. Slopes range from 0 to 5 percent.

Mattapex soils are similar to Keyport soils and are commonly adjacent to Matapeake and Othello soils. The Mattapex soils do not have the redoximorphic features that are typical in the surface and subsurface layers of Othello soils. The Mattapex soils differ from Keyport soils because they have less clay in the B horizon. The Mattapex soils differ from Matapeake soils because they have redoximorphic features in the B horizon.

Typical pedon of Mattapex silt loam, 0 to 2 percent slopes; 1.25 miles south of Linkwood, 0.5 mile southwest of Route 50, about 220 feet northwest of Percy May Road:

Ap—0 to 12 inches; brown (10YR 5/3) silt loam; moderate medium granular structure; friable; slightly sticky, slightly plastic; many very fine and common fine and medium roots; many very fine and few fine and medium random tubular pores; neutral; abrupt smooth boundary.

BE—12 to 17 inches; light olive brown (2.5Y 5/4) silt loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; common very fine and few fine roots; many very fine, common fine, and few medium random tubular pores; few prominent clay films on faces of peds; few fine and medium distinct yellowish brown (10YR 5/6) irregularly shaped masses of iron accumulation in the matrix; neutral; clear wavy boundary.

Bt—17 to 24 inches; light olive brown (2.5Y 5/4) silt loam; moderate coarse prismatic structure parting to moderate medium subangular blocky; friable; sticky, plastic; few very fine and fine roots; many very fine, common fine, and few medium random tubular pores; common prominent clay films on faces of peds and lining soil pores; the horizon is grading towards a fragipan; common fine distinct yellowish brown (10YR 5/6) masses of iron accumulation throughout; common medium distinct light brownish gray (2.5Y 6/2) irregularly shaped iron depletions in the matrix; very strongly acid; clear wavy boundary.

Btg—24 to 38 inches; gray (5Y 5/1) silt loam; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; sticky, plastic; few very fine roots; many very fine and few fine random

tubular pores; common prominent clay films on faces of peds and lining soil pores; the horizon is grading towards a fragipan; common medium and coarse prominent strong brown (7.5YR 5/8) masses of iron accumulation throughout; very strongly acid; clear wavy boundary.

2BCg—38 to 46 inches; gray (10YR 6/1) fine sandy loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; few very fine roots; many very fine and few fine irregular pores; few distinct clay films on faces of peds; common medium prominent strong brown (7.5YR 5/8) and many coarse distinct light yellowish brown (2.5Y 6/4) masses of iron accumulation throughout; very strongly acid; gradual irregular boundary.

2Cg—46 to 65 inches; light gray (10YR 7/1) sand; single grain; loose; strongly acid.

The thickness of the solum ranges from 24 to 48 inches. Depth to a high water table ranges from 18 to 36 inches from January through April. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas. Inherently these soils have a low base status.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 to 4.

The Bt horizon has hue of 10YR to 5Y, value of 5 or 6, and chroma of 1 to 6. It is silt loam or silty clay loam.

The 2BC horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 to 6. It is fine sandy loam or sandy clay loam.

The 2C horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 to 4. It ranges from sand to fine sandy loam and includes the gravelly analogues of these textures. The content of gravel ranges from 0 to 20 percent.

## 23—Mattapex fine sandy loam, 0 to 2 percent slopes

### *Composition*

Mattapex and similar soils: 75 percent
Dissimilar inclusions: 25 percent

### *Setting*

*Landform:* Lowland flats
*Slope:* 0 to 2 percent

### *Component Description*

*Surface layer texture:* Fine sandy loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Dominant parent material:* Silty eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* High

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Matapeake and similar soils in the slightly higher landscape positions (10 percent of map unit)
- Unnamed silty soils that are in the slightly lower landscape positions and that have a high water table between depths of 10 and 20 inches (10 percent of map unit)
- Othello and similar soils in the lower landscape positions (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## 24A—Mattapex silt loam, 0 to 2 percent slopes

### *Composition*

Mattapex and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### *Setting*

*Landform:* Lowland flats
*Slope:* 0 to 2 percent

### *Component Description*

*Surface layer texture:* Silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Dominant parent material:* Silty eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* High
*Note:* In some areas in the Neck District, the soil has 10 to 30 percent gravel in the substratum. Included in this unit in mapping in the towns of Cambridge, Hurlock, Secretary, and Vienna are areas of urban land. These areas consist of impervious materials and

support little or no vegetation. Most of the areas are covered by concrete, asphalt, or buildings.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Matapeake and similar soils in the slightly higher landscape positions (5 percent of map unit)
- Unnamed silty soils that are in the slightly lower landscape positions and that have a high water table between depths of 10 and 20 inches (5 percent of map unit)
- Othello and similar soils in the lower landscape positions (5 percent of map unit)
- Hammonton and Woodstown soils along major drainageways, in the central part of the county (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## 24B—Mattapex silt loam, 2 to 5 percent slopes

### *Composition*

Mattapex and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### *Setting*

*Landform:* Lowland flats and side slopes
*Slope:* 2 to 5 percent

### *Component Description*

*Surface layer texture:* Silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Dominant parent material:* Silty eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* High
*Note:* In some areas in the Neck District, the soil has 10 to 30 percent gravel in the substratum. Included in this unit in mapping in the towns of Cambridge, Hurlock, Secretary, and Vienna are areas of urban land. These areas consist of impervious materials and

support little or no vegetation. Most of the areas are covered by concrete, asphalt, or buildings.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Matapeake and similar soils in the slightly higher landscape positions (5 percent of map unit)
- Unnamed silty soils that are in the slightly lower landscape positions and that have a high water table between depths of 10 and 20 inches (5 percent of map unit)
- Othello and similar soils in the lower landscape positions (5 percent of map unit)
- Hammonton and Woodstown soils along major drainageways, in the central part of the county (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Nanticoke Series

The Nanticoke series consists of very deep, moderately slowly permeable, very poorly drained soils. These soils formed in silty estuarine sediments having a high *n* value. They are located in freshwater tidal marshes on flood plains of the Mid-Atlantic Coastal Plain. Slopes are 0 to 1 percent.

Nanticoke soils are similar to Bestpitch soils and commonly are adjacent to Puckum soils. The Nanticoke soils differ from these other soils because they have organic layers that are less than 16 inches thick.

Typical pedon of Nanticoke silt loam; on a smooth slope of 0 percent, in an estuarine tidal marsh, about 5,000 feet north-northwest of Brookview and Route 14, about 3,000 feet west of Puckum Road on the west side of Marshyhope Creek, 30 feet into the tidal marsh:

Ag—0 to 10 inches; black (5Y 2.5/2) silt loam; massive; friable; slightly sticky, slightly plastic; *n* value of more than 1.0, material flows easily between the fingers when squeezed; 5 percent organic soil material; strongly acid; clear smooth boundary.

Cg1—10 to 24 inches; dark greenish gray (5GY 3/1) silt loam; massive; friable; slightly sticky, slightly plastic; *n* value of more than 1.0, material flows easily between the fingers when squeezed; common fine faint light

gray (10YR 7/2) irregularly shaped iron depletions in the matrix; strongly acid; gradual smooth boundary.
Cg2—24 to 80 inches; dark greenish gray (5GY 4/1) silty clay loam; massive; firm; sticky, plastic; *n* value of more than 1.0, material flows easily between the fingers when squeezed; common fine faint light gray (10YR 7/2) irregularly shaped iron depletions in the matrix; very strongly acid.

The thickness of the Ag and Cg horizons is greater than 60 inches. Reaction ranges from moderately acid to neutral. Electrical conductivity is less than 4 millimhos per centimeter. The *n* value is typically more than 1.0 but ranges to 0.7 in the lower part of the Cg horizon. A high water table ranges from the surface to 12 inches above the surface throughout the year.

The Ag horizon has hue of 10YR to 5GY, value of 2 or 3, and chroma of 0 to 2. It is silt loam or mucky silt loam. The content of organic matter ranges from 3 to 10 percent.

The Cg horizon has hue of 10YR to 5GY, value of 3 or 4, and chroma of 0 to 2. It is typically silty clay loam but includes silt loam and very fine sandy loam. In some pedons thin sandy mineral layers less than 1 inch thick are stratified within the horizon. The content of organic matter ranges from 0.5 to 5.0 percent. In some pedons thin organic layers are stratified within the horizon.

## 25—Nanticoke silt loam

### *Composition*

Nanticoke and similar soils: 75 percent
Dissimilar inclusions: 25 percent

### *Setting*

*Landform:* Estuarine tidal flats, mud flats, and flood plains
*Slope:* 0 to 1 percent

### *Component Description*

*Surface layer texture:* Silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Very poorly drained
*Dominant parent material:* Silty estuarine sediments
*Flooding:* Frequent
*Kind of water table:* Apparent
*Ponding:* Very long in duration
*Available water capacity:* High
*Note:* The load-bearing capacity of this soil is very low throughout the profile.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Unnamed silty soils that have an organic surface layer thicker than 6 inches and that are in the interior of marshes (15 percent of map unit)
- Puckum and similar soils on adjacent swampland (10 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Othello Series

The Othello series consists of very deep, moderately slowly permeable, poorly drained soils. These soils formed in loess (silty) deposits overlying sandy fluviomarine sediments. They are on broad lowland flats of the Mid-Atlantic Coastal Plain. Slopes range from 0 to 2 percent.

Othello soils are similar to Mattapex soils and are commonly adjacent to Elkton, Kentuck, Keyport, and Mattapex soils. The Othello soils have less clay in the B horizon than Elkton and Keyport soils. The Othello soils do not have the 10-inch-thick, black, highly organic surface layer that is typical of Kentuck soils. The Othello soils differ from Mattapex soils because they have redoximorphic features in the surface and subsurface layers.

Typical pedon of Othello silt loam (fig. 15); 1.25 miles south of the junction of Egypt Road and Old Bridge Road, 0.6 mile west under power lines, 60 feet south, in a wooded area:

Oi—2 inches to 0; undecomposed and partially decomposed leaves and twigs; abrupt smooth boundary.
A—0 to 4 inches; dark grayish brown (2.5Y 4/2) silt loam; moderate medium subangular blocky structure; very friable; slightly sticky, slightly plastic; many very fine, common fine and medium, and few coarse roots; many very fine and few fine and medium random tubular pores; very strongly acid; clear wavy boundary.
Eg—4 to 11 inches; light brownish gray (2.5Y 6/2) silt loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; many very fine, common fine, and few medium and coarse roots; many very fine and few fine and medium random tubular pores; common fine and medium prominent strong brown (7.5YR 5/8) irregularly shaped masses

of iron accumulation in the matrix; very strongly acid; gradual wavy boundary.

Btg1—11 to 19 inches; gray (10YR 6/1) silt loam; moderate medium prismatic structure; firm; sticky, plastic; many very fine, common fine, and few medium and coarse roots; many very fine and few fine random tubular pores; few prominent clay films on faces of peds and lining soil pores; common medium prominent strong brown (7.5YR 5/8) masses of iron accumulation throughout; very strongly acid; gradual wavy boundary.

Btg2—19 to 28 inches; gray (10YR 6/1) silt loam; strong medium and coarse prismatic structure; firm; sticky, plastic; many very fine, common medium, and few fine and coarse roots; many very fine and few fine random tubular pores; common prominent clay films on faces of peds and lining soil pores; common medium prominent strong brown (7.5YR 5/8) masses of iron accumulation throughout; very strongly acid; clear wavy boundary.

2BC—28 to 36 inches; dark gray (10YR 4/1) sandy loam; massive; friable; slightly sticky, slightly plastic; common very fine and few fine and medium roots; many very fine and few fine irregular pores; 10 percent gravel; common fine and medium prominent strong brown (7.5YR 5/8) masses of iron accumulation throughout; very strongly acid; clear wavy boundary.

2Cg1—36 to 47 inches; grayish brown (10YR 5/2) loamy fine sand; single grain; loose; few very fine, fine, and medium roots; many coarse faint dark gray (5YR 4/1) irregularly shaped iron depletions in the matrix; very strongly acid; clear irregular boundary.

2Cg2—47 to 65 inches; light gray (2.5Y 7/2) loamy fine sand; single grain; loose; few medium roots; many coarse prominent strong brown (7.5YR 5/8) masses of iron accumulation throughout; very strongly acid.

The thickness of the solum, including the transitional 2BC horizon, ranges from 24 to 40 inches. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas. Inherently these soils have a low base status. The content of gravel ranges from 0 to 10 percent in the 2Cg and 2BC horizons. A high water table ranges from 6 inches above the surface to 12 inches below the surface from January through June.

The A horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 1 to 3. It is silt loam.

The Eg horizon has hue of 10YR to 5Y, value of 6 or 7, and chroma of 1 or 2. It is silt loam.

The Btg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. It is silt loam or silty clay loam. It has an average content of clay of 18 to 30 percent in the particle-size control section.

The 2BC horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It ranges from sandy loam to sandy clay loam.

The 2Cg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. It ranges from sand to loamy fine sand.

## 26—Othello silt loam

### *Composition*

Othello and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### *Setting*

*Landform:* Lowland flats
*Slope:* 0 to 2 percent
*Note:* In some areas this soil may be ponded for a short period after heavy rains.

### *Component Description*

*Surface layer texture:* Silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Dominant parent material:* Silty eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* Moderate
*Note:* In some areas in the Neck District, this soil has 10 to 30 percent gravel in the substratum. Included in this unit in mapping in the towns of Cambridge, Hurlock, Secretary, and Vienna are areas of urban land. These areas consist of impervious materials and support little or no vegetation. Most of the areas are covered by concrete, asphalt, or buildings.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Mattapex and similar soils in the higher landscape positions (5 percent of map unit)
- Unnamed silty soils that are in the slightly higher landscape positions and that have a high water table between depths of 10 and 20 inches (5 percent of map unit)

- The very wet Kentuck and Othello soils in the lower landscape positions (5 percent of map unit)
- Intermingled areas of Hurlock and similar soils in the central part of the county (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Kentuck Series

The Kentuck series consists of very deep, very poorly drained soils. Permeability is slow in the solum. These soils formed in eolian (silty) deposits overlying sandy fluviomarine sediments. They are on lowlands, in depressions, and on ancient flood plains of the Mid-Atlantic Coastal Plain. Slopes range from 0 to 2 percent.

Kentuck soils are similar to the Othello soils and are commonly adjacent to Elkton and Othello soils. The Kentuck soils differ from these other soils because they have a black, highly organic surface layer that is more than 10 inches thick.

Typical pedon of Kentuck mucky silt loam (fig. 16) in an area of Othello and Kentuck soils; on a smooth slope of 0 percent, about 2,800 feet southwest of the intersection of Beaver Neck Village Road and Linkwood Road, 50 feet northwest of the railroad, in a wooded area:

Oi/Oe—0 to 3 inches; undecomposed and moderately decomposed leaves and twigs; clear smooth boundary.

A—3 to 13 inches; black (10YR 2/1) mucky silt loam; strong fine granular structure; very friable; slightly sticky, slightly plastic; many very fine and fine and common medium and coarse roots; many very fine and fine and common medium irregular pores; high content of organic matter; extremely acid; clear wavy boundary.

Eg—13 to 24 inches; light brownish gray (2.5Y 6/2) silt loam; weak medium subangular blocky structure; very friable; slightly sticky, plastic; common very fine and fine and few medium roots; many very fine, common fine, and few medium tubular pores; common medium prominent brownish yellow (10YR 6/6) masses of iron accumulation throughout; common medium distinct white (10YR 8/1) irregularly shaped iron depletions in the matrix; very strongly acid; clear wavy boundary.

Btg1—24 to 37 inches; light brownish gray (10YR 6/2) silt loam; moderate medium subangular blocky structure; friable; sticky, plastic; common very fine and fine and few medium roots; many very fine, common fine, and few medium tubular pores; common faint clay films on faces of peds; common fine prominent strong brown (7.5YR 5/8) masses of iron accumulation throughout; common medium distinct white (10YR 8/1) irregularly shaped iron depletions in the matrix; very strongly acid; gradual wavy boundary.

Btg2—37 to 45 inches; grayish brown (2.5Y 5/2) silty clay loam; moderate medium subangular blocky structure; firm; sticky, plastic; few very fine and fine roots; common very fine and fine tubular pores; common distinct clay films on faces of peds; common fine prominent reddish yellow (7.5YR 6/8) masses of iron accumulation throughout; few medium distinct white (10YR 8/1) irregularly shaped iron depletions in the matrix; very strongly acid; gradual wavy boundary.

2BCg—45 to 56 inches; grayish brown (10YR 5/2) fine sandy loam; massive; very friable; slightly sticky; few very fine and fine roots; many very fine tubular pores; few fine distinct white (10YR 8/1) irregularly shaped iron depletions in the matrix; very strongly acid; gradual wavy boundary.

2Cg—56 to 70 inches; light gray (10YR 7/1) fine sand; single grain; loose; few very fine roots; very strongly acid.

The thickness of the solum ranges from 30 to 56 inches. The thickness of the umbric horizon ranges from 10 to 22 inches. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas. Inherently these soils have a low base status. A high water table ranges from 6 inches above the surface to 6 inches below the surface from December through June.

The A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2. It is mucky silt loam.

The Eg horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. It is silt loam.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2. It is silt loam or silty clay loam.

Some pedons have a 2Btg horizon that has hue of 10YR to 5Y, value of 3 to 6, and chroma of 1 or 2. It is very fine sandy loam, loam, or clay loam.

The 2BCg horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. It is sandy loam or fine sandy loam.

The Cg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma 1 to 4. It is sand, fine sand, or loamy sand and includes pockets of finer textured material.

## 27—Othello and Kentuck soils

### *Composition*

Othello and similar soils: 50 percent
Kentuck and similar soils: 30 percent

Dissimilar inclusions: 20 percent

### *Setting*

*Landform:*
- Othello—lowland flats, depressions, and swales
- Kentuck—lowland flats, depressions, and swales

*Slope:*
- Othello—0 to 2 percent
- Kentuck—0 to 2 percent

*Note:* Included in this unit in mapping in the towns of Cambridge, Hurlock, Secretary, and Vienna are areas of urban land. These areas consist of impervious materials and support little or no vegetation. Most of the areas are covered by concrete, asphalt, or buildings.

### *Component Description*

**Othello**

*Surface layer texture:* Silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Poorly drained
*Dominant parent material:* Silty eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Ponding:* Long in duration
*Available water capacity:* High
*Note:* In some areas in the Neck District, this soil has 10 to 30 percent gravel in the substratum.

**Kentuck**

*Surface layer texture:* Mucky silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Very poorly drained
*Dominant parent material:* Silty eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Ponding:* Long in duration
*Available water capacity:* High
*Note:* In some areas in the Neck District, this soil has 10 to 30 percent gravel in the substratum.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Intermingled areas of Elkton and similar soils (5 percent of map unit)
- Sunken and similar soils in areas supporting stunted pine vegetation that are adjacent to tidal marshes (5 percent of map unit)
- Puckum and similar soils near the headwaters of streams (5 percent of map unit)
- Intermingled areas of Fallsington and Pone soils in the central part of the county (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Pone Series

The Pone series consists of very deep, moderately rapidly permeable, very poorly drained soils. These soils formed in sandy eolian or fluviomarine sediments, or both, containing some silts and clays. They are on low uplands, on narrow flood plains, and in concave broad and small closed depressions of the Mid-Atlantic Coastal Plain. Slopes range from 0 to 2 percent.

Pone soils are similar to Hurlock soils and commonly are adjacent to Fallsington, Fort Mott, Hammonton, Hurlock, Klej, and Woodstown soils. The Pone soils differ from these other soils because they have a black, highly organic surface layer that is more than 10 inches thick.

Typical pedon of Pone mucky loam; on a smooth slope of 0 percent, in a wooded area about 1.25 miles northwest of Reids Grove, 0.75 mile southwest of Centennial Road, 250 feet east-southeast of a logging road, on the north side of a ditch:

Oi/Oa—0 to 3 inches; undecomposed and highly decomposed leaves, needles, and twigs; clear smooth boundary.

A1—3 to 6 inches; black (10YR 2/1) mucky loam; strong medium granular structure; friable; slightly sticky, slightly plastic; many very fine and fine, common medium, and few coarse roots; many very fine and fine and common medium irregular pores; high content of organic matter; extremely acid; gradual smooth boundary.

A2—6 to 14 inches; black (10YR 2/1) sandy loam; weak medium subangular blocky structure parting to weak fine granular; friable; slightly sticky, slightly plastic; many very fine, common fine and medium, and few coarse roots; many very fine and fine and common medium irregular pores; high content of organic matter; strongly acid; gradual wavy boundary.

Btg—14 to 26 inches; grayish brown (10YR 5/2) sandy loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; many very fine, common fine, and few medium roots; many very fine,

common fine, and few medium tubular pores; common prominent clay films on faces of peds and lining pores; common medium distinct light gray (10YR 7/1) irregularly shaped iron depletions in the matrix; common coarse distinct very dark grayish brown (10YR 3/2) material from A horizon in vertical channels; very strongly acid; clear irregular boundary.

BC—26 to 37 inches; light gray (10YR 7/2) loamy sand; massive; very friable; common very fine and few fine roots; common very fine and fine and few medium tubular pores; 10 percent pockets of dark gray sandy clay loam in vertical channels; few medium prominent yellowish brown (10YR 5/8) masses of iron accumulation throughout; common coarse distinct grayish brown (2.5Y 5/2) irregularly shaped iron depletions in the matrix; very strongly acid; clear irregular boundary.

Cg1—37 to 47 inches; gray (10YR 5/1) sand; massive; very friable; common very fine roots; stratified horizontal lines of light and dark gray sand that are less than 3 millimeters thick; many coarse prominent strong brown (7.5YR 5/8) masses of iron accumulation throughout; very strongly acid; clear broken boundary.

2Cg2—47 to 69 inches; gray (5Y 6/1) silt loam; massive; friable; slightly sticky, plastic; few very fine roots; many very fine tubular pores; common fine prominent strong brown (7.5YR 5/8) masses of iron accumulation throughout; common coarse distinct gray (10YR 5/1) irregularly shaped iron depletions in the matrix; very strongly acid.

The thickness of the solum ranges from 26 to 40 inches. Depth to the discontinuity is typically greater than 40 inches. The content of fine gravel ranges from 0 to 5 percent in the solum and from 0 to 15 percent in the substratum. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas. Inherently these soils have a low base status. A high water table ranges from 6 inches above the surface to 6 inches below the surface from December through June.

The A or Ap horizon has hue of 5YR to 5Y, value of 2 or 3, and chroma of 0 to 2. It is mucky sandy loam, mucky loam, loam, or sandy loam.

The Btg horizon has hue of 10YR to 5Y, value of 3 to 6, and chroma of 1 or 2. It is commonly sandy loam or loam but includes thin layers of sandy clay loam in some pedons.

The BC horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. It is loamy sand or sandy loam.

The C horizon has hue of 10YR to 5Y or is neutral in hue and has value of 5 to 8 and chroma of 1 or 2. It is sand or loamy sand.

The 2Cg horizon has hue of 10YR to 5Y or is neutral in hue and has value of 5 to 7 and chroma of 0 to 3. It ranges from very fine sandy loam to silty clay loam. The horizon commonly occurs above a depth of 50 inches but may only occur below that depth in some pedons. Some pedons have a buried A horizon (having a high content of organic matter) below a depth of 60 inches.

## 28—Pone mucky sandy loam

### *Composition*

Pone and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### *Setting*

*Landform:* Low uplands, depressions, and swales
*Slope:* 0 to 2 percent

### *Component Description*

*Surface layer texture:* Mucky sandy loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Very poorly drained
*Dominant parent material:* Sandy eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Ponding:* Long in duration
*Available water capacity:* Moderate

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Fallsington and Hurlock soils in the slightly higher landscape positions (10 percent of map unit)
- Hammonton, Woodstown, and Klej soils in the higher landscape positions (10 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## 29—Pone mucky loam

### *Composition*

Pone and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### Setting

*Landform:* Low uplands, depressions, and swales
*Slope:* 0 to 2 percent

### Component Description

*Surface layer texture:* Mucky loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Very poorly drained
*Dominant parent material:* Sandy eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Ponding:* Long in duration
*Available water capacity:* Moderate

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### Dissimilar Inclusions

- Fallsington and Hurlock soils in the slightly higher landscape positions (10 percent of map unit)
- Hammonton, Woodstown, and Klej soils in the higher landscape positions (10 percent of map unit)

### Management

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Puckum Series

The Puckum series consists of very deep, moderately rapidly permeable, very poorly drained soils. These soils formed in thick, highly decomposed organic materials derived from woody deposits. They are located in freshwater swamps on flood plains of the Mid-Atlantic Coastal Plain. Slopes are 0 to 1 percent.

Puckum soils are similar to Transquaking soils and are commonly adjacent to Chicone, Nanticoke, and Pone soils. The Puckum soils do not have the sulfidic materials that are typical in Transquaking soils. The Puckum soils differ from Chicone soils because they do not have a thick mineral layer overlying the organic materials. The Puckum soils differ from Nanticoke and Pone soils because they have dominantly organic materials throughout.

Typical pedon of Puckum muck; about 0.5 mile northwest of Sharptown, 120 feet southwest of Route 313, in a swamp:

Oa1—0 to 4 inches; very dark brown (10YR 2/2) muck, sapric soil material; fiber content is one-seventh of the soil volume after rubbing; 20 percent, by weight, mineral soil material; strongly acid; abrupt smooth boundary.

Oa2—4 to 20 inches; dark brown (7.5YR 3/2) muck, sapric soil material; fiber content is one-seventh of the soil volume after rubbing; 25 percent, by weight, mineral soil material; strongly acid; gradual wavy boundary.

Oa3—20 to 40 inches; dark brown (7.5YR 3/2) muck, sapric soil material; fiber content is one-seventh of the soil volume after rubbing; 30 percent, by weight, mineral soil material; material having a higher content of water than the above horizon; strongly acid; gradual wavy boundary.

Oa4—40 to 57 inches; very dark brown (10YR 2/2) muck, sapric soil material; fiber content is one-seventh of the soil volume after rubbing; 40 percent, by weight, mineral soil material; 20 percent yellow (10YR 8/6) soft woody fragments 0.5 inch to 2.0 inches in diameter; strongly acid; gradual wavy boundary.

Oa5—57 to 65 inches; dark brown (7.5YR 3/2) muck, sapric soil material; fiber content is one-tenth of the soil volume after rubbing; 50 percent, by weight, mineral soil material; strongly acid; clear wavy boundary.

Oa6—65 to 80 inches; very dark brown (10YR 3/2) muck, sapric soil material; fiber content is one-tenth of the soil volume after rubbing; 60 percent, by weight, mineral soil material; strongly acid.

The thickness of the organic deposits is more than 51 inches. Woody fragments occur in some part of the profile in most pedons. The content of woody fragments ranges from 0 to 25 percent. Fragments consist of twigs, branches, logs, or stumps and are 1/2 inch to 12 inches in diameter. Wood fragments are firm but break abruptly under pressure. The conductivity of the saturation extract is less than 4 millimhos per centimeter throughout the profile. These soils are extremely acid to strongly acid. The water table is at the surface to 12 inches above the surface throughout the year.

The surface tier has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 4. It is hemic or sapric material. The fiber content after rubbing is less than one-half of the soil volume. The content of mineral material, by weight, ranges from 10 to 55 percent.

The subsurface and bottom tiers have hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 to 4. They are dominantly sapric material but include some thin layers of hemic material. The fiber content after rubbing generally is less than one-quarter of the soil volume and averages less than one-sixth. The content of mineral material, by

weight, ranges from 25 to 70 percent. Some pedons contain thin strata of loamy or sandy mineral soil material.

## 30—Puckum muck

### *Composition*

Puckum and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### *Setting*

*Landform:* Swamps, flood plains, and depressions
*Slope:* 0 to 1 percent
*Note:* Vegetation in this map unit dominantly grows on tussocks (raised, drier areas), which make up about 30 percent of the unit.

### *Component Description*

*Surface layer texture:* Muck
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Very poorly drained
*Dominant parent material:* Woody organic deposits
*Flooding:* Frequent
*Kind of water table:* Apparent
*Ponding:* Very long in duration
*Available water capacity:* Very high
*Note:* The load-bearing capacity of this soil is very low throughout the profile.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Unnamed soils that have organic layers less than 51 inches thick and that are adjacent to uplands (10 percent of map unit)
- Nanticoke and similar soils on mud flats along streams (5 percent of map unit)
- Pone and similar soils adjacent to uplands (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Runclint Series

The Runclint series consists of very deep, rapidly permeable, excessively drained soils. These soils formed in sandy eolian or fluviomarine sediments, or both. They are on uplands and old stream terraces of the Mid-Atlantic Coastal Plain. Slopes range from 0 to 5 percent.

Runclint soils are similar to Evesboro soils and are commonly adjacent to Downer, Fort Mott, Galestown, Hammonton, and Klej soils. The Runclint soils have less clay in the B horizon than Downer, Fort Mott, Galestown, and Hammonton soils. The Runclint soils differ from Evesboro soils because they have redoximorphic features in the substratum. The Runclint soils do not have the redoximorphic features that are typical of the solum in Klej soils.

Typical pedon of Runclint sand, 0 to 2 percent slopes (fig. 17); about 2.25 miles east-southeast of Hurlock, 0.5 mile east of Marshyhope Creek, 60 feet south of Wesley Road, in a wooded area:

Oi—2 inches to 0; partially decomposed needles and twigs from loblolly pine trees; abrupt smooth boundary.
Ap—0 to 9 inches; dark brown (10YR 3/3) sand; massive; friable; common fine and medium roots; many very fine and few fine irregular pores; very strongly acid; abrupt wavy boundary.
E—9 to 22 inches; yellowish brown (10YR 5/6) sand; massive; very friable; few medium and coarse roots; many very fine irregular pores; strongly acid; clear wavy boundary.
Bw1—22 to 31 inches; yellowish red (5YR 5/8) and light yellowish brown (10YR 6/4) sand; massive; friable; few fine and medium roots; few fine irregular pores; very strongly acid; clear wavy boundary.
Bw2—31 to 40 inches; yellowish red (5YR 5/8) sand; common medium distinct brownish yellow (10YR 6/6) mottles; massive; friable; few medium and coarse roots; few fine and medium irregular pores; common medium dark yellowish brown (10YR 3/4) rounded soft accumulations of iron and manganese; very strongly acid; clear irregular boundary.
BC1—40 to 47 inches; sand in variegated colors of light yellowish brown (10YR 6/4) and light gray (10YR 7/2); massive; very friable; common medium reddish brown (5YR 4/4) rounded soft accumulations of iron and manganese; very strongly acid; clear irregular boundary.
BC2—47 to 59 inches; light yellowish brown (10YR 6/4) and yellowish brown (10YR 5/6) sand; single grain; loose; 10 percent pebbles; common medium dark reddish brown (2.5YR 3/4) rounded soft accumulations of iron and manganese; very strongly acid; clear smooth boundary.
2C—59 to 72 inches; pale brown (10YR 6/3) loamy coarse sand; massive; friable; 5 percent pebbles; common medium distinct light gray (10YR 7/1) irregularly shaped iron depletions in the matrix; very strongly acid.

The solum is more than 48 inches thick. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas. Inherently these soils have a low base status. The content of gravel ranges from 0 to 20 percent in the solum and from 0 to 30 percent in the substratum. Depth to a high water table ranges from 48 to 72 inches from January through May. Redoximorphic features with chroma of 2 or less occur only below a depth of 72 inches.

The Ap or A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 3 to 6. It is sand or loamy sand.

The Bw horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is sand or loamy sand. In some areas the B horizon includes thin lamellae that have a total thickness of less than 6 inches.

The BC horizon has hue of 2.5YR or 10YR, value of 5 to 7, and chroma of 2 to 6. It is sand. The upper part of the horizon has low-chroma colors derived from the parent material.

The 2C horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 2 to 6. It is commonly sand but ranges from sand to sandy clay loam below a depth of 48 inches. The horizon commonly occurs above a depth of 72 inches but may only occur below that depth in some pedons. High- and low-chroma redoximorphic features commonly occur throughout the horizon.

## 31A—Runclint sand, 0 to 2 percent slopes

### *Composition*

Runclint and similar soils: 75 percent
Dissimilar inclusions: 25 percent

### *Setting*

*Landform:* Upland flats and stream terraces
*Slope:* 0 to 2 percent

### *Component Description*

*Surface layer texture:* Sand
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Excessively drained
*Dominant parent material:* Sandy eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* Low

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Intermingled areas of Downer, Ingleside, Fort Mott, and Galestown soils (15 percent of map unit)
- Hammonton and Klej soils in the slightly lower landscape positions (5 percent of map unit)
- Hurlock and Pone soils in depressions and drainageways (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## 31B—Runclint sand, 2 to 5 percent slopes

### *Composition*

Runclint and similar soils: 75 percent
Dissimilar inclusions: 25 percent

### *Setting*

*Landform:* Upland flats and stream terraces
*Slope:* 2 to 5 percent

### *Component Description*

*Surface layer texture:* Sand
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Excessively drained
*Dominant parent material:* Sandy eolian deposits or fluviomarine sediments, or both
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* Low

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Intermingled areas of Downer, Galestown, and Fort Mott soils (15 percent of map unit)
- Hammonton and Klej soils in the slightly lower landscape positions (5 percent of map unit)
- Evesboro and similar soils in the higher landscape positions (5 percent of map unit)

### *Management*

For general and detailed information about managing

this map unit, see the section "Use and Management of the Soils."

## Sassafras Series

The Sassafras series consists of very deep, moderately permeable, well drained soils. These soils formed in loamy fluviomarine sediments. They are on uplands of the Mid-Atlantic Coastal Plain. Slopes range from 0 to 2 percent.

Sassafras soils are similar to Downer soils and are commonly adjacent to Downer, Fort Mott, Galestown, Hammonton, and Woodstown soils. The Sassafras soils have more clay in the B horizon than Downer and Galestown soils typically do. The Sassafras soils have more clay in the A and E horizons than Fort Mott soils typically do. The Sassafras soils do not have the redoximorphic features that are typical of the B horizon in Hammonton and Woodstown soils.

Typical pedon of Sassafras loam (fig. 18); about 0.8 mile northwest of Hurlock, 200 feet southwest of Route 331:

Ap—0 to 7 inches; dark brown (10YR 3/3) loam; moderate fine granular structure; very friable; slightly sticky, slightly plastic; many very fine and common fine roots; many very fine and common fine and medium irregular pores; slightly acid; abrupt smooth boundary.

E—7 to 17 inches; yellowish brown (10YR 5/4) sandy loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; many very fine roots; many very fine and common fine tubular pores; slightly acid; clear smooth boundary.

Bt1—17 to 26 inches; yellowish brown (10YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable; slightly sticky, slightly plastic; many very fine roots; many very fine and few fine tubular pores; common distinct clay films on faces of peds; moderately acid; gradual wavy boundary.

Bt2—26 to 36 inches; strong brown (7.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable; sticky, plastic; many very fine and common fine tubular pores; common prominent clay films on faces of peds; moderately acid; gradual wavy boundary.

BC—36 to 42 inches; strong brown (7.5YR 5/8) loamy sand; massive; very friable; slightly sticky; distinct clay coatings on sand grains; moderately acid; clear wavy boundary.

C—42 to 72 inches; brownish yellow (10YR 6/6) stratified sand and loamy sand; single grain; loose; few deposits of sand-sized feldspar and manganese; moderately acid.

The thickness of the solum typically ranges from 20 to 40 inches. Reaction ranges from extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas. Inherently these soils have a low base status.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. It is sandy loam or loam.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 2 to 6. It is loamy sand or sandy loam. In some pedons the E horizon has been mixed with the Ap horizon because of plowing.

The Bt horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 6 to 8. It is sandy loam, sandy clay loam, or loam. The average content of clay ranges from 18 to 27 percent. The content of gravel ranges from 0 to 15 percent.

The BC horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 to 8. It is loamy sand or sandy loam. The content of gravel ranges from 0 to 20 percent.

The C horizon has hue of 10YR, value of 6 or 7, and chroma of 3 to 6. It is sand or loamy sand.

## 32—Sassafras loam

### *Composition*

Sassafras and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### *Setting*

*Landform:* Upland flats
*Slope:* 0 to 2 percent
*Note:* This map unit dominantly occurs above 35 feet in elevation.

### *Component Description*

*Surface layer texture:* Loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Well drained
*Dominant parent material:* Loamy fluviomarine sediments
*Flooding:* None
*Available water capacity:* Moderate

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Ingleside, Hammonton, and Woodstown soils in the lower landscape positions (10 percent of map unit)
- Intermingled areas of Downer and Hambrook soils (5 percent of map unit)

• Fort Mott and Galestown soils on small ridges (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Sunken Series

The Sunken series consists of very deep, slowly permeable, very poorly drained soils. These soils formed in loess (silty) deposits overlying sandy fluviomarine sediments. They are located in brackish submerged uplands along tidally influenced bays, rivers, and drainageways of the Mid-Atlantic Coastal Plain. Slopes are 0 to 1 percent.

Sunken soils are similar to Elkton and Othello soils and are commonly adjacent to Bestpitch, Honga, Elkton, Othello, and Transquaking soils. The Sunken soils differ from Elkton and Othello soils because they have a base saturation of more than 35 percent at a depth of 49 inches below the upper boundary of the argillic horizon. The Sunken soils differ from Bestpitch, Honga, and Transquaking soils because they did not form in organic deposits.

Typical pedon of Sunken mucky silt loam; on a smooth slope of 0 percent, on a submerged upland, about 2 miles north of Golden Hill, 2,000 feet northeast of Beaverdam Creek and Smithville Road, 900 feet east of Smithville Road:

Oi—0 to 2 inches; dark reddish brown (5YR 2.5/2) peat, fibric soil material, that is dominantly composed of pine needles; fiber content is three-fourths of the soil volume after rubbing; 10 percent mineral soil material; many fine, medium, and coarse live roots; neutral; clear smooth boundary.

Oa—2 to 4 inches; very dark brown (10YR 2/2) muck, sapric soil material; fiber content is one-tenth of the soil volume after rubbing; 10 percent mineral soil material; common fine and medium live roots; neutral; clear smooth boundary.

Ag—4 to 6 inches; grayish brown (10YR 5/2) silt loam; massive; friable; slightly sticky, slightly plastic; common very fine and fine and few medium roots; common fine and few medium pores; neutral; gradual smooth boundary.

Eg—6 to 18 inches; light gray (10YR 6/1) silt loam; massive; friable; sticky, plastic; common very fine, fine, and medium roots; common fine and few medium and very fine pores; common medium prominent yellowish red (5YR 5/8) masses of iron accumulation throughout; neutral; gradual wavy boundary.

Btg1—18 to 38 inches; light gray (10YR 6/1) silty clay loam; massive; firm; sticky, plastic; few medium and fine roots; common fine and few medium pores; few faint clay films on faces of peds; common medium prominent strong brown (7.5YR 5/8) and common medium distinct brownish yellow (10YR 6/8) masses of iron accumulation throughout; slightly acid; gradual wavy boundary.

2Btg2—38 to 65 inches; gray (5Y 6/1) very fine sandy loam; massive; firm; slightly sticky, plastic; common fine and very fine pores; few faint clay films on faces of peds; common medium prominent brownish yellow (10YR 6/8) masses of iron accumulation throughout; moderately acid; gradual smooth boundary.

2Cg—65 to 72 inches; light olive gray (5Y 6/2) fine sand; massive; common coarse distinct yellowish brown (10YR 5/6) masses of iron accumulation throughout; slightly acid.

The thickness of the organic deposits ranges from 2 to 8 inches. Below a depth of 18 inches, these soils range from moderately acid to neutral in the natural state. Above a depth of 18 inches, they range from strongly acid to neutral. They can range from extremely acid to strongly acid upon drying. The total content of sulfur in the organic horizons ranges from 0.50 to 1.5 percent. The total content of sulfur in the mineral horizons ranges from 0.05 to 0.50 percent. The conductivity of the saturation extract of the organic horizons is more than 8 millimhos per centimeter. The conductivity of the saturation extract of the mineral horizons ranges from 2 to 8 millimhos per centimeter. The mineral horizons have an *n* value that is typically less than 0.7 but that ranges to 1.0. In the subsoil, structure is difficult to determine and clay films are faint or not visible at all because of the dispersion of clay caused by the soluble salts. A high water table ranges from the surface to 6 inches above the surface throughout the year. The level of the high water table is sometimes influenced by storm-induced tidal events.

The organic surface layers have hue of 5YR or 10YR, value of 2 or 3, and chroma of 2 to 4. They are typically fibric and sapric soil materials but include hemic soil materials. The fiber content after rubbing is greater than one-tenth of the soil volume. The content of mineral material ranges from 5 to 40 percent.

The Ag horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. It is silt loam.

The Eg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. It is silt loam.

The Btg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. It is silt loam or silty clay loam.

The 2Btg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. It is fine sandy loam or very fine sandy loam.

The 2Cg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. It ranges from fine sand to loamy sand.

## 33—Sunken mucky silt loam

### *Composition*

Sunken and similar soils: 80 percent
Dissimilar inclusions: 20 percent

### *Setting*

*Landform:* Lowland flats
*Slope:* 0 to 1 percent
*Note:* Because of the rise in sea level and the subsidence of land, this map unit is slowly becoming a tidal marsh.

### *Component Description*

*Surface layer texture:* Mucky silt loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Very poorly drained
*Dominant parent material:* Silty eolian deposits or fluviomarine sediments, or both
*Flooding:* Occasional
*Kind of water table:* Apparent
*Ponding:* Long in duration
*Salt affected:* Saline within a depth of 30 inches
*Available water capacity:* High
*Note:* In small cultivated areas of this soil, crop production is limited because of salinity.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Othello and Elkton soils in the higher landscape positions (5 percent of map unit)
- Intermingled areas of Kentuck and similar soils (5 percent of map unit)
- Honga and Bestpitch soils on adjacent marshland (5 percent of map unit)
- Mattapex soils that have moderate salinity and are in the higher landscape positions (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## 34—Udorthents

### *Composition*

Udorthents and similar soils: 90 percent
Dissimilar inclusions: 10 percent

### *Setting*

*Landform:* Upland flats, knolls, and side slopes
*Slope:* 0 to 15 percent
*Note:* Most areas of this map unit occur as borrow pits, landfills, or areas that have been cut and filled. Some smaller abandoned areas occur as woods or ponds.

### *Component Description*

*Surface layer texture:* Gravelly sand
*Depth class:* Very deep (more than 60 inches)
*Dominant parent material:* Sandy fluviomarine sediments
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* Moderate
*Note:* The soil material in this map unit has been moved, filled in, or worked by machinery. Most of the areas have been reshaped and leveled or consist of cuts and excavations that extend into the underlying geologic material.

Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Intermingled areas of Evesboro, Fort Mott, Galestown, and Downer soils (10 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## Woodstown Series

The Woodstown series consists of very deep, moderately permeable, moderately well drained soils. These soils formed in loamy fluviomarine sediments. They are on broad uplands and in small depressions of the Mid-Atlantic Coastal Plain. Slopes range from 0 to 5 percent.

Woodstown soils are similar to Hammonton soils and are commonly adjacent to Downer, Sassafras, and Fallsington soils. The Woodstown soils have more clay in

the B horizon than Downer and Hammonton soils. The Woodstown soils differ from Sassafras soils because they have redoximorphic features in the B horizon. The Woodstown soils do not have the grayish matrix or redoximorphic features that are typical of the surface and subsurface layers in Fallsington soils.

Typical pedon of Woodstown sandy loam, 0 to 2 percent slopes; 0.75 mile northwest of Galestown, 800 feet northeast of a bend in Wheatly's Church Road:

Ap—0 to 7 inches; dark grayish brown (2.5Y 4/2) sandy loam; weak medium granular structure; friable; many very fine and fine roots; strongly acid; clear wavy boundary.

E—7 to 11 inches; light yellowish brown (2.5Y 6/4) sandy loam; weak medium granular structure; friable; many fine roots; strongly acid; clear wavy boundary.

Bt1—11 to 19 inches; light olive brown (2.5Y 5/6) sandy clay loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; common fine roots; common distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt2—19 to 29 inches; light olive brown (2.5Y 5/6) sandy clay loam; moderate medium subangular blocky structure; firm; sticky, slightly plastic; few fine roots; common distinct clay films on faces of peds; common medium prominent strong brown (7.5YR 5/8) masses of iron accumulation throughout; common medium distinct light gray (2.5Y 7/2) irregularly shaped iron depletions in the matrix; strongly acid; clear wavy boundary.

Cg1—29 to 45 inches; light brownish gray (2.5Y 6/2) sandy loam; massive; friable; slightly sticky, slightly plastic; few fine roots; common medium distinct yellowish brown (10YR 5/4) masses of iron accumulation throughout; very strongly acid; clear wavy boundary.

Cg2—45 to 70 inches; light gray (5Y 7/2) loamy sand; single grain; loose; 10 percent rounded gravel; common thick grayish brown (2.5Y 5/2) horizontal, irregularly shaped iron depletions in the matrix; extremely acid.

The thickness of the solum ranges from 24 to 45 inches. The content of gravel ranges from 0 to 5 percent in the solum and from 0 to 20 percent in the substratum. Reaction ranges extremely acid to strongly acid in unlimed areas and to neutral in heavily limed areas. Inherently these soils have a low base status. Depth to a high water table ranges from 18 to 36 inches from January through April.

The A horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. It is sandy loam or loam.

The E horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 to 4. It is sandy loam or loam.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 to 8. It is sandy loam, sandy clay loam, or loam. The content of clay ranges from 18 to 27 percent.

The C horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 0 to 4. It ranges from sand to sandy loam and has thin strata of silt loam or sandy clay loam below a depth of 40 inches.

## 35—Woodstown loam, 0 to 2 percent slopes

### *Composition*

Woodstown and similar soils: 75 percent
Dissimilar inclusions: 25 percent

### *Setting*

*Landform:* Upland flats and shallow depressions
*Slope:* 0 to 2 percent

### *Component Description*

*Surface layer texture:* Loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Dominant parent material:* Loamy fluviomarine sediments
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* Moderate
*Note:* Included in this unit in mapping in the towns of Cambridge, Hurlock, Secretary, and Vienna are areas of urban land. These areas consist of impervious materials and support little or no vegetation. Most of the areas are covered by concrete, asphalt, or buildings.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Intermingled areas of Hammonton, Downer, and Ingleside soils (10 percent of map unit)
- Galestown and similar soils on ridges along drainageways (5 percent of map unit)
- Hurlock and Fallsington soils in the lower landscape positions (5 percent of map unit)
- Pone and similar soils in small depressions and drainageways (5 percent of map unit)

### *Management*

For general and detailed information about managing

this map unit, see the section "Use and Management of the Soils."

## 36A—Woodstown sandy loam, 0 to 2 percent slopes

### *Composition*

Woodstown and similar soils: 75 percent
Dissimilar inclusions: 25 percent

### *Setting*

*Landform:* Upland flats and shallow depressions
*Slope:* 0 to 2 percent

### *Component Description*

*Surface layer texture:* Sandy loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Dominant parent material:* Loamy fluviomarine sediments
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* Moderate
*Note:* Included in this unit in mapping in the towns of Cambridge, Hurlock, Secretary, and Vienna are areas of urban land. These areas consist of impervious materials and support little or no vegetation. Most of the areas are covered by concrete, asphalt, or buildings.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Intermingled areas of Hammonton and similar soils (5 percent of map unit)
- Sassafras and Hambrook soils in the higher landscape positions (5 percent of map unit)
- Galestown and similar soils on ridges along drainageways (5 percent of map unit)
- Hurlock and Fallsington soils in the lower landscape positions (5 percent of map unit)
- Pone and similar soils in depressions and drainageways (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

## 36B—Woodstown sandy loam, 2 to 5 percent slopes

### *Composition*

Woodstown and similar soils: 75 percent
Dissimilar inclusions: 25 percent

### *Setting*

*Landform:* Upland flats and shallow depressions
*Slope:* 2 to 5 percent

### *Component Description*

*Surface layer texture:* Sandy loam
*Depth class:* Very deep (more than 60 inches)
*Drainage class:* Moderately well drained
*Dominant parent material:* Loamy fluviomarine sediments
*Flooding:* None
*Kind of water table:* Apparent
*Available water capacity:* Moderate
*Note:* Included in this unit in mapping in the towns of Cambridge, Hurlock, Secretary, and Vienna are areas of urban land. These areas consist of impervious materials and support little or no vegetation. Most of the areas are covered by concrete, asphalt, or buildings.

A typical soil description is included in this section (see "Index to Series"). Additional information specific to this map unit, such as horizon depth and textures, is available in the appropriate table of this publication (see "Summary of Tables").

### *Dissimilar Inclusions*

- Intermingled areas of Hammonton and similar soils (5 percent of map unit)
- Sassafras and Hambrook soils in the higher landscape positions (5 percent of map unit)
- Galestown and similar soils on ridges along drainageways (5 percent of map unit)
- Hurlock and Fallsington soils in the lower landscape positions (5 percent of map unit)
- Pone and similar soils in depressions and drainageways (5 percent of map unit)

### *Management*

For general and detailed information about managing this map unit, see the section "Use and Management of the Soils."

# Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in Dorchester County. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent 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 behavioral 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; for woodland; as sites for buildings, sanitary facilities, highways and other transportation systems; parks and other recreational 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 or crop 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 will 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

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed for each soil, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Soil Series and Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

In 1992, about 105,000 acres in Dorchester County were used for crops and less than 500 acres were used as permanent pasture *(19)*.

The field crops suited to the soils and climate of the survey area include grain corn, soybeans, wheat, sweet corn, barley, and grain sorghum. Soybeans are the most common crop. Specialty crops produced in the survey area are cucumbers, tomatoes, watermelons, cantaloups, and peas.

The latest information about producing row crops or specialty crops can be obtained from the local office of the Maryland Cooperative Extension Service or the Natural Resources Conservation Service.

*Drainage.*—Improving drainage is one of the most important management concerns on more than 50,000 acres in Dorchester County. Drainage has already been improved in many areas. The degree of limitation and the need for drainage varies throughout the county.

Well drained soils, such as Downer, Hambrook, Matapeake, and Sassafras soils, are not limited by drainage problems. Moderately well drained soils, such as Hammonton, Keyport, Mattapex, and Woodstown soils, may be limited by a high water table that affects early planting and late harvesting in some years. Poorly drained soils, such as Hurlock, Elkton, Fallsington, and Othello soils, have severe limitations. The main management concern on these soils is providing surface and subsurface drainage systems where possible. Most cultivated areas of these soils have a drainage system consisting of open main and lateral outlet ditches, shallow field ditches, and surface water leads (fig. 19). Areas of Hurlock soils, Fallsington soils, and the very poorly drained Pone soils may also have a subsurface tile drainage system. On finer textured soils, such as Elkton and Othello soils, excess surface water can be removed by properly orienting rows and smoothing and crowning fields (forming "turtle backs"). On all of these soils, outlet

**Figure 19.—A typical leader ditch in an area of Fallsington sandy loam. It is used to drain shallow depressions on poorly drained soils.**

and field ditches, water leads, and subsurface tile, where present, must be maintained to produce optimum crop yields.

*Managing drainage in conformance with regulations concerning wetlands may require special permits and extra planning. The local office of the Natural Resources Conservation Service should be contacted for identification of hydric soils and potential wetlands.*

*Soil amendments.*—Most of the soils in Dorchester County are low in natural plant nutrients, and some are very low. Almost all of the cultivated soils are acid, and some are extremely acid. Because of these conditions, additions of lime and fertilizer are needed for crop production.

Lime should be applied if soil tests indicate that the level of lime in the soil is below the optimum level for the kinds of crops to be grown. Generally, applications are needed every 2 to 3 years. Very sandy soils, such as Fort Mott, Galestown, Klej, and Runclint soils, need smaller, more frequent applications. Wet, finer textured soils, such as Elkton and Othello soils, require larger quantities.

Soils that are regularly cultivated become deficient in nitrogen, phosphorus, and potassium unless these elements are regularly applied. Some soils need additions

of minor elements, such as sulfur, boron, manganese, and zinc. Unlike phosphorus and potassium, nitrogen does not come from the mineral part of the soil. Although nitrogen compounds are produced by some plants, especially soybeans and other legumes, nitrogen is commonly supplied through fertilization.

Applications of manure furnish large amounts of nitrogen and organic matter and small amounts of other plant nutrients. Determining the amount of manure and the kinds and amounts of commercial fertilizer to be applied depends on the kind of crop to be grown.

Measures that are effective in maintaining soil fertility include applications of fertilizer, both organic and inorganic, and proper crop rotations. Controlling erosion helps to prevent the loss of organic matter and plant nutrients and thus helps to maintain productivity.

The use of fertilizers and manure based on a nutrient management program that includes soil and manure testing, equipment calibration, and timely application helps to prevent ground-water contamination and minimize economic losses. The Cooperative Extension Service can help to determine the kind and amount of fertilizer and lime needed and the proper method of application.

*Irrigation.*—Rainfall in Dorchester County is generally adequate for agriculture but is not always well distributed during the growing season. Frequently, there are extended dry periods between June and September. As a result, many crops are damaged. An adequate irrigation system and a good supply of water that are readily available during these dry periods can help to prevent the drastic reduction in yields.

On irrigated soils, the main management concerns are efficient water use, nutrient management, erosion control, control of pests and weeds, and timely planting and harvesting.

The nature of a soil determines how much water can be applied to it efficiently and the rate at which the water should be applied. Almost 10,000 acres in the survey area are irrigated.

Generally, soils that have a low available water capacity or a sandy surface layer require irrigation. Conserving moisture consists primarily of reducing the evaporation and runoff rates and increasing the rate of water intake. Many of the conservation practices, such as conservation tillage, establishing field windbreaks, and leaving crop residue on the soil surface, help to conserve moisture.

Fort Mott, Galestown, and Runclint soils warm up early in spring and are especially suited to crops of early season vegetables in irrigated fields. In summer, irrigation is required on these soils for the optimum production of most crops.

Irrigation on Downer, Hambrook, Hammonton, Ingleside, Sassafras, and Woodstown soils can greatly increase crop production (fig. 20). On these soils late-maturing crops are sometimes damaged by drought, especially in years when rainfall is unevenly distributed. Irrigation systems can also be used to protect these soils from soil blowing.

An irrigation system that provides optimum control and distribution of water at minimum cost is needed. Properly adjusting the application rate of irrigation water according to the available water capacity, the rate of water intake, and the needs of the crop helps to prevent overirrigating and the leaching of plant nutrients. Overirrigation wastes water, can cause erosion, can create drainage problems, and can raise the water table.

*Erosion control.*—Approximately 20 percent of the soils in Dorchester County have a hazard of water erosion or soil blowing if they are cultivated (fig. 21). Loss of the surface layer through erosion is damaging. Plant nutrients and organic matter are lost and water infiltration and soil fertility are reduced as the surface layer is lost. Erosion on farmland results in the sedimentation of streams and a lower quality of water available for municipal use, for recreation, and for fish and wildlife.

Generally, a combination of several practices is needed to control erosion. Planting cover crops, including grasses or legumes, or both, in the cropping system, using conservation tillage systems that include no-till farming, and stubble mulching help to protect the soil from water erosion and soil blowing. These practices also help to improve the moisture-holding capacity, reduce runoff, increase infiltration, and improve the content of organic matter.

On soils susceptible to soil blowing, such as Fort Mott, Galestown, and Runclint soils, stripcropping, establishing barriers of tall grass, and planting field windbreaks helps to conserve moisture and protect the plants from damage caused by blowing soil (fig. 22). Keeping the soil rough and cloddy where it is not protected by vegetation can also prevent the damage caused by soil blowing.

*Tillage.*—Excessive tillage breaks down soil structure, decreases the content of organic matter, and increases the hazard of erosion. Over a period of time, the heavy equipment used in cultivating and harvesting certain crops compacts the soil and makes it difficult to work. This damage is most severe if the soil is too wet when the machinery is used. Keyport and Elkton soils are susceptible to compaction because they have a firm subsoil and a high water table. Chisel plowing to a depth of 10 to 15 inches every 3 to 5 years can improve aeration and root development in these soils. Chisel plowing deeper than 15 inches, however, mixes the clayey subsoil with the surface layer and destroys soil tilth.

**Figure 20.—A pivot irrigation system in a field of no-till soybeans on Downer sandy loam, 0 to 2 percent slopes.**

## Cropland Limitations and Hazards

The management concerns affecting the use of the detailed soil map units in the survey area for crops are shown in table 9. The main concerns in managing nonirrigated cropland are conserving moisture, controlling soil blowing and water erosion, and maintaining soil fertility. The limitations and hazards listed in this table apply only to the crops shown in table 10.

*Conserving moisture* consists primarily of reducing the evaporation and runoff rates and increasing the water intake rate. Applying conservation tillage and conservation cropping systems, farming on the contour, stripcropping, establishing field windbreaks, and leaving crop residue on the surface conserve moisture.

Generally, a combination of several practices is needed to control *soil blowing* and *water erosion.* Conservation tillage, stripcropping, field windbreaks, tall grass barriers, contour farming, conservation cropping systems, crop residue management, diversions, and grassed waterways help to prevent excessive soil loss.

Measures that are effective in maintaining *soil fertility* include applying both organic and inorganic fertilizer, including manure; incorporating crop residue or green manure crops into the soil; and using proper crop rotations. Controlling erosion helps to prevent the loss of

organic matter and plant nutrients and thus helps to maintain productivity, although the level of fertility can be reduced even in areas where erosion is controlled. All soils used for nonirrigated crops respond well to applications of fertilizer.

Some of the limitations and hazards shown in the table cannot be easily overcome. These include *flooding* and *ponding*.

Additional limitations and hazards are as follows:

*Excessive permeability.*—This limitation causes deep leaching of nutrients and pesticides. The capacity of the soil to retain moisture for plant use is poor.

*Potential for ground-water pollution.*—This is a hazard in soils that have excessive permeability, hard bedrock, or a water table within the profile.

*Limited available water capacity, poor tilth, restricted permeability,* and *surface crusting.*—These limitations can be overcome by incorporating manure or crop residue into the soil, applying a system of conservation tillage, and using conservation cropping systems.

*Slope.*—Where the slope is more than 8 percent, water erosion and soil blowing may be accelerated unless conservation farming practices are applied.

*Salt and sodium content.*—In areas where this is a limitation, only salt- and sodium-tolerant crops should be grown.

On irrigated soils the main management concerns are *efficient water use, nutrient management, control of erosion, pest and weed control,* and *timely planting and harvesting* for a successful crop. An irrigation system that provides optimum control and distribution of water at minimum cost is needed. Overirrigation wastes water, leaches plant nutrients, and causes erosion. Also, it can create drainage problems and raise the water table.

Following is an explanation of the criteria used to determine the limitations or hazards.

*Erosion by water.*—The surface K factor multiplied by the upper slope limit is more than 2 (same as prime farmland criteria).

*Excessive permeability.*—The upper limit of the permeability range is 6 inches or more within the soil profile.

**Figure 21.—Soil blowing on Galestown loamy sand, 0 to 2 percent slopes. This soil is in wind erodibility group 2.**

**Figure 22.—Cantaloups planted in black plastic in an area of Fort Mott loamy sand, 0 to 2 percent slopes. Strips of annual rye help to protect the crop against damage caused by blowing soil. In areas of concentrated runoff on the steeper soils, contour tillage and grassed waterways help to prevent the formation of gullies.**

*Flooding.*—The component of the map unit is occasionally flooded or frequently flooded.

*Limited available water capacity.*—The available water capacity calculated to a depth of 60 inches or to a root-limiting layer is 5 inches or less.

*Ponding.*—Ponding duration is assigned to the component of the map unit.

*Potential for ground-water pollution.*—The soil has a water table within a depth of 4 feet or permeability is more than 6 inches per hour within the soil.

*Restricted permeability.*—Permeability is 0.06 inch per hour or less within the soil profile.

*Salt content.*—The component of the map unit has an electrical conductivity of more than 4 in the surface layer or more than 8 within a depth of 30 inches.

*Slope.*—The upper slope range of the component of the map unit is more than 8 percent.

*Soil blowing.*—The wind erodibility index multiplied by the selected high C factor for the survey area and then divided by the T factor is more than 8 for the component of the map unit.

*Water table.*—The component of the map unit has a water table within a depth of 60 inches.

### 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 10. 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 land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of local farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials, computer modeling, 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 cover crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

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 and applied. The relative productivity of a given soil compared with that of other soils, however, is not likely to change.

Some crops other than those shown in table 10 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 Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

### 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 *(13)*. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include 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 rangeland, for woodland, and for 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.

*Capability classes*, the broadest groups, are designated by 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 few limitations that restrict their use.

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

Class III soils have severe limitations that reduce the choice of plants 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,* or *s* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the 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); and *s* shows that the soil is limited mainly because it is shallow, droughty, or stony.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w* or *s* 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.

The acreage of soils in each capability class and subclass is shown in table 11. The capability classification of each map unit is given in the yields table.

### Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture *(12)*. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and

moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 60,000 acres in Dorchester County, or nearly 17 percent of the total land acreage, meets the soil requirements for prime farmland. Scattered areas of this land are throughout the county.

About 30,000 acres, or nearly 9 percent of the survey area, would meet the requirements for prime farmland if an adequate and dependable supply of irrigation water were available or if adequate drainage was provided.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 12. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 8. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Soil Series and Detailed Soil Map Units."

## Woodland Management and Productivity

Representatives of the Maryland Forest Service, Maryland Department of Natural Resources, helped prepare this section.

Practically no pure virgin forests remain in Dorchester County. Most of the wooded areas are on farmland, and almost all of the woodland in the county has been cut several times. Trees have been cleared on most of the land suitable for cultivation. In most areas of the remaining woodland, the soils are too wet or too droughty to be used for farming. These soils can produce high-quality trees if the woodland is properly managed.

About 141,000 acres in the county, or 37 percent of the total acreage, is woodland. About 98 percent of the forest land is privately owned. Currently, about 40 percent is owned by farmers and the rest is owned by private industry, such as lumber and paper companies, or by other individuals.

The largest areas of woodland are in general soil map units 2, 5, and 6, which are described in the section "General Soil Map Units." The most common trees in the upland areas are loblolly pine, Virginia pine, white oak, red oak, and hickory. The main lowland species are loblolly pine, sweetgum, red maple, and blackgum. Loblolly pine is the principal species used for commercial timber in the county because it can grow tall and straight in a relatively short period of time.

Much of the existing commercial woodland could be improved by thinning out mature trees and undesirable species. Protection from fire and control of disease and insects also can improve the stands. The Maryland Department of Natural Resources Forest Service or the Natural Resources Conservation Service can help to determine specific needs of woodland management.

Table 13 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 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 an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce in a pure stand under natural conditions. The number 1 indicates low potential productivity; 2 or 3, moderate; 4 or 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; *F*, a high content of rock fragments in the soil; and *L*, low strength. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, F, and L *(11)*.

In table 13, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

*Erosion hazard* is the probability that damage will occur

as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

*Equipment limitation* reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment and period of use are not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the period of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

*Seedling mortality* refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

*Windthrow hazard* is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

*Plant competition* ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *productivity class*. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of 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.

The *productivity class*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic meters per hectare per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It generally is the most common species on the soil and is the one that determines the ordination class.

*Trees to plant* are those that are suitable for commercial wood production.

### Managing Woodland

The type and degree of limitations affecting woodland vary throughout Dorchester County.

Soils that have no limitations or have slight limitations and that have high potential productivity for loblolly pine include Downer, Hambrook, Hammonton, Matapeake, Mattapex, Sassafras, and Woodstown soils.

Droughty soils, such as Evesboro, Fort Mott, Galestown, and Runclint soils, have moderately high potential productivity for loblolly pine and Virginia pine. Seedling survival is limited by moisture stress. The rate of seedling mortality can be reduced by planting seedlings in

early spring so that the seedlings can obtain sufficient moisture from spring rains. Only drought-tolerant species, such as Virginia pine, loblolly pine, and shortleaf pine, should be planted. Loose sand in some areas causes poor trafficability for equipment. Management practices that minimize the risk of erosion are essential for harvesting timber in the steeper areas of these soils.

Keyport soils have moderately high potential productivity for loblolly pine. Conventional methods of harvesting timber generally are suitable on these soils. The high water table limits the use of heavy equipment from January through April. Disturbance of the surface layer during this period exposes the subsoil, which is sticky and slippery when wet. Unless road drainage is provided during this period, timber harvesting and planting are delayed until dry periods.

The potential productivity is moderately high for loblolly pine on Elkton, Fallsington, Hurlock, Klej, and Othello soils. The main limitation is the high water table, and only trees that can tolerate wetness should be planted. Trees that are suitable for planting on these soils include loblolly pine and sweetgum. Soils that have a high water table and low potential productivity are Kentuck soils, Pone soils, and the very wet Elkton and Othello soils. Only trees that tolerate wetness, mainly red maple, sweetgum, bald cypress, and loblolly pine in bedded areas, are suited to these soils.

Most areas of woodland on these wet soils are undrained. Equipment limitations, increased seedling mortality, and increased plant competition are management concerns because of the high water table. Road drainage should be provided from November through June, or timber harvesting and planting should be delayed until dry periods. Conventional methods of harvesting timber generally are suitable, but the soils can become compacted if they are wet and heavy equipment is used. Trees are commonly subject to windthrow during periods when the soils are excessively wet and winds are strong. Bedding these soils before planting provides drainage and thus reduces seedling mortality rates (fig. 23). Aerial spraying or manual application of herbicides can effectively decrease plant competition.

The potential productivity is low for loblolly pine on Sunken soils. Because of the sodium salts in the upper layers of these soils, the trees are stunted and seedling mortality rates are increased. Areas of Sunken soils are slowly being inundated by brackish waters (becoming submerged uplands), and the future use of these soils for producing harvestable timber is severely limited. Planting salt-tolerant species of grass, shrubs, or trees in harvested areas helps to stabilize the soil, provide wildlife habitat, and reduce the potential for salt crusting on the soil surface.

Chicone, Nanticoke, and Puckum soils are not suitable for woodland production because of flooding, a high water table, and very low strength.

## Recreation

Dorchester County has vast expanses of marshland, swamps, and woodland and many streams. It offers opportunities for hiking, hunting, fishing, picnicking, sightseeing, and boating. Public lands available for outdoor recreation include 4 state wildlife management areas, 21 public boat ramps providing access to 72,000 acres of open water, and the Blackwater National Wildlife Refuge.

The use of recreational areas in the county has increased greatly in the past several years. The well drained upland soils in the northern part of the county are well suited to recreational facilities and provide excellent habitat for upland wildlife species, some of which are hunted. The wetter soils in woodland and soils in marshlands in the southern part of the county are poorly suited to recreational facilities. They, however, provide habitat for wildlife that includes an abundance of waterfowl, fish, and deer and that is available for hunting or observation.

The soils of the survey area are rated in table 14 according to the 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 sewer lines. 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 recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 14, 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 14 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 17

**Figure 23.—Recently harvested, cleared, and windrowed woods in an area of Elkton silt loam. The area has been bedded for reforestation.**

and interpretations for dwellings without basements and for local roads and streets in table 16.

*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 period 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 and horseback riding 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

Anne Lynn, State Biologist, Natural Resources Conservation Service, helped prepare this section.

The combination of wetland, farmland, and woodland in Dorchester County attracts a wide variety of wildlife. The county has large populations of deer, squirrels, raccoons, rabbits, muskrats, and birds. Many of the bird species are important for the control of many insect pests. Some birds, such as the turkey vulture and other scavenger species, consume carrion, helping to dispose of animal carcasses. Bird species, especially waterfowl, that frequently inhabit wetlands often occur in large numbers. From late fall to early spring the open waters of bays, rivers, creeks, and ponds throughout the county harbor thousands of migratory waterfowl.

The soils in the county need to be managed so that open waters and wetlands are protected from pollution and so that land used for forestry or agriculture can concurrently provide good 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 15, 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 the specified element of 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 flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, millet, wheat, oats, soybeans, sunflowers, sorghum, buckwheat, 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, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are lovegrass, lespedeza, bromegrass, orchardgrass, timothy, 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 flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, pokeweed, goldenrod, butterfly weed, switchgrass, bluegrass, redtop, gamagrass, and panicgrass.

*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, available water capacity, slope, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, locust, holly, dogwood, and hickory.

*Coniferous plants* furnish browse and seeds. 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 loblolly pine, scrub pine, white pine, Virginia pine, spruce, 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, arrow-arum, saltgrass, cordgrass, rushes, spatterdock, sedges, ferns, 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, forbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, mourning dove, field sparrow, deer, cottontail rabbit, and red fox.

Approximately 25 percent of the county has good potential as habitat for openland wildlife. The dominant soils in these areas are Downer, Fallsington, Hurlock, Mattapex, and Hammonton soils. Maintaining and establishing the vegetative elements of the habitat are not difficult on these soils.

*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, woodcock, thrushes, woodpeckers, gray squirrel, gray fox, raccoon, fox squirrel, deer, and various species of small mammals, reptiles, and songbirds.

Approximately 23 percent of the county has good potential as habitat for woodland wildlife. The dominant soils in these areas are Downer, Fallsington, Hurlock, Mattapex, and Hammonton soils. Maintaining and establishing the vegetative elements of the habitat are not difficult on these soils. In woodlands that have been planted and managed for pine production, the diversity of plant species is very low. As a result, these areas generally support fewer animal species and have a smaller total number of animals.

*Habitat for wetland wildlife* consists of open, marshy or swampy shallow water areas. Approximately 52 percent of the county has good potential as habitat for wetland wildlife. Wetlands that have interspersed areas of open water and vegetated areas are the most valuable to wildlife. Generally, wetlands are not disturbed by intensive human activities and can therefore provide a haven in which wildlife can hunt, feed, and nest. The two kinds of wetlands in Dorchester County are tidal wetlands and nontidal wetlands. The soils of these wetlands provide a valuable storage medium for retention of nutrients (nitrogen and phosphorus), floodwaters, sediment, and potential pollutants.

In areas of tidal wetlands, differences in the range of tidal fluctuation, in the height of the water table, and in the degree of salinity or freshness of tidal waters result in a wide variety of wetland types, which differ particularly in the kind of plant cover that they support. Tidal wetlands in Dorchester County can be divided into four major types: swamp forest, freshwater tidal marsh, brackish tidal marsh (slightly saline or moderately saline), and saline tidal marsh.

Swamp forests are inundated by fresh water, supplied by streams, only during seasonal tidal events. The vegetation is predominantly blackgum, red maple, smooth alder, ash, sweetgum, swamp chestnut oak, northern white cedar, red cedar, sweetbay magnolia, arrowhead, ferns, sedges, and mosses. This wetland type provides feeding and resting habitat for many species of breeding songbirds, including flycatchers, warblers, towhees, chickadees, titmice, tanagers, vireos, wrens, catbirds, thrushes, and woodpeckers. Wading birds, such as herons and egrets, feed in tidal marshes and use the adjacent swamp forests for nesting. Where natural tree cavities or artificial nest boxes are available, wood ducks extensively use swamp forests for nesting, brood rearing, feeding, and resting. Besides birds, wildlife in this wetland type includes resident populations of turtles, frogs, toads, salamanders, snakes, otters, raccoons, and various other small mammals. There are extensive areas of swamp forests along Marshyhope Creek and the Nanticoke River north of the city of Vienna. Other areas occur along the upper reaches of the Little Blackwater, Chicamacomico, and Transquaking Rivers. The dominant soils in swamp forests are Puckum soils.

Freshwater tidal marshes are inundated daily by mainly fresh water. The vegetation consists of pickerelweed, arrow-arum, spatterdock, rice cutgrass, smartweed, wildrice, sweetflag, and cattail. Wildlife attracted to this wetland type includes many species of ducks, rails, geese, wrens, red-winged blackbirds, and other songbirds. This freshwater habitat provides a high quality and quantity of food in the form of seeds, shoots, and root stalks during late spring, summer, and early fall. There is little nesting in areas of these wetlands, except along the edges, where wood ducks sometimes build their nests. Because of the lack of persistent emergent vegetation

after the growing season, these wetlands provide little or no food and cover during winter. Intertidal mudflats that are associated with the vegetated wetlands are used by waterfowl for resting and preening *(8)*. The freshwater tidal marshes are primarily located north of the city of Vienna along the Nanticoke River and Marshyhope Creek. Some small areas are located along the upper reaches of tidally influenced streams throughout the county. Except for areas along the Nanticoke River and Marshyhope Creek, most areas of freshwater tidal marshes have a small range in tidal fluctuation. Areas along the Nanticoke River and Marshyhope Creek have a normal range in tidal fluctuation. The dominant soils in freshwater tidal marshes are Nanticoke soils.

Brackish tidal marshes are inundated by brackish water daily. The vegetation consists dominantly of Olney's threesquare, big cordgrass, saltmarsh (smooth) cordgrass, and saltmeadow (marshhay) cordgrass. Brackish tidal marshes provide excellent feeding and resting habitat for resident and migrating geese, swans, ducks, songbirds, and wading birds. They are also used for nesting and feeding by gulls, terns, rails, hawks, sparrows, blackbirds, wrens, warblers, and waterfowl. Depending on the avian species, most nesting occurs in clumps of vegetation above mean high tide, on hummocks surrounded by water, in shrubs (such as groundsel and marshelder) or in trees growing in marshes, or on adjacent low uplands. Wading birds, such as herons and egrets, feed in areas of this wetland type but nest in adjacent woodland. Open water areas (such as tidal creeks and pools in marshes) are used by many aquatic birds for resting and escaping from predators. Mammals, such as muskrats, are numerous in brackish tidal marshes in areas where Olney's threesquare provides excellent food and nesting materials. This wetland type dominantly occurs south of the city of Vienna along the Nanticoke River and along the Blackwater, Chicamacomico, and Transquaking Rivers (fig. 24). Other small areas of these wetlands occur along the Choptank River north of the city of Cambridge. The dominant soils in brackish tidal marshes are Bestpitch and Transquaking soils.

Saline tidal marshes are inundated by saline water daily. The vegetation dominantly consists of needlerush, saltgrass, saltmarsh (smooth) cordgrass, and saltmeadow (marshhay) cordgrass. Groundsel and marshelder (high-tide bush) are common in the higher areas of these wetlands. Saline tidal marshes provide good nesting habitat for songbirds, marsh birds, and black ducks. The fiddler crab, which is abundant in this wetland type, is a major source of food for the blue heron and other wading birds. Saline tidal marshes that are dominantly vegetated by black needlerush generally provide poor feeding habitat for geese and muskrats because they lack the preferred plants of these animals *(7)*. These marshes are located in the southern part of the county along the Honga River, the lower reaches of the Nanticoke River, the lower part of Fishing Bay, and the mouth of the Choptank River. The dominant soils in saline tidal marshes are Honga soils.

Other wildlife species also use the tidal wetlands. They include reptiles, such as turtles and snakes. Mammals, such as rabbits, mice, skunks, opossums, raccoons, red foxes, and deer, that are characteristic of upland habitats frequently use the wetlands for food and cover. Sika deer graze the brackish and saline tidal marshes in areas adjacent to nontidal wetlands and low uplands. Crustaceans, mollusks, and finfish inhabit temporarily inundated areas and permanently flooded areas of the tidal wetlands.

The nontidal wetlands in the county are not influenced by the tide except in areas adjacent to tidal waters, where they are susceptible to unusually high tides during storm events. These wetlands are dominantly forested. The vegetation includes swamp chestnut oak, willow oak, red maple, sweetgum, highbush blueberry, sweetbay magnolia, ferns, sedges, and sphagnum moss. The nontidal wetlands in the southern part of the county that have been affected by storm-event high tides are salt affected and commonly have vegetation consisting of stunted loblolly pine and an understory of saltmeadow (marshhay) cordgrass. The nontidal wetlands in Dorchester County provide feeding and resting habitat for many species of breeding songbirds, including flycatchers, warblers, towhees, chickadees, titmice, tanagers, vireos, wrens, catbirds, thrushes, and woodpeckers. Wading birds, such as herons and egrets, which feed in tidal marshes, use adjacent forested areas of nontidal wetlands for nesting. From late winter to early spring, many frogs, salamanders, and toads use seasonally ponded areas as breeding habitat (fig. 25). These species are sufficiently adapted to this hydrologic regime and can survive the rest of the year on dry land (although salamanders and frogs require some moisture if not surface water). Where surface water is not available, these wetlands provide wildlife habitat that is very similar to that of adjacent transitional or upland areas. In areas without standing water, the wetlands can provide food and protective cover to smaller ground-dwelling mammals, such as mice, shrews, voles, opossums, and skunks. The nontidal wetlands occur in small or large distinct areas throughout the county. They are in depressions, in drainageways, on low uplands, and at the headwaters of many streams. The dominant soils of these wetlands are Chicone soils, Fluvaquents, Pone soils, Kentuck soils, Sunken soils, and the very wet Othello and Elkton soils. Also included are some areas of Fallsington soils, Hurlock soils, and the drier Othello and Elkton soils. Maintaining

**Figure 24.—The meandering Chicamacomico River and areas of the estuarine deposited Bestpitch and Transquaking soils.**

the vegetative elements of the habitat is not difficult on these soils.

## Engineering

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. Ratings are given for building site development, sanitary facilities, waste management, 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 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*

**Figure 25.—A ponded area of Othello and Kentuck soils which provides suitable habitat for wetland wildlife.**

*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 should 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, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a 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 kinds 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 evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills,

septic tank absorption fields, and sewage lagoons; evaluate potential areas for application of manure, sewage sludge, and wastewater; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and 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 16 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 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 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, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 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 soil 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 17 shows the degree and 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 17 also shows the suitability of the soils for use as daily cover for landfill. 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 filter the effluent effectively. 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 17 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 resulting from rapid permeability in 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 should be considered.

The ratings in table 17 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 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 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.

### Waste Management

Table 18 shows the degree and kind of soil limitations that affect land application of manure and food processing waste, land application of municipal sewage sludge, disposal of wastewater by irrigation, treatment of wastewater by slow rate, and treatment of wastewater by rapid infiltration. 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.

*Land application of manure and food processing waste* uses the waste materials in a liquid form, as a slurry, or as a solid. The materials have a variable content of nitrogen that can limit the application rate. The soil properties and qualities considered are those that affect soil absorption, plant growth, microbial activity, susceptibility to soil blowing and water erosion, and the rate and method of the application of wastes. Soil properties that affect absorption are permeability, depth to a high water table, and the available water capacity. Plant growth and microbial activity are affected by soil reaction and salinity. Susceptibility to soil blowing and water erosion is affected by the slope, erosion factor, and wind erodibility. The depth to a high water table and flooding can interfere with the application of wastes. Interpretations are based on utilizing the nutrients in the wastes for crop production and are not intended to be used in reclaiming or restoring critical areas or in maximizing the efficient use of moisture.

*Land application of municipal sewage sludge* uses the waste materials in a liquid form, as a slurry, or as a solid. The materials have a variable content of nitrogen that can limit the application rate. Some sludge has constituents (such as heavy metals or exotic organic compounds) that are toxic to plants or hazardous to the food chain and should be chemically analyzed prior to use. The soil properties and qualities considered are those that affect soil absorption, plant growth, microbial activity, susceptibility to soil blowing and water erosion, and the rate and method of the application of wastes. Permeability, soil reaction, salinity, depth to a high water table, and the available water capacity affect absorption. They also affect plant growth and microbial activity. Susceptibility to soil blowing and water erosion is affected by the slope, erosion factor, and wind erodibility group. The depth to a high water table and flooding can interfere with the application of wastes. Interpretations are based on utilizing the nutrients in the wastes for crop production and are not intended to be used in reclaiming or restoring critical areas or in maximizing the efficient use of moisture.

*Disposal of wastewater by irrigation* requires soils that can take in large amounts of water and be able to absorb the nutrients. The wastewater comes from a municipality and contains domestic and industrial waste or comes from food processing operations. It may be untreated (on rare occasions), or it may have received primary or secondary treatment. The content of nitrogen can vary considerably. The soil properties and qualities considered are those that affect design, construction, management, and performance of wastewater irrigation systems. The soil properties and qualities important in design and management are depth to a high water table, the available water capacity, permeability, wind erodibility, erosion factor, the slope, and flooding. The soil properties and qualities that influence construction are depth to a high water table and flooding. The properties and qualities that affect performance of the irrigation system are salinity and soil reaction. Interpretations are based on utilizing the wastewater for crop production and are not intended to be used only for the disposal or treatment of wastewater.

*Treatment of wastewater by the slow rate process* is performed at a rate normally between 0.5 inch and 4.0 inches per week. The applied wastewater is treated as it moves through the soil. Much of the treated water percolates to the ground water, and some enters the atmosphere through evapotranspiration. The wastewater comes from a municipality and contains domestic and industrial waste or comes from food processing operations. It may be untreated (on rare occasions), or it may have received primary or secondary treatment. The content of nitrogen can vary considerably. The soil properties and qualities considered are those that affect soil absorption, plant growth, microbial activity, susceptibility to soil blowing and water erosion, and the rate and method of the application of wastes. Permeability, soil reaction, salinity, depth to a high water table, and the available water capacity affect absorption. They also affect plant growth and microbial activity. Susceptibility to soil blowing and water erosion is affected by the slope, erosion factor, and wind erodibility. The depth to a high water table and flooding can interfere with the application of wastes. Interpretations are based on the treatment of the wastewater and are not intended for the use of the wastewater as a source of moisture for crop production. It is assumed, however, that crops are grown or may be grown as a part of the treatment process. Checks should be performed to ensure that heavy metals and nitrogen are not added to the soil in excessive amounts.

*Treatment of wastewater by the process of rapid infiltration* is performed at a rate normally between 4.0 and 120 inches per week. In this process, the wastewater is applied in a level basin where it percolates through the soil. The treated water eventually reaches the ground water. Geologic and hydrologic investigations are needed during the planning stages to ensure proper design and to determine the reliability of a system's performance and the potential for ground-water pollution. The wastewater generally comes from municipal wastewater treatment plants, and it generally has a low content of nitrogen. The soil properties and qualities that affect the design, construction, and performance of a system and the risk of pollution are major considerations. The depth to a high

water table and flooding are potential limitations and can influence design and construction. The properties and qualities that influence performance are permeability and soil reaction. Interpretations are based on the treatment of the wastewater and are not intended for the use of the wastewater as a source of moisture for crop production. Because vegetation is not a necessary part of the treatment process, the basins may or may not be vegetated.

**Construction Materials**

Table 19 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 to 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, a 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 a 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 have a water table at a depth of 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. They are used in many kinds of construction. Specifications for each use vary widely. In table 19, 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 of grain sizes is 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 high 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 20 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 excavated 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 the restrictive features that affect each soil for drainage, irrigation, terraces and diversions, and grassed waterways.

*Pond reservoir areas* hold water behind a dam or 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 and the depth to fractured bedrock or other permeable material. 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. Generally, 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 bedrock, 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 the potential for 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, and 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.

*Terraces and diversions* are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

*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 soil blowing, 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 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.

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 to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, 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 21 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 the heading "Soil Series and Detailed Soil Map Units."

*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 the content of particles coarser than sand is as much as about 15 percent, 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 *(1)*.

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, CL-ML.

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.

*Rock fragments* 3 to 10 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 ovendry 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 generally 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 22 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, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

*Moist bulk density* is the weight of soil (ovendry) 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 and septic tank absorption fields.

*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.

*Salinity* is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

*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 classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6

percent; *high*, more than 6 percent; and *very high*, greater than 9 percent.

*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 Revised Universal Soil Loss Equation (RUSLE) 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 0.02 to 0.64. 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 over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

*Wind erodibility groups* are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. The soils assigned to group 1 are the most susceptible to soil blowing, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.
8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

*Organic matter* is the plant and animal residue in the soil at various stages of decomposition. In table 22, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

## Soil and Water Features

Table 23 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

*Hydrologic soil groups* are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, 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 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.

If a soil is assigned to two hydrologic groups in table 23, the first letter is for drained areas and the second is for undrained areas.

*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 is not considered flooding. Water standing in swamps and marshes is considered ponding.

Table 23 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, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it

occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

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 little or no horizon development.

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 estimates are based mainly on observations of the water table at selected sites and on the evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in table 23 are the depth to the high water table; the kind of water table—that is, perched 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 23.

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. 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.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

*Subsidence* is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. Table 23 shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

*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 the 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 results in a severe hazard of corrosion. 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.

## Physical and Chemical Analyses of Selected Soils

The results of physical analysis of two typical pedons in the survey area are given in table 24 and the results of chemical analysis are given in table 25. The data are for soils sampled at carefully selected sites. The pedons are typical of the series. They are described in the section "Soil Series and Detailed Soil Map Units." Soil samples were analyzed by the Soil Survey Laboratory, Lincoln, Nebraska.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an ovendry basis. The methods used in

obtaining the data are indicated in the list that follows. The codes in parentheses refer to published methods *(16)*.

*Sand*—(0.05-2.0 mm fraction) weight percentages of material less than 2 mm (3A1).
*Silt*—(0.002-0.05 mm fraction) pipette extraction, weight percentages of all material less than 2 mm (3A1).
*Clay*—(fraction less than 0.002 mm) pipette extraction, weight percentages of material less than 2 mm (3A1).
*Water retained*—pressure extraction, percentage of ovendry weight of less than 2 mm material 1/3 bar (4B1).
*Water-retention difference*—between 1/3 bar and 15 bars for whole soil (4C1).
*Bulk density*—of less than 2 mm material, saran-coated clods 1/3 bar (4A1d).
*Organic carbon*—wet combustion. Walkley-Black modified acid-dichromate, ferric sulfate titration (6A1c).
*Extractable cations*—ammonium acetate pH 7.0, atomic absorption; calcium (6N2e), magnesium (6O2d), sodium (6P2b), potassium (6Q2b).
*Cation-exchange capacity*—sum of cations (5A3a).
*Base saturation*—sum of cations, TEA, pH 8.2 (5C3).
*Reaction (pH)*—1:1 water dilution (8C1f).

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# Glossary

**ABC soil.** A soil having an A, a B, and a C horizon.

**AC soil.** A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

**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.

**Aggregate, soil.** Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

**Alluvium.** Material, such as sand, silt, or clay, deposited on land by streams.

**Alpha,alpha-dipridyl.** A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

**Animal unit month (AUM).** The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

**Aquic conditions.** Current soil wetness characterized by saturation, reduction, and redoximorphic features.

**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.

**Argillic horizon.** A subsoil horizon characterized by an accumulation of illuvial clay.

**Argillite.** Weakly metamorphosed mudstone or shale.

**Aspect.** The direction in which a slope faces.

**Association, soil.** A group of soils or miscellaneous areas 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 60-inch profile or to a limiting layer is expressed as:

| | |
|---|---|
| Very low | 0 to 3 |
| Low | 3 to 6 |
| Moderate | 6 to 9 |
| High | 9 to 12 |
| Very high | more than 12 |

**Back slope.** The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Back slopes in profile are commonly steep, are linear, and may or may not include cliff segments.

**Basal area.** The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

**Base saturation.** The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

**Bedding planes.** Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

**Bedding system.** A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

**Bedrock.** The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

**Bisequum.** Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

**Board foot.** A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick before finishing.

**Bottom land.** The normal flood plain of a stream, subject to flooding.

**Boulders.** Rock fragments larger than 2 feet (60 centimeters) in diameter.

**Brackish water.** Water commonly in the tidal reaches of a river where seawater and fresh water mix. The content of salt in brackish water is greater than that in fresh water but less than that in sea water.

**Breaks.** The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

**Breast height.** An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

**Canopy.** The leafy crown of trees or shrubs. (See Crown.)

**Capillary water.** Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

**Catena.** A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

**Cation.** An ion carrying a positive charge of electricity. Some common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

**Cation-exchange capacity.** The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

**Channeled.** Refers to a streambed in which meandering, repeated branching, and convergence of streams, either active or abandoned, have created deeply incised cuts in alluvial material.

**Chemical treatment.** Control of unwanted vegetation through the use of chemicals.

**Chiseling.** Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth. This practice is often called chisel plowing or ripping.

**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 depletions.** Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

**Clayey soil.** Silty clay, sandy clay, or clay.

**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.

**Claypan.** A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

**Clearcutting.** A method of forest harvesting that removes the entire stand of trees in one cutting. The stand is reproduced artificially or by natural seeding from adjacent stands.

**Climax plant community.** The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

**Closed depression.** A low area completely surrounded by higher ground and having no natural outlet.

**Coarse fragments.** Mineral or rock particles larger than 2 millimeters in diameter.

**Coarse textured soil.** Sand or loamy sand.

**Cobble (or cobblestone).** A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

**Cobbly soil material.** Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

**Codominant trees.** Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.

**Commercial forest.** Forest land capable of producing 20 cubic feet or more of wood per acre per year at the culmination of mean annual increment.

**Complex slope.** Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

**Complex, soil.** A map unit of two or more kinds of soil or miscellaneous areas 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 or miscellaneous areas are somewhat similar in all areas.

**Concretions.** Cemented bodies with crude internal symmetry organized around a point, a line, or a plane that typically takes the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

**Congeliturbate.** Soil material disturbed by frost action.

**Conglomerate.** A coarse grained, clastic rock composed of rounded to subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of

sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

**Conservation cropping system.** Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of cover crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

**Conservation tillage.** A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

**Consistence, soil.** Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

**Consolidated sandstone.** Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.

**Consolidated shale.** Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

**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.

**Coppice dune.** A small dune of fine grained soil material stabilized around shrubs or small trees.

**Coprogenous earth (sedimentary peat).** Fecal material deposited in water by aquatic organisms.

**Corrosion.** Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

**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.

**Cropping system.** Growing crops according to a planned system of rotation and management practices.

**Crop residue management.** Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

**Cross-slope farming.** Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

**Crown.** The upper part of a tree or shrub, including the living branches and their foliage.

**Cutbanks cave** (in tables). The walls of excavations tend to cave in or slough.

**Decreasers.** The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

**Deep soil.** A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Deferred grazing.** Postponing grazing or resting grazing land for a prescribed period.

**Delta.** A body of alluvium having a surface that is nearly flat and fan shaped; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

**Depth, soil.** Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

**Divided-slope farming.** A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

**Dominant trees.** Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.

**Drainage class (natural).** Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well*

*drained, somewhat poorly drained, poorly drained,* and *very poorly drained.* These classes are defined in the "Soil Survey Manual."

**Drainage, surface.** Runoff, or surface flow of water, from an area.

**Drainageway.** A land area that is lower in elevation than surrounding areas and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may have distinctly incised channels at its upper reaches or throughout its course.

**Draw.** A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

**Duff.** A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

**Dune.** A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

**Eluviation.** The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

**Endosaturation.** A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

**Eolian soil material.** Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

**Ephemeral stream.** A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

**Episaturation.** A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

**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 human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

**Erosion pavement.** A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

**Escarpment.** A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

**Estuarine.** Term relating to marsh soils that may contain mineral material with a high *n* value that was deposited by tidally influenced streams in a quiescent environment.

**Even-aged.** Refers to a stand of trees in which only small differences in age occur between individual trees. A range of 20 years is allowed.

**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.

**Excess salts** (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

**Excess sodium** (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties and toxicity restrict the growth of plants.

**Excess sulfur** (in tables). Excessive amount of sulfur in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.

**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, tilth, and other growth factors are favorable.

**Fibric soil material (peat).** The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

**Field moisture capacity.** The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

**Fill slope.** A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

**Fine textured soil.** Sandy clay, silty clay, or clay.

**Firebreak.** An area cleared of flammable material to stop or help control creeping or running fires. It also serves

as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

**First bottom.** The normal flood plain of a stream, subject to frequent or occasional flooding.

**Flood plain.** A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

**Fluvial.** Of or pertaining to rivers; produced by river action, as a fluvial plain.

**Fluviomarine.** Of or pertaining to material deposited by oceans and reworked and deposited by streams after exposure.

**Foot slope.** The inclined surface at the base of a hill.

**Forb.** Any herbaceous plant not a grass or a sedge.

**Forest cover.** All trees and other woody plants (underbrush) covering the ground in a forest.

**Forest type.** A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

**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.

**Genesis, soil.** The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

**Gleyed soil.** Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

**Graded stripcropping.** Growing crops in strips that grade toward a protected waterway.

**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 as much as 3 inches (2 millimeters to 7.6 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, as much as 3 inches (7.6 centimeters) in diameter.

**Ground water.** Water filling all the unblocked pores of the material below the water table.

**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.

**Gypsum.** A mineral consisting of hydrous calcium sulfate.

**Hardpan.** A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

**Head out.** To form a flower head; especially refers to small grain crops.

**Heavy metals.** Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

**Hemic soil material (mucky peat).** Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

**High-residue crops.** Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

**Hill.** A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

**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 uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons of mineral soil are as follows:

*O horizon.*—An organic layer of fresh and decaying plant residue.

*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.

*E horizon.*—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

*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.

*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 overlying soil material. 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, an Arabic numeral, commonly a 2, precedes the letter C.

**Hummock.** A small, irregularly shaped knob or mound consisting of mineral or organic material covered by vegetation.

**Humus.** The well decomposed, more or less stable part of the organic matter in mineral soils.

**Hydrologic soil groups.** Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

**Igneous rock.** Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

**Illuviation.** The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

**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.

**Increasers.** Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

**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 capacity.** The maximum rate at which water can infiltrate into a soil under a given set of conditions.

**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 |

**Intermittent stream.** A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

**Invaders.** On pasture, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

**Iron depletions.** Low-chroma zones that have a low content of iron and manganese oxide because of chemical reduction and removal but also have a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

**Irrigation.** Application of water to soils to assist in production of crops. Methods of irrigation are:

*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.

**Knoll.** A small, low, rounded hill rising above adjacent landforms.

**Lacustrine deposit.** Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

**Lamellae**. Zones of clay accumulation caused by soil-forming processes and occurring as horizontal bands.

**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.

**Loamy soil.** Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

**Loess.** Fine grained material, dominantly of silt-sized particles, deposited by the wind.

**Lowland.** A general term for low-lying land or an extensive region of low land, at elevations near tide level.

**Lowland flats.** A general term for a level or nearly level surface or large area of land that is characterized by little or no relief.

**Low-residue crops.** Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

**Low strength.** The soil is not strong enough to support loads.

**Marsh.** A periodically wet or continually flooded area where the surface is not deeply submerged. Marshes are dominantly covered by sedges, rushes, and other hydrophytic plants.

**Masses.** Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

**Mean annual increment (MAI).** The average annual increase in volume of a tree during the entire life of the tree.

**Mechanical treatment.** Use of mechanical equipment for seeding, brush management, and other management practices.

**Medium textured soil.** Very fine sandy loam, loam, silt loam, or silt.

**Merchantable trees.** Trees that are of sufficient size to be economically processed into wood products.

**Metamorphic rock.** Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

**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 soil development and supports little or no vegetation.

**Moderately coarse textured soil.** Coarse sandy loam, sandy loam, or fine sandy loam.

**Moderately deep soil.** A soil that is 20 to 40 inches deep to bedrock or other material that restricts the penetration of plant roots.

**Moderately fine textured soil.** Clay loam, sandy clay loam, or silty clay loam.

**Mollic epipedon.** A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

**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. 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, finely divided, well decomposed organic soil material. (See Sapric soil material.)

**Mud flat.** A level area along a shore that consists of fine grained material alternately covered and uncovered by the tide or covered by shallow water and that is barren of vegetation during winter.

**Mudstone.** Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

**Munsell notation.** A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

**Neck.** A narrow strip of land that is connected to a larger

body of land but is bounded on both sides by water.

**Neutral soil.** A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

**Nodules.** Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

**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.

***n* value.** Refers to the relationship between percentage of water under field conditions and percentages of inorganic clay and humus. Soils that have a high *n* value (more than 0.7) are very fluid and are never dry below field capacity.

**Observed rooting depth.** Depth to which roots have been observed to penetrate.

**Organic matter.** Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

| | |
|---|---|
| Very low | less than 0.5 percent |
| Low | 0.5 to 1.0 percent |
| Moderately low | 1.0 to 2.0 percent |
| Moderate | 2.0 to 4.0 percent |
| High | 4.0 to 8.0 percent |
| Very high | more than 8.0 percent |

**Overstory.** The trees in a forest that form the upper crown cover.

**Oxbow.** The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

**Pan.** A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

**Panne.** A small pond located on a tidal marsh, commonly having a higher content of salt than the surrounding areas of marsh.

**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 affects the specified use.

**Permeability.** The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

| | |
|---|---|
| Extremely slow | 0.00 to 0.01 inch |
| Very slow | 0.01 to 0.06 inch |
| Slow | 0.06 to 0.2 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, such as slope, stoniness, and flooding.

**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.

**Plowpan.** A compacted layer formed in the soil directly below the plowed layer.

**Ponding.** Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

**Poor filter** (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

**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.

**Potential rooting depth (effective rooting depth).** Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

**Prescribed burning.** Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

**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.

**Proper grazing use.** Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

**Quartzite, metamorphic.** Rock consisting mainly of quartz that formed through recrystallization of quartz-rich sandstone or chert.

**Quartzite, sedimentary.** Very hard but unmetamorphosed sandstone consisting chiefly of quartz grains.

**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 degrees of acidity or alkalinity, expressed as pH values, are:

| | |
|---|---|
| Ultra acid | less than 3.5 |
| Extremely acid | 3.5 to 4.4 |
| Very strongly acid | 4.5 to 5.0 |
| Strongly acid | 5.1 to 5.5 |
| Moderately acid | 5.6 to 6.0 |
| Slightly acid | 6.1 to 6.5 |
| Neutral | 6.6 to 7.3 |
| Slightly 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 |

**Red beds.** Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

**Redoximorphic concentrations.** Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

**Redoximorphic depletions.** Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

**Redoximorphic features.** Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

**Reduced matrix.** A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

**Regeneration.** The new growth of a natural plant community, developing from seed.

**Regolith.** The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

**Relict stream terrace.** One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

**Relief.** The elevations or inequalities of a land surface, considered collectively.

**Residuum (residual soil material).** Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

**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.

**Riser.** The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

**Riverwash.** Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

**Road cut.** A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

**Rock fragments.** Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

**Rock outcrop.** Exposures of bare bedrock other than lava flows and rock-lined pits.

**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.

**Rubble land.** Areas that have more than 90 percent of

the surface covered by stones or boulders. Voids contain no soil material and virtually no vegetation other than lichens. Areas commonly are at the base of mountain slopes, but some are on mountain slopes as deposits of cobbles, stones, and boulders resulting from Pleistocene glaciation or periglacial phenomena.

**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.

**Saline soil.** A soil containing soluble salts in an amount that impairs the growth of plants. A saline soil does not contain excess exchangeable sodium.

**Salinity.** The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

| | |
|---|---|
| Nonsaline | 0 to 4 |
| Slightly saline | 4 to 8 |
| Moderately saline | 8 to 16 |
| Strongly saline | more than 16 |

**Salty water** (in tables). Water is too salty for consumption by livestock.

**Sand.** As a soil separate, individual rock or mineral fragments ranging from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

**Sandstone.** Sedimentary rock containing dominantly sand-sized particles.

**Sandy soil.** Sand or loamy sand.

**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.

**Saprolite.** Unconsolidated residual material underlying the soil and grading to hard bedrock below.

**Saturation.** Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

**Saw logs.** Logs of suitable size and quality for the production of lumber.

**Scarification.** The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

**Scarp.** An escarpment, cliff, or steep slope of considerable extent along the margin of a terrace.

**Scribner's log rule.** A method of estimating the number of board feet that can be cut from a log of a given diameter and length.

**Second bottom.** The first terrace above the normal flood plain (or first bottom) of a river.

**Sedimentary plain.** An extensive, nearly level to gently rolling or moderately sloping area that is underlain by sedimentary bedrock and that has a slope of 0 to 8 percent.

**Sedimentary rock.** Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

**Seepage** (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

**Semiconsolidated sedimentary beds.** Soft geologic sediments that disperse when fragments are placed in water. The fragments are hard or very hard when dry. Determining the texture by the usual field method is difficult.

**Sequum.** A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

**Series, soil.** A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

**Shale.** Sedimentary rock formed by the hardening of a clay deposit.

**Shallow soil.** A soil that is 10 to 20 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Sheet erosion.** The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

**Shoulder slope.** The uppermost inclined surface at the top of a hillside. It is the transition zone from the back slope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

**Shrink-swell** (in tables). 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.

**Silica.** A combination of silicon and oxygen. One crystalline mineral form is called quartz.

**Silica-sesquioxide ratio.** The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

**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.

**Siltstone.** Sedimentary rock made up of dominantly silt-sized particles.

**Similar soils.** Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

**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.

**Skid trails.** Pathways along which logs are dragged to a common site for loading onto a logging truck.

**Slash.** The branches, bark, treetops, reject logs, and broken or uprooted trees left on the ground after logging.

**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 ensure satisfactory performance of the soil for a specific use.

**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 (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

**Soil.** A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

**Soil classification terminology.** Taxonomic terms are briefly described as follows:

*Acid.*—Reaction class for mineral soils. The pH is less than 5.0 in 0.01 M calcium chloride solution in part of the subsoil.

*Alfs.*—Formative element indicating the Alfisols order. These soils have an argillic zone and have a moderate or high proportion of the exchange capacity occupied by calcium, magnesium, sodium, and potassium, considered collectively, and do not have a thick, dark surficial zone.

*Aqu.*—There is evidence of free water at or very near the soil surface for significant periods of time during the growing season while parts of the soil have temperatures high enough to permit the growth of micro-organisms.

*Aquic.*—There is evidence of free water beneath the surficial soil zone during the growing season. Soil depth is shallow enough that free water affects plant growth, but the soils are less wet than *Aqu.*

*Arenic.*—There is a surficial soil zone that has a sandy particle-size class 20 to 40 inches thick.

*Argillic.*—There is a zone of clay accumulation caused by soil-forming processes that is a major classification criteria because it is sufficiently expressed.

*Clayey.*—More than 35 percent clay and less than 35 percent, by volume, rock fragments. Composition pertains to a subsoil zone that occurs in different positions and has different thicknesses among soils but is commonly within the rooting depth if water is not a limiting factor.

*Coarse-loamy.*—Less than 18 percent clay and more than 15 percent material coarser than very fine sand and finer than cobbles. Composition pertains to a subsoil zone that occurs in different positions and has different thicknesses among soils but is commonly within the rooting depth if water is not a limiting factor.

*Coarse-silty.*—Less than 18 percent clay and less than 15 percent material coarser than very fine sand and finer than cobbles. Composition pertains to a subsoil zone that occurs in different positions and has different thicknesses among soils but is commonly within the rooting depth if water is not a limiting factor.

*Coated.*—Sandy particle-size class that has appreciable amounts of finer textured grains (silt and clay).

*Dysic.*—Reaction class for Histosols. The pH in 0.01 M calcium chloride solution before drying is less than 4.5 in part of the subsoil.

*Ents.*—Formative element indicating the Entisols order. These soils do not have appreciable horizon development and commonly are very young.

*Euic.*—Reaction class for Histosols. The pH in 0.01 M calcium chloride solution before drying is 4.5 or more in part of the subsoil.

*Family.*—A group of soils having similar kinds and sequences of layers that specifies particle size, mineralogy, chemistry, and mean annual temperature. Particle size, mineralogy, and chemistry pertain to a subsoil zone that occurs in different positions and has different thicknesses among soils but is commonly within the rooting depth if water is not a limiting factor.

*Fine-loamy.*—18 to 35 percent clay and 15 percent or more material coarser than very fine sand and finer than cobbles. Composition pertains to a subsoil zone that occurs in different positions and has different thicknesses among soils but is commonly within the rooting depth if water is not a limiting factor.

*Fluv.*—Soil material which was deposited by water so recently that the original organization and content of organic matter are retained.
*Great group.*—The third categorical level of the taxonomic system. Terms of this group consist of a single word composed of three formative elements, such as *Hapl aqu ents*. The major genetic process is defined but not the kind and sequence of all major zones.
*Hapl.*—None of the sets of properties that are used for great groups are expressed well enough to affect the classification.
*Hem.*—Soils that are composed of organic material in an intermediate state of decomposition.
*Histo.*—Parent material of the soil is predominantly organic.
*Histosols.*—Soils that formed in predominantly organic material.
*Hydr.*—Mineral soils that are permanently saturated with water and have a low bulk density.
*Ists.*—Formative element indicating the Histosols order. These soils predominantly consist of organic matter.
*Loamy.*—Less than 35 percent, by volume, rock fragments and excluding sandy and clayey textures. Composition pertains to a subsoil zone that occurs in different positions and has different thicknesses among soils but is commonly within the rooting depth if water is not a limiting factor.
*Medi.*—Organic soils (Histosols) that have mean annual soil temperatures above 47 degrees F and that have differences of more than 8 degrees between summer and winter temperatures.
*Mesic.*—The mean annual soil temperature is between 47 and 59 degrees F.
*Mixed.*—Term describing mineralogy. If the soil has less than 35 percent clay in the relevant zone, the term indicates that appreciable amounts of weatherable minerals occur in the sand and silt. If the soil has 35 percent or more clay, the term indicates that two or more kinds of clay minerals occur in appreciable amounts.
*Nonacid.*—Reaction class for mineral soils. The pH is 5.0 or more in 0.01 M calcium chloride solution in part of the subsoil.
*Ochr.*—Presence of an ochric epipedon.
*Order.*—Highest level in the classification system. There are 11 orders.
*Orth.*—The soils do not meet criteria for any of the property sets used to subdivide the order.
*Psamm.*—Sandy or sandy skeletal soil material is at depths of 10 to 40 inches.
*Psammentic.*—The argillic horizon has a sandy particle-size class or consists entirely of thin lamellae, or both.
*Quartzi.*—The sand fraction is 95 percent or more insoluble crystalline minerals (mainly quartz) that do not weather to liberate iron or aluminum.
*Sandy.*—Less than 35 percent, by volume, rock fragments and material coarser than loamy very fine sand. Composition pertains to a subsoil zone that occurs in different positions and has different thicknesses among soils but is commonly within the rooting depth if water is not a limiting factor.
*Sapr.*—Organic soils (Histosols) that are composed of highly decomposed material.
*Series.*—The concepts that specify the kind and sequence of major soil zones in a genetic sense and the composition of these zones. The series is commonly named for communities near the location where the soil was first formally described for the records of the soil survey.
*Siliceous.*—Term describing mineralogy. The soils are more than 90 percent, by weight, silica and other durable minerals that are resistant to weathering.
*Sols.*—Term meaning soils.
*Subgroup.*—The classification level that encompasses the major kinds and sequences of soil horizons in a genetic sense.
*Suborder.*—The second categorical level of the taxonomic system. The term connotes a formative element from the name of the order and something about diagnostic properties of the soils.
*Sulf.*—Occurrence of sulfides within the upper 40 inches of an organic soil.
*Terric.*—Organic soils (Histosols) that generally have continuous mineral material within a depth of 50 inches. The term also includes some soils that have discontinuous mineral layers within a depth of 50 inches.
*Thapto-Histic.*—There is a zone of buried organic material that is more than 8 inches thick and whose upper boundary is within 40 inches of the surface.
*Typic.*—The soils do not meet criteria of any of the property sets used to subdivide at the subgroup level.
*Ud.*—Commonly moist soils. During the growing season, these soils do not have free water at shallow depths over extended periods of time (see *Aqu*) and commonly have available water within the rooting depth of common annual crops.
*Udi.*—Term synonymous with *Ud*.
*Ults.*—Formative element indicating the Ultisols order. These soils have an argillic zone and have a low or very low proportion of the exchange capacity occupied by calcium, magnesium, sodium, and potassium, considered collectively.

*Umbr.*—Thick, dark, highly organic, mineral surficial zone that has a low or moderate proportion of the exchange capacity occupied by calcium, magnesium, sodium, and potassium, considered collectively.

**Soil separates.** Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

| | |
|---|---|
| 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, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

**Species.** A single, distinct kind of plant or animal having certain distinguishing characteristics.

**Stone line.** A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

**Stones.** Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

**Stream channel.** The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

**Stream terrace.** One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that was produced during a former stage of erosion or deposition.

**Stripcropping.** Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing 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 grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

**Stubble mulch.** Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

**Subsoil.** Technically, the B horizon; roughly, the part of the solum below plow depth.

**Subsoiling.** Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

**Substratum.** The part of the soil below the solum.

**Subsurface layer.** Any subsurface soil horizon (E, BE, or EB) below the surface layer.

**Summit.** A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

**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."

**Surface soil.** The A, AE, and AB horizons, considered collectively. It includes all subdivisions of these horizons.

**Swamp.** A saturated, very poorly drained area that is intermittently or permanently covered by water. Swamps are dominantly vegetated by shrubs and trees.

**Tailwater.** The water directly downstream of a structure.

**Talus.** Fragments of rock and other soil material accumulated by gravity at the foot of cliffs or steep slopes.

**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. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

**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.

**Toe slope.** The outermost inclined surface at the base of a hill; part of a foot slope.

**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.

**Trace elements.** Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

**Trafficability.** The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

**Tread.** The relatively flat terrace surface that was cut or built by stream or wave action.

**Understory.** The collection of plants in a forest community that grow to a height of less than 5 feet.

**Upland** (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

**Urban land.** An area where more than 75 percent of the surface is covered by asphalt, concrete, buildings, or other structures.

**Valley.** An elongated depressional area primarily developed by stream action.

**Variegation.** Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

**Very deep soil.** A soil that is more than 60 inches deep to bedrock or other material that restricts the penetration of plant roots.

**Very shallow soil.** A soil that is less than 10 inches deep to bedrock or other material that restricts the penetration of plant roots.

**Water bars.** Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and to divert water off and away from the road surface. Water bars can easily be driven over if they are constructed properly.

**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.

**Wilting point (or permanent wilting point).** The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

**Windthrow.** The uprooting and tipping over of trees by the wind.

# Tables

TABLE 1.--ACREAGE OF PRINCIPAL CROPS IN DORCHESTER COUNTY

(Data is from the year 1992)

| Crop | Acreage | Rank in State |
|---|---|---|
| Corn for grain or seed | 18,827 | 11 |
| Sweet corn | 2,309 | 1 |
| Wheat | 19,962 | 3 |
| Barley | 9,622 | 2 |
| Soybeans | 62,006 | 1 |
| Sorghum for grain or seed | 4,794 | 1 |
| Tomatoes | 234 | 3 |
| Cucumbers | 1,209 | 1 |
| Watermelons | 880 | 2 |
| Cantaloupes | 40 | 8 |
| Peas | 652 | 1 |

TABLE 2.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1961-90 at Vienna, Maryland)

| Month | Temperature | | | | | | Precipitation | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2 years in 10 will have-- | | | | 2 years in 10 will have-- | | | |
| | Average daily maximum | Average daily minimum | Average | Maximum temperature higher than-- | Minimum temperature lower than-- | Average number of growing degree days* | Average | Less than-- | More than-- | Average number of days with 0.10 inch or more | Average snowfall |
| | °F | °F | °F | °F | °F | Units | In | In | In | | In |
| January | 43.6 | 26.0 | 34.8 | 66 | 1 | 50 | 3.57 | 2.49 | 4.57 | 6 | 4.8 |
| February | 46.7 | 28.1 | 37.4 | 70 | 7 | 73 | 3.48 | 2.14 | 4.69 | 6 | 3.3 |
| March | 57.1 | 36.1 | 46.6 | 81 | 18 | 232 | 3.65 | 2.23 | 4.93 | 6 | .9 |
| April | 66.8 | 43.8 | 55.3 | 89 | 27 | 443 | 3.38 | 1.98 | 4.63 | 6 | .0 |
| May | 76.5 | 53.6 | 65.1 | 93 | 37 | 773 | 3.51 | 1.78 | 5.02 | 6 | .0 |
| June | 84.8 | 62.4 | 73.6 | 97 | 46 | 999 | 3.78 | 1.83 | 5.46 | 6 | .0 |
| July | 88.3 | 66.9 | 77.6 | 99 | 53 | 1,153 | 3.90 | 1.91 | 5.63 | 6 | .0 |
| August | 87.0 | 65.7 | 76.3 | 97 | 49 | 1,111 | 4.68 | 2.00 | 6.96 | 6 | .0 |
| September | 81.1 | 58.7 | 69.9 | 95 | 40 | 874 | 3.84 | 1.71 | 5.67 | 4 | .0 |
| October | 70.2 | 47.7 | 59.0 | 86 | 28 | 578 | 3.00 | 1.35 | 4.41 | 4 | .0 |
| November | 59.7 | 39.1 | 49.4 | 78 | 20 | 293 | 3.16 | 1.60 | 4.51 | 5 | .2 |
| December | 48.8 | 30.6 | 39.7 | 70 | 10 | 107 | 3.44 | 1.53 | 5.07 | 6 | 1.4 |
| Yearly: | | | | | | | | | | | |
| Average | 67.5 | 46.6 | 57.0 | --- | --- | --- | --- | --- | --- | --- | --- |
| Extreme | --- | --- | --- | 99 | 0 | --- | --- | --- | --- | --- | --- |
| Total | --- | --- | --- | --- | --- | 6,685 | 43.38 | 35.53 | 48.15 | 67 | 10.6 |

* A 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 degrees F).

TABLE 3.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1961-90 at Vienna, 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-- | Mar. 29 | Apr. 12 | Apr. 23 |
| 2 years in 10 later than-- | Mar. 24 | Apr. 6 | Apr. 18 |
| 5 years in 10 later than-- | Mar. 13 | Mar. 25 | Apr. 8 |
| First freezing temperature in fall: | | | |
| 1 year in 10 earlier than-- | Nov. 11 | Oct. 22 | Oct. 9 |
| 2 years in 10 earlier than-- | Nov. 17 | Oct. 28 | Oct. 16 |
| 5 years in 10 earlier than-- | Nov. 28 | Nov. 8 | Oct. 28 |

TABLE 4.--GROWING SEASON

(Recorded in the period 1961-90 at Vienna, Maryland)

| Probability | Daily minimum temperature during growing season | | |
|---|---|---|---|
| | Higher than 24 °F | Higher than 28 °F | Higher than 32 °F |
| | Days | Days | Days |
| 9 years in 10 | 234 | 202 | 181 |
| 8 years in 10 | 243 | 211 | 189 |
| 5 years in 10 | 258 | 230 | 205 |
| 2 years in 10 | 274 | 248 | 220 |
| 1 year in 10 | 283 | 257 | 229 |

TABLE 5.--SOIL TEMPERATURE OF SELECTED SOIL SERIES

(Data recorded in the period 1983-86)

| Map unit symbol | Soil series | Land use | 1st year average | 2nd year average | 3rd year average | Mean annual soil temperature |
|---|---|---|---|---|---|---|
| 18 | Hurlock | Cropland | 56.3 | 57.8 | 58.4 | 57.5 |
| 18 | Hurlock | Woodland | 54.6 | 56.6 | 56.8 | 56.0 |
| 12A | Fort Mott | Cropland | 54.4 | 57.5 | 58.5 | 56.9 |
| 10 | Fallsington | Woodland | 53.8 | 56.9 | 55.7 | 55.5 |
| 14A | Galestown | Cropland | 55.4 | 58.4 | 58.2 | 57.4 |
| 30 | Puckum | Swamp | 53.4 | 55.9 | 55.7 | 55.1 |
| 7 | Elkton | Woodland | 53.5 | 56.8 | 55.6 | 55.3 |
| 2 | Bestpitch | Tidal marsh | 55.5 | 57.5 | 58.4 | 57.2 |
| 26 | Othello | Woodland | 56.1 | 58.9 | 56.8 | 57.2 |
| 7 | Elkton | Cropland | 56.5 | 59.2 | 59.0 | 58.3 |
| 19A | Ingleside | Cropland | 56.3 | 58.3 | 58.5 | 57.7 |
| 22A | Matapeake | Cropland | 55.9 | 58.4 | 56.0 | 56.7 |
| 8 | Elkton | Grass lawn | 58.1 | 59.6 | 58.2 | 58.6 |
| 17 | Honga | Tidal marsh | 57.9 | 59.3 | 57.4 | 58.2 |
| 33 | Sunken | Grass lawn | 58.7 | 59.3 | 57.4 | 58.4 |

TABLE 6.--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 |
|---|---|
| Bestpitch | Clayey, mixed, euic, mesic Terric Sulfihemists |
| Chicone | Coarse-silty, mixed, acid, mesic Thapto-Histic Fluvaquents |
| Downer | Coarse-loamy, siliceous, mesic Typic Hapludults |
| Elkton | Fine-silty, mixed, mesic Typic Ochraquults |
| Evesboro | Mesic, coated Typic Quartzipsamments |
| Fallsington | Fine-loamy, mixed, mesic Typic Ochraquults |
| Fluvaquents | Fluvaquents |
| Fort Mott | Loamy, siliceous, mesic Arenic Hapludults |
| Galestown | Sandy, siliceous, mesic Psammentic Hapludults |
| Hambrook | Fine-loamy, siliceous, mesic Typic Hapludults |
| Hammonton | Coarse-loamy, siliceous, mesic Aquic Hapludults |
| Honga | Loamy, mixed, euic, mesic Terric Sulfihemists |
| Hurlock | Coarse-loamy, siliceous, mesic Typic Ochraquults |
| Ingleside | Coarse-loamy, siliceous, mesic Typic Hapludults |
| Kentuck | Fine-silty, mixed, mesic Typic Umbraquults |
| *Keyport | Clayey, mixed, mesic Aquic Hapludults |
| Klej | Mesic, coated Aquic Quartzipsamments |
| Matapeake | Fine-silty, mixed, mesic Typic Hapludults |
| Mattapex | Fine-silty, mixed, mesic Aquic Hapludults |
| Nanticoke | Fine-silty, mixed, nonacid, mesic Typic Hydraquents |
| Othello | Fine-silty, mixed, mesic Typic Ochraquults |
| Pone | Coarse-loamy, siliceous, mesic Typic Umbraquults |
| Puckum | Dysic, mesic Typic Medisaprists |
| Runclint | Mesic, coated Typic Quartzipsamments |
| Sassafras | Fine-loamy, siliceous, mesic Typic Hapludults |
| Sunken | Fine-silty, mixed, mesic Typic Ochraquults |
| Transquaking | Euic, mesic Typic Sulfihemists |
| Udorthents | Udorthents |
| Woodstown | Fine-loamy, mixed, mesic Aquic Hapludults |

TABLE 7.--CLASSIFICATION TERMINOLOGY FOR SOILS

(See "Soil classification terminology" in the Glossary for definitions of taxonomic terms)

| Soil series | Family modifiers | Subgroup | Great group |
|---|---|---|---|
| Bestpitch | Clayey, mixed, euic, mesic | Terric | Sulfi hem ists |
| Chicone | Coarse-silty, mixed, acid, mesic | Thapto-Histic | Fluv aqu ents |
| Downer | Coarse-loamy, siliceous, mesic | Typic | Hapl ud ults |
| Elkton | Fine-silty, mixed, mesic | Typic | Ochr aqu ults |
| Evesboro | Mesic, coated | Typic | Quartzi psamm ents |
| Fallsington | Fine-loamy, mixed, mesic | Typic | Ochr aqu ults |
| Fort Mott | Loamy, siliceous, mesic | Arenic | Hapl ud ults |
| Galestown | Sandy, siliceous, mesic | Psammentic | Hapl ud ults |
| Hambrook | Fine-loamy, siliceous, mesic | Typic | Hapl ud ults |
| Hammonton | Coarse-loamy, siliceous, mesic | Aquic | Hapl ud ults |
| Honga | Loamy, mixed, euic, mesic | Terric | Sulfi hem ists |
| Hurlock | Coarse-loamy, siliceous, mesic | Typic | Ochr aqu ults |
| Ingleside | Coarse-loamy, siliceous, mesic | Typic | Hapl ud ults |
| Kentuck | Fine-silty, mixed, mesic | Typic | Umbr aqu ults |
| Keyport | Clayey, mixed, mesic | Aquic | Hapl ud ults |
| Klej | Mesic, coated | Aquic | Quartzi psamm ents |
| Matapeake | Fine-silty, mixed, mesic | Typic | Hapl ud ults |
| Mattapex | Fine-silty, mixed, mesic | Aquic | Hapl ud ults |
| Nanticoke | Fine-silty, mixed, nonacid, mesic | Typic | Hydr aqu ents |
| Othello | Fine-silty, mixed, mesic | Typic | Ochr aqu ults |
| Pone | Coarse-loamy, siliceous, mesic | Typic | Umbr aqu ults |
| Puckum | Dysic, mesic | Typic | Medi sapr ists |
| Runclint | Mesic, coated | Typic | Quartzi psamm ents |
| Sassafras | Fine-loamy, siliceous, mesic | Typic | Hapl ud ults |
| Sunken | Fine-silty, mixed, mesic | Typic | Ochr aqu ults |
| Transquaking | Euic, mesic | Typic | Sulfi hem ists |
| Woodstown | Fine-loamy, mixed, mesic | Aquic | Hapl ud ults |

TABLE 8.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

| Map symbol | Soil name | Acres | Percent |
|---|---|---|---|
| 1 | Beaches | 96 | * |
| 2 | Bestpitch and Transquaking soils | 29,310 | 6.9 |
| 3 | Chicone mucky silt loam | 1,665 | 0.4 |
| 4C | Downer loamy sand, 5 to 10 percent slopes | 645 | 0.2 |
| 5A | Downer sandy loam, 0 to 2 percent slopes | 11,451 | 2.7 |
| 5B | Downer sandy loam, 2 to 5 percent slopes | 3,103 | 0.7 |
| 6 | Elkton loam | 1,095 | 0.3 |
| 7 | Elkton silt loam | 37,443 | 8.8 |
| 8 | Elkton mucky silt loam, very wet | 17,503 | 4.1 |
| 9C | Evesboro sand, 5 to 10 percent slopes | 1,114 | 0.3 |
| 9E | Evesboro sand, 15 to 30 percent slopes | 209 | * |
| 10 | Fallsington sandy loam | 11,834 | 2.8 |
| 11 | Fluvaquents | 2,560 | 0.6 |
| 12A | Fort Mott loamy sand, 0 to 2 percent slopes | 7,538 | 1.8 |
| 12B | Fort Mott loamy sand, 2 to 5 percent slopes | 8,727 | 2.1 |
| 13E | Fort Mott, Evesboro, and Downer soils | 192 | * |
| 14A | Galestown loamy sand, 0 to 2 percent slopes | 2,926 | 0.7 |
| 14B | Galestown loamy sand, 2 to 5 percent slopes | 4,546 | 1.1 |
| 15A | Hambrook loam, 0 to 2 percent slopes | 2,111 | 0.5 |
| 15B | Hambrook loam, 2 to 5 percent slopes | 958 | 0.2 |
| 16 | Hammonton sandy loam | 9,009 | 2.1 |
| 17 | Honga peat | 46,114 | 10.9 |
| 18 | Hurlock sandy loam | 12,848 | 3.0 |
| 19A | Ingleside sandy loam, 0 to 2 percent slopes | 7,500 | 1.8 |
| 19B | Ingleside sandy loam, 2 to 5 percent slopes | 2,560 | 0.6 |
| 20 | Keyport silt loam | 5,104 | 1.2 |
| 21 | Klej-Hammonton complex | 5,637 | 1.3 |
| 22A | Matapeake silt loam, wet substratum, 0 to 2 percent slopes | 5,123 | 1.2 |
| 22B | Matapeake silt loam, wet substratum, 2 to 5 percent slopes | 1,809 | 0.4 |
| 23 | Mattapex fine sandy loam, 0 to 2 percent slopes | 409 | 0.1 |
| 24A | Mattapex silt loam, 0 to 2 percent slopes | 10,542 | 2.5 |
| 24B | Mattapex silt loam, 2 to 5 percent slopes | 1,775 | 0.4 |
| 25 | Nanticoke silt loam | 1,019 | 0.2 |
| 26 | Othello silt loam | 32,739 | 7.7 |
| 27 | Othello and Kentuck soils | 17,928 | 4.2 |
| 28 | Pone mucky sandy loam | 2,692 | 0.6 |
| 29 | Pone mucky loam | 4,109 | 1.0 |
| 30 | Puckum muck | 7,187 | 1.7 |
| 31A | Runclint sand, 0 to 2 percent slopes | 1,695 | 0.4 |
| 31B | Runclint sand, 2 to 5 percent slopes | 2,682 | 0.6 |
| 32 | Sassafras loam | 1,095 | 0.3 |
| 33 | Sunken mucky silt loam | 19,846 | 4.7 |
| 34 | Udorthents | 844 | 0.2 |
| 35 | Woodstown loam, 0 to 2 percent slopes | 1,151 | 0.3 |
| 36A | Woodstown sandy loam, 0 to 2 percent slopes | 4,955 | 1.2 |
| 36B | Woodstown sandy loam, 2 to 5 percent slopes | 538 | 0.1 |
| | Water | 71,164 | 16.8 |
| | Total | 423,100 | 100.0 |

* Less than 0.1 percent.

TABLE 9.--MAIN LIMITATIONS AND HAZARDS AFFECTING CROPLAND

| Map symbol and soil name | Limitations or hazards |
|---|---|
| 1<br>Beaches | Nonsoil material. |
| 2: | |
| Bestpitch | Acidity (soil needs lime),<br>flooding,<br>ponding,<br>restricted permeability,<br>salt content,<br>water table. |
| Transquaking | Acidity (soil needs lime),<br>flooding,<br>ponding,<br>restricted permeability,<br>salt content,<br>water table. |
| 3<br>Chicone | Acidity (soil needs lime),<br>excessive permeability,<br>flooding,<br>ponding,<br>water table. |
| 4C<br>Downer | Acidity (soil needs lime),<br>excessive permeability,<br>slope,<br>soil blowing. |
| 5A<br>Downer | Acidity (soil needs lime),<br>excessive permeability,<br>soil blowing. |
| 5B<br>Downer | Acidity (soil needs lime),<br>excessive permeability,<br>soil blowing. |
| 6<br>Elkton | Acidity (soil needs lime),<br>restricted permeability,<br>water table. |
| 7<br>Elkton | Acidity (soil needs lime),<br>restricted permeability,<br>water table. |
| 8<br>Elkton | Acidity (soil needs lime),<br>ponding,<br>restricted permeability,<br>water table. |
| 9C<br>Evesboro | Acidity (soil needs lime),<br>excessive permeability,<br>limited available water capacity,<br>slope,<br>soil blowing. |
| 9E<br>Evesboro | Acidity (soil needs lime),<br>water erosion,<br>excessive permeability,<br>limited available water capacity,<br>slope,<br>soil blowing. |

TABLE 9.--MAIN LIMITATIONS AND HAZARDS AFFECTING CROPLAND--Continued

| Map symbol and soil name | Limitations or hazards |
|---|---|
| 10---------- Fallsington | Acidity (soil needs lime), soil blowing, water table. |
| 11---------- Fluvaquents | Acidity (soil needs lime), excessive permeability, flooding, water table. |
| 12A---------- Fort Mott | Acidity (soil needs lime), excessive permeability, soil blowing. |
| 12B---------- Fort Mott | Acidity (soil needs lime), excessive permeability, soil blowing. |
| 13E: | |
| Fort Mott-------- | Acidity (soil needs lime), water erosion, excessive permeability, slope, soil blowing. |
| Evesboro--------- | Acidity (soil needs lime), water erosion, excessive permeability, limited available water capacity, slope, soil blowing. |
| Downer---------- | Acidity (soil needs lime), water erosion, slope, soil blowing. |
| 14A---------- Galestown | Acidity (soil needs lime), excessive permeability, limited available water capacity, soil blowing. |
| 14B---------- Galestown | Acidity (soil needs lime), excessive permeability, limited available water capacity, soil blowing. |
| 15A---------- Hambrook | Acidity (soil needs lime), restricted permeability, soil blowing. |
| 15B---------- Hambrook | Acidity (soil needs lime), soil blowing. |
| 16---------- Hammonton | Acidity (soil needs lime), soil blowing, water table. |
| 17---------- Honga | Acidity (soil needs lime), flooding, ponding, restricted permeability, salt content, water table. |

TABLE 9.--MAIN LIMITATIONS AND HAZARDS AFFECTING CROPLAND--Continued

| Map symbol and soil name | Limitations or hazards |
|---|---|
| 18---------- Hurlock | Acidity (soil needs lime), restricted permeability, soil blowing, water table. |
| 19A---------- Ingleside | Acidity (soil needs lime), restricted permeability, soil blowing. |
| 19B---------- Ingleside | Acidity (soil needs lime), restricted permeability, soil blowing. |
| 20---------- Keyport | Acidity (soil needs lime), restricted permeability, water table. |
| 21: Klej---------- | Acidity (soil needs lime), excessive permeability, limited available water capacity, soil blowing, water table. |
| Hammonton-------- | Acidity (soil needs lime), excessive permeability, soil blowing, water table. |
| 22A---------- Matapeake | Acidity (soil needs lime), excessive permeability, water table. |
| 22B---------- Matapeake | Acidity (soil needs lime), water erosion, excessive permeability, water table. |
| 23---------- Mattapex | Acidity (soil needs lime), excessive permeability, water table. |
| 24A---------- Mattapex | Acidity (soil needs lime), excessive permeability, water table. |
| 24B---------- Mattapex | Acidity (soil needs lime), water erosion, excessive permeability, water table. |
| 25---------- Nanticoke | Acidity (soil needs lime), flooding, ponding, water table. |
| 26---------- Othello | Acidity (soil needs lime), water table. |

TABLE 9.--MAIN LIMITATIONS AND HAZARDS AFFECTING CROPLAND--Continued

| Map symbol and soil name | Limitations or hazards |
|---|---|
| 27: Othello | Acidity (soil needs lime), excessive permeability, ponding, water table. |
| Kentuck | Acidity (soil needs lime), ponding, restricted permeability, water table. |
| 28 Pone | Acidity (soil needs lime), ponding, soil blowing, water table. |
| 29 Pone | Acidity (soil needs lime), ponding, soil blowing, water table. |
| 30 Puckum | Acidity (soil needs lime), flooding, ponding, water table. |
| 31A Runclint | Acidity (soil needs lime), excessive permeability, limited available water capacity, soil blowing. |
| 31B Runclint | Acidity (soil needs lime), excessive permeability, limited available water capacity, soil blowing. |
| 32 Sassafras | Acidity (soil needs lime). |
| 33 Sunken | Acidity (soil needs lime), flooding, ponding, restricted permeability, salt content, water table. |
| 34 Udorthents | Acidity (soil needs lime), excessive permeability, slope, soil blowing, water table. |
| 35 Woodstown | Acidity (soil needs lime), water table. |
| 36A Woodstown | Acidity (soil needs lime), soil blowing, water table. |
| 36B Woodstown | Acidity (soil needs lime), soil blowing, water table. |

TABLE 10.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS

(Yields in the N columns are for nonirrigated soils; those in the I columns are for irrigated soils. 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 | Land capability | | Corn | | Wheat | | Soybeans | | Barley | | Watermelons | | Sweet corn | | Tomatoes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | I | N | I | N | I | N | I | N | I | N | I | N | I | N | I |
| | | | Bu | Bu | Bu | Bu | Bu | Bu | Bu | Bu | Tons | Tons | Tons | Tons | Tons | Tons |
| 1*---------- Beaches | VIIIw | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2---------- Bestpitch and Transquaking | VIIIw | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3---------- Chicone | Vw | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4C---------- Downer | IIIe | --- | 80 | --- | 30 | --- | 20 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5A---------- Downer | I | --- | 100 | 165 | 55 | --- | 45 | 50 | 70 | --- | --- | --- | --- | 7.0 | --- | 20.0 |
| 5B---------- Downer | IIe | --- | 100 | 155 | 55 | --- | 45 | 50 | 70 | --- | --- | --- | --- | --- | --- | 20.0 |
| 6, 7: | | | | | | | | | | | | | | | | |
| Elkton, drained---- | IIIw | --- | 120 | --- | 50 | --- | 40 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Elkton, undrained-- | IVw | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 8---------- Elkton | Vw | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 9C, 9E---------- Evesboro | VIIs | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 10: | | | | | | | | | | | | | | | | |
| Fallsington, drained---------- | IIIw | --- | 110 | --- | 45 | --- | 35 | --- | 50 | --- | --- | --- | --- | --- | --- | --- |
| Fallsington, undrained--------- | IVw | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 11---------- Fluvaquents | Vw | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 12A, 12B---------- Fort Mott | IIIs | IIs | 110 | 150 | --- | --- | 48 | 75 | --- | --- | --- | --- | --- | --- | --- | 20.0 |

TABLE 10.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

| Soil name and map symbol | Land capability | | Corn | | Wheat | | Soybeans | | Barley | | Watermelons | | Sweet corn | | Tomatoes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | I | N | I | N | I | N | I | N | I | N | I | N | I | N | I |
| | | | Bu | Bu | Bu | Bu | Bu | Bu | Bu | Bu | Tons | Tons | Tons | Tons | Tons | Tons |
| 13E--Fort Mott, Evesboro, and Downer | VIIe | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 14A, 14B--Galestown | IIIs | --- | 60 | 150 | 25 | 65 | 30 | 40 | --- | --- | --- | 22.0 | --- | 6.0 | 13.0 | 20.0 |
| 15A--Hambrook | I | --- | 110 | 165 | 50 | 55 | 45 | 55 | 60 | 70 | --- | --- | --- | 6.0 | 15.0 | 25.0 |
| 15B--Hambrook | IIe | --- | 110 | 165 | 50 | 55 | 40 | 55 | 60 | 70 | --- | --- | --- | 5.0 | 15.0 | 25.0 |
| 16--Hammonton | IIw | --- | 100 | --- | 35 | --- | 35 | --- | --- | --- | --- | --- | --- | --- | --- | 25.0 |
| 17--Honga | VIIIw | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 18: | | | | | | | | | | | | | | | | |
| Hurlock, drained | IIIw | --- | 110 | --- | 40 | --- | 32 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hurlock, undrained | IVw | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 19A--Ingleside | I | --- | 110 | 165 | 50 | 55 | 45 | 55 | 60 | 70 | --- | --- | --- | 6.0 | 15.0 | 25.0 |
| 19B--Ingleside | IIe | --- | 110 | 165 | 50 | 55 | 40 | 55 | 60 | 70 | --- | --- | --- | 5.0 | 15.0 | 25.0 |
| 20--Keyport | IIw | --- | 110 | --- | 40 | --- | 50 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 21--Klej-Hammonton | IIIw | --- | 102 | --- | --- | --- | 30 | --- | --- | --- | --- | --- | --- | --- | --- | 23.0 |
| 22A--Matapeake | I | --- | 140 | 165 | 65 | --- | 45 | 55 | --- | --- | --- | --- | --- | --- | --- | --- |
| 22B--Matapeake | IIe | --- | 140 | 165 | 60 | --- | 45 | 55 | --- | --- | --- | --- | --- | --- | --- | --- |
| 23, 24A--Mattapex | IIw | --- | 135 | 165 | 65 | --- | 40 | 55 | --- | --- | --- | --- | --- | --- | --- | --- |
| 24B--Mattapex | IIe | --- | 135 | 165 | 60 | --- | 40 | 55 | --- | --- | --- | --- | --- | --- | --- | --- |

TABLE 10.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

| Soil name and map symbol | Land capability | | Corn | | Wheat | | Soybeans | | Barley | | Watermelons | | Sweet corn | | Tomatoes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | I | N | I | N | I | N | I | N | I | N | I | N | I | N | I |
| | | | Bu | Bu | Bu | Bu | Bu | Bu | Bu | Bu | Tons | Tons | Tons | Tons | Tons | Tons |
| 25--Nanticoke | VIIIw | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 26: | | | | | | | | | | | | | | | | |
| Othello, drained | IIIw | --- | 115 | --- | 55 | --- | 40 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Othello, undrained | IVw | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 27--Othello and Kentuck | Vw | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 28, 29: | | | | | | | | | | | | | | | | |
| Pone, drained | IIIw | --- | 110 | --- | --- | --- | 40 | --- | --- | --- | --- | --- | --- | --- | 12.0 | --- |
| Pone, undrained | IVw | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 30--Puckum | VIIIw | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 31A, 31B--Runclint | IVs | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 32--Sassafras | I | --- | 130 | 175 | 50 | 70 | 45 | --- | --- | --- | --- | --- | --- | --- | --- | 25.0 |
| 33--Sunken | Vw | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 34--Udorthents | Vw | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 35, 36A, 36B--Woodstown | IIw | --- | 130 | 170 | 45 | --- | 40 | 50 | 60 | --- | --- | --- | --- | --- | --- | 20.0 |

TABLE 11.--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) |
| | | Acres | Acres | Acres |
| I | 27,280 | --- | --- | --- |
| II | 43,886 | 10,205 | 33,681 | --- |
| III | 77,593 | 645 | 53,211 | 23,737 |
| IV | 57,590 | --- | 53,213 | 4,377 |
| V | 60,346 | --- | 60,346 | --- |
| VI | --- | --- | --- | --- |
| VII | 1,515 | 192 | --- | 1,323 |
| VIII | 83,726 | --- | 83,726 | --- |

TABLE 12.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

| Map symbol | Soil name |
|---|---|
| 5A | Downer sandy loam, 0 to 2 percent slopes |
| 5B | Downer sandy loam, 2 to 5 percent slopes |
| 10 | Fallsington sandy loam (where drained) |
| 12A | Fort Mott loamy sand, 0 to 2 percent slopes (where irrigated) |
| 12B | Fort Mott loamy sand, 2 to 5 percent slopes (where irrigated) |
| 14A | Galestown loamy sand, 0 to 2 percent slopes (where irrigated) |
| 14B | Galestown loamy sand, 2 to 5 percent slopes (where irrigated) |
| 15A | Hambrook loam, 0 to 2 percent slopes |
| 15B | Hambrook loam, 2 to 5 percent slopes |
| 16 | Hammonton sandy loam |
| 18 | Hurlock sandy loam (where drained) |
| 19A | Ingleside sandy loam, 0 to 2 percent slopes |
| 19B | Ingleside sandy loam, 2 to 5 percent slopes |
| 20 | Keyport silt loam |
| 21 | Klej-Hammonton complex (where drained) |
| 22A | Matapeake silt loam, wet substratum, 0 to 2 percent slopes |
| 22B | Matapeake silt loam, wet substratum, 2 to 5 percent slopes |
| 23 | Mattapex fine sandy loam, 0 to 2 percent slopes |
| 24A | Mattapex silt loam, 0 to 2 percent slopes |
| 24B | Mattapex silt loam, 2 to 5 percent slopes |
| 26 | Othello silt loam (where drained) |
| 32 | Sassafras loam |
| 35 | Woodstown loam, 0 to 2 percent slopes |
| 36A | Woodstown sandy loam, 0 to 2 percent slopes |
| 36B | Woodstown sandy loam, 2 to 5 percent slopes |

TABLE 13.--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 | Windthrow hazard | Plant competition | Common trees | Site index | Productivity class* | |
| 3---- Chicone | 2W | Slight | Severe | Severe | Severe | Severe | Red maple | 50 | 2 | Atlantic white-cedar, baldcypress. |
| | | | | | | | Sweetgum | 50 | 4 | |
| | | | | | | | Water oak | 50 | 2 | |
| | | | | | | | Pin oak | 50 | 2 | |
| 4C, 5A, 5B---- Downer | 4A | Slight | Slight | Slight | Slight | Slight | Black oak | 70 | 4 | Virginia pine, loblolly pine. |
| | | | | | | | White oak | 70 | 4 | |
| | | | | | | | Scarlet oak | 70 | 4 | |
| | | | | | | | Virginia pine | 60 | 6 | |
| | | | | | | | Loblolly pine | 65 | 6 | |
| 6, 7---- Elkton | 8W | Slight | Severe | Slight | Slight | Slight | Loblolly pine | 78 | 8 | Loblolly pine. |
| | | | | | | | Sweetgum | 80 | 6 | |
| | | | | | | | Blackgum | 60 | 6 | |
| | | | | | | | Red maple | 50 | 2 | |
| | | | | | | | Willow oak | 60 | 3 | |
| 8---- Elkton | 2W | Slight | Severe | Moderate | Severe | Severe | Red maple | 50 | 2 | Baldcypress. |
| | | | | | | | Sweetgum | 50 | 4 | |
| | | | | | | | Willow oak | 60 | 3 | |
| | | | | | | | Swamp chestnut oak | 60 | 3 | |
| | | | | | | | Water oak | 60 | 3 | |
| 9C---- Evesboro | 6S | Slight | Moderate | Slight | Slight | Slight | Shortleaf pine | 60 | 6 | Virginia pine, loblolly pine. |
| | | | | | | | Virginia pine | 70 | 8 | |
| | | | | | | | Black oak | 70 | 4 | |
| | | | | | | | White oak | 70 | 4 | |
| | | | | | | | Chestnut oak | 70 | 4 | |
| 9E---- Evesboro | 6R | Moderate | Moderate | Slight | Slight | Slight | Shortleaf pine | 60 | 6 | Virginia pine, loblolly pine. |
| | | | | | | | Virginia pine | 70 | 8 | |
| | | | | | | | Black oak | 70 | 4 | |
| | | | | | | | White oak | 70 | 4 | |
| | | | | | | | Chestnut oak | 70 | 4 | |
| 10---- Fallsington | 9W | Slight | Moderate | Moderate | Moderate | Severe | Loblolly pine | 90 | 9 | Loblolly pine, eastern white pine, sweetgum, yellow-poplar. |
| | | | | | | | Sweetgum | 80 | 6 | |
| | | | | | | | White oak | 70 | 4 | |
| | | | | | | | Willow oak | 70 | 4 | |

See footnotes at end of table.

TABLE 13.--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 | Windthrow hazard | Plant competition | Common trees | Site index | Productivity class* | |
| 11----------<br>Fluvaquents | 2W | Slight | Severe | Moderate | Moderate | Severe | Red maple----------<br>Sweetgum----------<br>Blackgum---------- | 50<br>50<br>40 | 2<br>4<br>5 | |
| 12A, 12B----------<br>Fort Mott | 8A | Slight | Moderate | Slight | Slight | Slight | Shortleaf pine------<br>Virginia pine-------<br>Black oak----------<br>White oak---------- | 70<br>70<br>70<br>70 | 8<br>8<br>4<br>4 | Virginia pine,<br>loblolly pine. |
| 13E**:<br>Fort Mott---------- | 8A | Slight | Moderate | Slight | Slight | Slight | Shortleaf pine------<br>Virginia pine-------<br>Black oak----------<br>White oak---------- | 70<br>70<br>70<br>70 | 8<br>8<br>4<br>4 | Virginia pine,<br>loblolly pine. |
| Evesboro---------- | 6R | Moderate | Moderate | Slight | Slight | Slight | Shortleaf pine------<br>Virginia pine-------<br>Black oak----------<br>White oak----------<br>Chestnut oak-------- | 60<br>70<br>70<br>70<br>70 | 6<br>8<br>4<br>4<br>4 | Virginia pine,<br>loblolly pine. |
| Downer---------- | 4R | Slight | Moderate | Slight | Slight | Slight | Black oak----------<br>White oak----------<br>Scarlet oak---------<br>Virginia pine-------<br>Loblolly pine------- | 70<br>70<br>70<br>60<br>65 | 4<br>4<br>4<br>6<br>6 | Virginia pine,<br>loblolly pine. |
| 14A, 14B----------<br>Galestown | 4S | Slight | Moderate | Moderate | Slight | Moderate | Black oak----------<br>Loblolly pine-------<br>Virginia pine-------<br>Shortleaf pine------ | 70<br>80<br>70<br>70 | 4<br>8<br>8<br>8 | Loblolly pine,<br>shortleaf pine,<br>Virginia pine. |
| 15A, 15B----------<br>Hambrook | 8A | Slight | Slight | Slight | Slight | Slight | Virginia pine-------<br>Black oak----------<br>White oak----------<br>Scarlet oak---------<br>Loblolly pine------- | 70<br>65<br>70<br>70<br>75 | 8<br>3<br>4<br>4<br>7 | Loblolly pine. |
| 16----------<br>Hammonton | 4A | Slight | Slight | Slight | Slight | Moderate | Black oak----------<br>White oak----------<br>Virginia pine-------<br>Shortleaf pine------<br>Loblolly pine------- | 80<br>80<br>70<br>70<br>60 | 4<br>4<br>8<br>8<br>5 | Virginia pine,<br>loblolly pine. |

See footnotes at end of table.

TABLE 13.--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 | Windthrow hazard | Plant competition | Common trees | Site index | Productivity class* | |
| 18----------<br>Hurlock | 8W | Slight | Severe | Moderate | Moderate | Severe | Loblolly pine-------<br>White oak----------<br>Willow oak----------<br>Red maple---------- | 85<br>70<br>70<br>70 | 8<br>4<br>4<br>3 | Loblolly pine, yellow-poplar. |
| 19A, 19B----------<br>Ingleside | 8A | Slight | Slight | Slight | Slight | Slight | Virginia pine-------<br>Black oak----------<br>White oak----------<br>Scarlet oak--------- | 70<br>65<br>70<br>70 | 8<br>3<br>4<br>4 | Loblolly pine. |
| 20----------<br>Keyport | 6A | Slight | Slight | Slight | Slight | Moderate | Yellow-poplar-------<br>Northern red oak----<br>American beech------<br>Loblolly pine------- | 90<br>80<br>80<br>80 | 6<br>4<br>4<br>8 | Yellow-poplar, northern red oak, loblolly pine. |
| 21**:<br>Klej----------<br><br><br><br>Hammonton---------<br><br><br><br><br>22A, 22B----------<br>Matapeake<br><br><br><br>23, 24A, 24B-------<br>Mattapex<br><br><br><br>26----------<br>Othello | 8S<br><br><br><br>4A<br><br><br><br><br>4A<br><br><br><br>4A<br><br><br><br>4W<br><br><br><br> | Slight<br><br><br><br>Slight<br><br><br><br><br>Slight<br><br><br><br>Slight<br><br><br><br>Slight<br><br><br><br> | Moderate<br><br><br><br>Slight<br><br><br><br><br>Slight<br><br><br><br>Slight<br><br><br><br>Severe<br><br><br><br> | Moderate<br><br><br><br>Slight<br><br><br><br><br>Slight<br><br><br><br>Moderate<br><br><br><br>Severe<br><br><br><br> | Slight<br><br><br><br>Slight<br><br><br><br><br>Slight<br><br><br><br>Slight<br><br><br><br>Slight<br><br><br><br> | Moderate<br><br><br><br>Moderate<br><br><br><br><br>Moderate<br><br><br><br>Moderate<br><br><br><br>Severe<br><br><br><br> | Loblolly pine-------<br>Sweetgum----------<br>White oak----------<br>Virginia pine-------<br><br>Black oak----------<br>White oak----------<br>Virginia pine-------<br>Shortleaf pine------<br>Loblolly pine-------<br><br>Southern red oak----<br>White oak----------<br>Loblolly pine-------<br>Red maple----------<br><br>White oak----------<br>Northern red oak----<br>Loblolly pine-------<br>Sweetgum----------<br><br>White oak----------<br>Sweetgum----------<br>Loblolly pine-------<br>Red maple---------- | 80<br>80<br>70<br>70<br><br>80<br>80<br>70<br>70<br>60<br><br>75<br>75<br>83<br>60<br><br>70<br>70<br>81<br>80<br><br>80<br>80<br>83<br>50 | 8<br>6<br>4<br>8<br><br>4<br>4<br>8<br>8<br>5<br><br>4<br>4<br>8<br>3<br><br>4<br>4<br>8<br>6<br><br>4<br>6<br>8<br>2 | Virginia pine, eastern white pine, loblolly pine.<br><br>Virginia pine, loblolly pine.<br><br>Loblolly pine.<br><br>Loblolly pine, eastern white pine, yellow-poplar.<br><br>Loblolly pine. |

See footnotes at end of table.

TABLE 13.--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 | Windthrow hazard | Plant competition | Common trees | Site index | Productivity class* | |
| 27**: | | | | | | | | | | |
| Othello | 3W | Slight | Severe | Moderate | Severe | Severe | Red maple | 70 | 3 | Loblolly pine, baldcypress. |
| | | | | | | | Sweetgum | 70 | 4 | |
| | | | | | | | Willow oak | 70 | 4 | |
| | | | | | | | Swamp chestnut oak | 60 | 4 | |
| | | | | | | | Water oak | 70 | 4 | |
| | | | | | | | Loblolly pine | 70 | 6 | |
| Kentuck | 3W | Slight | Severe | Severe | Severe | Severe | Red maple | 70 | 3 | Loblolly pine. |
| | | | | | | | Sweetgum | 70 | 4 | |
| | | | | | | | Willow oak | 70 | 4 | |
| | | | | | | | Swamp chestnut oak | 60 | 4 | |
| | | | | | | | Water oak | 70 | 4 | |
| | | | | | | | Loblolly pine | 70 | 6 | |
| 28, 29--Pone | 3W | Slight | Severe | Severe | Severe | Severe | Red maple | 65 | 3 | Loblolly pine, baldcypress, yellow-poplar. |
| | | | | | | | Sweetgum | 65 | 4 | |
| | | | | | | | Willow oak | 65 | 4 | |
| | | | | | | | Swamp chestnut oak | 60 | 4 | |
| | | | | | | | Water oak | 65 | 4 | |
| | | | | | | | Loblolly pine | 60 | 5 | |
| 30--Puckum | 2W | Slight | Severe | Severe | Severe | Severe | Red maple | 50 | 2 | Atlantic white-cedar, baldcypress. |
| | | | | | | | Blackgum | 60 | 6 | |
| | | | | | | | Sweetgum | 60 | 4 | |
| | | | | | | | Swamp chestnut oak | 60 | 4 | |
| | | | | | | | Water oak | 60 | 3 | |
| | | | | | | | Northern whitecedar | 60 | 6 | |
| 31A, 31B--Runclint | 6S | Slight | Slight | Severe | Slight | Slight | Virginia pine | 60 | 6 | Loblolly pine. |
| | | | | | | | Loblolly pine | 70 | 6 | |
| | | | | | | | White oak | 55 | 3 | |
| | | | | | | | Black oak | 70 | 4 | |
| | | | | | | | Northern red oak | 70 | 4 | |
| 32--Sassafras | 4A | Slight | Slight | Slight | Slight | --- | White oak | 70 | 4 | Loblolly pine, eastern white pine, yellow-poplar. |
| | | | | | | | Yellow-poplar | 80 | 5 | |
| | | | | | | | Loblolly pine | 85 | 8 | |
| | | | | | | | Virginia pine | 70 | 8 | |
| 33--Sunken | 5T | Slight | Severe | Severe | Severe | Severe | Loblolly pine | 40 | 5 | Baldcypress. |

See footnotes at end of table.

TABLE 13.--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 | Windthrow hazard | Plant competition | Common trees | Site index | Productivity class* | |
| 34---------- Udorthents | 4W | Slight | Moderate | Moderate | Slight | Severe | Sweetgum---------- | 40 | 4 | Loblolly pine. |
| | | | | | | | Red maple---------- | 40 | 2 | |
| | | | | | | | Willow oak---------- | 50 | 2 | |
| | | | | | | | Loblolly pine------- | 60 | 5 | |
| 35, 36A, 36B------- Woodstown | 4A | Slight | Slight | Slight | Slight | Moderate | White oak---------- | 80 | 4 | Loblolly pine, yellow-poplar, eastern white pine. |
| | | | | | | | Yellow-poplar------- | 90 | 6 | |
| | | | | | | | Loblolly pine------- | 85 | 8 | |
| | | | | | | | Sweetgum---------- | 90 | 7 | |
| | | | | | | | Northern red oak---- | 70 | 4 | |

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe")

| Soil name and map symbol | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 1*<br>Beaches | Severe:<br>flooding,<br>wetness,<br>too sandy. | Severe:<br>wetness,<br>too sandy,<br>excess salt. | Severe:<br>too sandy,<br>wetness. | Severe:<br>wetness,<br>too sandy. | Severe:<br>excess salt,<br>wetness,<br>droughty. |
| 2*:<br>Bestpitch | Severe:<br>flooding,<br>ponding,<br>excess humus. | Severe:<br>ponding,<br>excess humus,<br>excess salt. | Severe:<br>excess humus,<br>ponding,<br>flooding. | Severe:<br>ponding,<br>excess humus. | Severe:<br>excess salt,<br>excess sulfur,<br>ponding. |
| Transquaking | Severe:<br>flooding,<br>ponding,<br>excess humus. | Severe:<br>ponding,<br>excess humus,<br>excess salt. | Severe:<br>excess humus,<br>ponding,<br>flooding. | Severe:<br>ponding,<br>excess humus. | Severe:<br>excess salt,<br>excess sulfur,<br>ponding. |
| 3<br>Chicone | Severe:<br>flooding,<br>ponding. | Severe:<br>ponding. | Severe:<br>ponding,<br>flooding. | Severe:<br>ponding. | Severe:<br>ponding,<br>flooding. |
| 4C<br>Downer | Moderate:<br>slope. | Moderate:<br>slope. | Severe:<br>slope. | Slight | Moderate:<br>slope. |
| 5A, 5B<br>Downer | Slight | Slight | Slight | Slight | Slight. |
| 6, 7<br>Elkton | Severe:<br>wetness,<br>percs slowly. | Severe:<br>wetness,<br>percs slowly. | Severe:<br>wetness,<br>percs slowly. | Severe:<br>wetness. | Severe:<br>wetness. |
| 8<br>Elkton | Severe:<br>ponding. | Severe:<br>ponding. | Severe:<br>ponding. | Severe:<br>ponding. | Severe:<br>ponding. |
| 9C<br>Evesboro | Severe:<br>too sandy. | Severe:<br>too sandy. | Severe:<br>slope,<br>too sandy. | Severe:<br>too sandy. | Severe:<br>droughty. |
| 9E<br>Evesboro | Severe:<br>slope,<br>too sandy. | Severe:<br>slope,<br>too sandy. | Severe:<br>slope,<br>too sandy. | Severe:<br>too sandy. | Severe:<br>droughty,<br>slope. |
| 10<br>Fallsington | Severe:<br>wetness. | Severe:<br>wetness. | Severe:<br>wetness. | Severe:<br>wetness. | Severe:<br>wetness. |
| 11<br>Fluvaquents | Severe:<br>flooding,<br>wetness. | Severe:<br>wetness. | Severe:<br>wetness,<br>flooding. | Severe:<br>wetness. | Severe:<br>wetness,<br>flooding. |
| 12A<br>Fort Mott | Slight | Slight | Slight | Slight | Moderate:<br>droughty. |
| 12B<br>Fort Mott | Slight | Slight | Moderate:<br>slope. | Slight | Moderate:<br>droughty. |

See footnote at end of table.

TABLE 14.--RECREATIONAL DEVELOPMENT--Continued

| Soil name and map symbol | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 13E*: | | | | | |
| Fort Mott | Severe: slope. | Severe: slope. | Severe: slope. | Slight | Severe: slope. |
| Evesboro | Severe: slope, too sandy. | Severe: slope, too sandy. | Severe: slope, too sandy. | Severe: too sandy. | Severe: droughty, slope. |
| Downer | Severe: slope. | Severe: slope. | Severe: slope. | Moderate: slope. | Severe: slope. |
| 14A<br>Galestown | Slight | Slight | Slight | Slight | Severe: droughty. |
| 14B<br>Galestown | Slight | Slight | Moderate: slope. | Slight | Severe: droughty. |
| 15A<br>Hambrook | Slight | Slight | Slight | Slight | Slight. |
| 15B<br>Hambrook | Slight | Slight | Moderate: slope. | Slight | Slight. |
| 16<br>Hammonton | Moderate: wetness. | Moderate: wetness. | Moderate: wetness. | Moderate: wetness. | Moderate: wetness. |
| 17<br>Honga | Severe: flooding, ponding, excess humus. | Severe: ponding, excess humus, excess salt. | Severe: excess humus, ponding, flooding. | Severe: ponding, excess humus. | Severe: excess salt, excess sulfur, ponding. |
| 18<br>Hurlock | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. |
| 19A<br>Ingleside | Slight | Slight | Slight | Slight | Slight. |
| 19B<br>Ingleside | Slight | Slight | Moderate: slope. | Slight | Slight. |
| 20<br>Keyport | Severe: percs slowly. | Severe: percs slowly. | Severe: percs slowly. | Moderate: wetness. | Moderate: wetness. |
| 21*: | | | | | |
| Klej | Severe: wetness. | Moderate: wetness, too sandy. | Severe: wetness. | Moderate: wetness, too sandy. | Moderate: wetness, droughty. |
| Hammonton | Moderate: wetness. | Moderate: wetness. | Moderate: wetness. | Moderate: wetness. | Moderate: wetness. |
| 22A<br>Matapeake | Moderate: percs slowly. | Moderate: percs slowly. | Moderate: percs slowly. | Slight | Slight. |
| 22B<br>Matapeake | Moderate: percs slowly. | Moderate: percs slowly. | Moderate: slope, percs slowly. | Slight | Slight. |
| 23, 24A<br>Mattapex | Moderate: wetness, percs slowly. | Moderate: wetness, percs slowly. | Moderate: wetness, percs slowly. | Severe: erodes easily. | Moderate: wetness. |

See footnote at end of table.

TABLE 14.--RECREATIONAL DEVELOPMENT--Continued

| Soil name and map symbol | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 24B---------- Mattapex | Moderate: wetness, percs slowly. | Moderate: wetness, percs slowly. | Moderate: slope, wetness, percs slowly. | Severe: erodes easily. | Moderate: wetness. |
| 25---------- Nanticoke | Severe: flooding, ponding. | Severe: ponding. | Severe: ponding, flooding. | Severe: ponding. | Severe: ponding, flooding. |
| 26---------- Othello | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. |
| 27*: | | | | | |
| Othello---------- | Severe: ponding. | Severe: ponding. | Severe: ponding. | Severe: ponding. | Severe: ponding. |
| Kentuck---------- | Severe: ponding. | Severe: ponding. | Severe: ponding. | Severe: ponding. | Severe: ponding. |
| 28, 29---------- Pone | Severe: ponding. | Severe: ponding. | Severe: ponding. | Severe: ponding. | Severe: ponding. |
| 30---------- Puckum | Severe: flooding, ponding, excess humus. | Severe: ponding, excess humus. | Severe: excess humus, ponding, flooding. | Severe: ponding, excess humus. | Severe: ponding, flooding. |
| 31A, 31B---------- Runclint | Severe: too sandy. | Severe: too sandy. | Severe: too sandy. | Severe: too sandy. | Severe: droughty. |
| 32---------- Sassafras | Moderate: percs slowly. | Moderate: percs slowly. | Moderate: percs slowly. | Slight---------- | Slight. |
| 33---------- Sunken | Severe: flooding, ponding, excess salt. | Severe: ponding, excess salt. | Severe: ponding, excess salt. | Severe: ponding. | Severe: excess salt, ponding. |
| 34---------- Udorthents | Severe: wetness. | Severe: wetness. | Severe: slope, small stones, too sandy. | Severe: wetness, too sandy. | Severe: wetness, droughty. |
| 35, 36A---------- Woodstown | Moderate: wetness, percs slowly. | Moderate: wetness, percs slowly. | Moderate: wetness. | Moderate: wetness. | Moderate: wetness, droughty. |
| 36B---------- Woodstown | Moderate: wetness, percs slowly. | Moderate: wetness, percs slowly. | Moderate: slope, wetness. | Moderate: wetness. | Moderate: wetness, droughty. |

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor")

| Soil name and map symbol | Potential for habitat elements | | | | | | | Potential as habitat for-- | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Grain and seed crops | Grasses and legumes | Wild herbaceous plants | Hardwood trees | Coniferous plants | Wetland plants | Shallow water areas | Openland wildlife | Woodland wildlife | Wetland wildlife |
| 1*----- Beaches | Very poor. | Very poor. | Very poor. | Very poor. | Very poor. | Very poor. | Very poor. | Very poor. | Very poor. | Very poor. |
| 2*: | | | | | | | | | | |
| Bestpitch--------- | Very poor. | Very poor. | Very poor. | Very poor. | Very poor. | Good | Good | Very poor. | Very poor. | Good. |
| Transquaking------ | Very poor. | Very poor. | Very poor. | Very poor. | Very poor. | Good | Good | Very poor. | Very poor. | Good. |
| 3----- Chicone | Very poor. | Poor | Poor | Poor | Poor | Good | Good | Poor | Fair | Good. |
| 4C----- Downer | Poor | Fair | Good | Good | Good | Poor | Very poor. | Fair | Good | Very poor. |
| 5A, 5B---------- Downer | Good | Good | Good | Good | Good | Poor | Very poor. | Good | Good | Very poor. |
| 6, 7---------- Elkton | Poor | Fair | Fair | Fair | Fair | Good | Fair | Fair | Fair | Fair. |
| 8----- Elkton | Very poor. | Poor | Fair | Fair | Fair | Good | Good | Poor | Fair | Good. |
| 9C----- Evesboro | Poor | Poor | Poor | Poor | Poor | Very poor. | Very poor. | Poor | Poor | Very poor. |
| 9E----- Evesboro | Very poor. | Very poor. | Poor | Poor | Poor | Very poor. | Very poor. | Very poor. | Poor | Very poor. |
| 10----- Fallsington | Fair | Good | Good | Good | Good | Good | Fair | Good | Good | Fair. |
| 11----- Fluvaquents | Very poor. | Poor | Fair | Fair | Fair | Good | Good | Poor | Fair | Good. |
| 12A, 12B---------- Fort Mott | Poor | Fair | Fair | Poor | Poor | Poor | Very poor. | Fair | Poor | Very poor. |
| 13E*: | | | | | | | | | | |
| Fort Mott--------- | Poor | Fair | Fair | Poor | Poor | Poor | Very poor. | Fair | Poor | Very poor. |
| Evesboro---------- | Very poor. | Very poor. | Poor | Poor | Poor | Very poor. | Very poor. | Very poor. | Poor | Very poor. |
| Downer------------ | Poor | Fair | Fair | Good | Good | Very poor. | Very poor. | Fair | Fair | Very poor. |
| 14A, 14B---------- Galestown | Poor | Fair | Fair | Poor | Poor | Very poor. | Very poor. | Fair | Poor | Very poor. |
| 15A, 15B---------- Hambrook | Good | Good | Good | Good | Good | Poor | Very poor. | Good | Good | Very poor. |

See footnote at end of table.

TABLE 15.--WILDLIFE HABITAT--Continued

| Soil name and map symbol | Potential for habitat elements | | | | | | | Potential as habitat for-- | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Grain and seed crops | Grasses and legumes | Wild herbaceous plants | Hardwood trees | Coniferous plants | Wetland plants | Shallow water areas | Openland wildlife | Woodland wildlife | Wetland wildlife |
| 16--Hammonton | Fair | Good | Good | Fair | Fair | Poor | Poor | Good | Fair | Poor. |
| 17--Honga | Very poor. | Very poor. | Very poor. | Very poor. | Very poor. | Good | Good | Very poor. | Very poor. | Good. |
| 18--Hurlock | Fair | Good | Good | Good | Good | Good | Fair | Good | Good | Fair. |
| 19A, 19B--Ingleside | Good | Good | Good | Good | Good | Poor | Very poor. | Good | Good | Very poor. |
| 20--Keyport | Fair | Good | Good | Good | Good | Poor | Poor | Good | Good | Poor. |
| 21*: | | | | | | | | | | |
| Klej | Fair | Fair | Good | Fair | Fair | Poor | Poor | Fair | Fair | Poor. |
| Hammonton | Poor | Fair | Good | Fair | Fair | Poor | Poor | Fair | Fair | Poor. |
| 22A, 22B--Matapeake | Good | Good | Good | Good | Good | Very poor. | Very poor. | Good | Good | Very poor. |
| 23, 24A--Mattapex | Good | Good | Good | Good | Good | Poor | Poor | Good | Good | Poor. |
| 24B--Mattapex | Good | Good | Good | Good | Good | Poor | Very poor. | Good | Good | Very poor. |
| 25--Nanticoke | Very poor. | Very poor. | Very poor. | Very poor. | Very poor. | Good | Good | Very poor. | Very poor. | Good. |
| 26--Othello | Poor | Fair | Fair | Fair | Fair | Good | Good | Fair | Fair | Good. |
| 27*: | | | | | | | | | | |
| Othello | Very poor. | Poor | Fair | Fair | Fair | Good | Good | Poor | Fair | Good. |
| Kentuck | Very poor. | Poor | Poor | Poor | Poor | Good | Good | Poor | Fair | Good. |
| 28, 29--Pone | Fair | Fair | Good | Good | Good | Good | Good | Fair | Good | Good. |
| 30--Puckum | Very poor. | Very poor. | Poor | Poor | Poor | Good | Good | Very poor. | Poor | Good. |
| 31A, 31B--Runclint | Poor | Poor | Fair | Poor | Poor | Very poor. | Very poor. | Poor | Poor | Very poor. |
| 32--Sassafras | Good | Good | Good | Good | Good | Poor | Very poor. | Good | Good | Very poor. |
| 33--Sunken | Very poor. | Poor | Very poor. | Poor | Poor | Good | Good | Very poor. | Poor | Good. |
| 34--Udorthents | Poor | Fair | Fair | Poor | Fair | Fair | Fair | Poor | Fair | Fair. |

See footnote at end of table.

TABLE 15.--WILDLIFE HABITAT--Continued

| Soil name and map symbol | Potential for habitat elements | | | | | | | Potential as habitat for-- | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Grain and seed crops | Grasses and legumes | Wild herbaceous plants | Hardwood trees | Coniferous plants | Wetland plants | Shallow water areas | Openland wildlife | Woodland wildlife | Wetland wildlife |
| 35, 36A---------- Woodstown | Fair | Good | Good | Good | Poor | Poor | Poor | Good | Good | Poor. |
| 36B---------- Woodstown | Fair | Good | Good | Good | Poor | Poor | Very poor. | Good | Good | Very poor. |

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

| Soil name and map symbol | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
|---|---|---|---|---|---|---|
| 1*<br>Beaches | Severe: cutbanks cave, wetness. | Severe: flooding, wetness. | Severe: flooding, wetness. | Severe: flooding, wetness. | Severe: wetness, flooding. | Severe: excess salt, wetness, droughty. |
| 2*: | | | | | | |
| Bestpitch | Severe: excess humus, ponding. | Severe: subsides, flooding, ponding. | Severe: subsides, flooding, ponding. | Severe: subsides, flooding, ponding. | Severe: subsides, ponding, flooding. | Severe: excess salt, excess sulfur, ponding. |
| Transquaking | Severe: excess humus, ponding. | Severe: subsides, flooding, ponding. | Severe: subsides, flooding, ponding. | Severe: subsides, flooding, ponding. | Severe: subsides, ponding, flooding. | Severe: excess salt, excess sulfur, ponding. |
| 3<br>Chicone | Severe: excess humus, ponding. | Severe: flooding, ponding, low strength. | Severe: flooding, ponding. | Severe: flooding, ponding, low strength. | Severe: ponding, flooding. | Severe: ponding, flooding. |
| 4C<br>Downer | Severe: cutbanks cave. | Slight | Slight | Moderate: slope. | Slight | Slight. |
| 5A, 5B<br>Downer | Severe: cutbanks cave. | Slight | Slight | Slight | Slight | Slight. |
| 6, 7<br>Elkton | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: low strength, wetness. | Severe: wetness. |
| 8<br>Elkton | Severe: ponding. | Severe: ponding. | Severe: ponding. | Severe: ponding. | Severe: low strength, ponding. | Severe: ponding. |
| 9C<br>Evesboro | Severe: cutbanks cave. | Slight | Slight | Moderate: slope. | Slight | Severe: droughty. |
| 9E<br>Evesboro | Severe: cutbanks cave, slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: droughty, slope. |
| 10<br>Fallsington | Severe: cutbanks cave, wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. |
| 11<br>Fluvaquents | Severe: cutbanks cave, wetness. | Severe: flooding, wetness. | Severe: flooding, wetness. | Severe: flooding, wetness. | Severe: wetness, flooding. | Severe: wetness, flooding. |
| 12A, 12B<br>Fort Mott | Severe: cutbanks cave. | Slight | Slight | Slight | Moderate: frost action. | Moderate: droughty. |

See footnote at end of table.

TABLE 16.--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 |
|---|---|---|---|---|---|---|
| 13E*: | | | | | | |
| Fort Mott | Severe: cutbanks cave, slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| Evesboro | Severe: cutbanks cave, slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: droughty, slope. |
| Downer | Severe: cutbanks cave, slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 14A, 14B<br>Galestown | Severe: cutbanks cave. | Slight | Slight | Slight | Slight | Severe: droughty. |
| 15A, 15B<br>Hambrook | Severe: cutbanks cave. | Slight | Moderate: wetness. | Slight | Moderate: frost action. | Slight. |
| 16<br>Hammonton | Severe: cutbanks cave, wetness. | Moderate: wetness. | Severe: wetness. | Moderate: wetness. | Severe: frost action. | Slight. |
| 17<br>Honga | Severe: excess humus, ponding. | Severe: flooding, ponding. | Severe: flooding, ponding. | Severe: flooding, ponding. | Severe: low strength, ponding, flooding. | Severe: excess salt, excess sulfur, ponding. |
| 18<br>Hurlock | Severe: cutbanks cave, wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. |
| 19A, 19B<br>Ingleside | Severe: cutbanks cave. | Slight | Moderate: wetness. | Slight | Slight | Slight. |
| 20<br>Keyport | Severe: wetness. | Moderate: wetness, shrink-swell. | Severe: wetness. | Moderate: wetness, shrink-swell. | Severe: low strength, frost action. | Moderate: wetness. |
| 21*: | | | | | | |
| Klej | Severe: cutbanks cave, wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Moderate: wetness, frost action. | Moderate: wetness, droughty. |
| Hammonton | Severe: cutbanks cave, wetness. | Moderate: wetness. | Severe: wetness. | Moderate: wetness. | Severe: frost action. | Slight. |
| 22A, 22B<br>Matapeake | Severe: cutbanks cave. | Slight | Moderate: wetness. | Slight | Moderate: low strength, frost action. | Slight. |
| 23, 24A, 24B<br>Mattapex | Severe: cutbanks cave, wetness. | Moderate: wetness. | Severe: wetness. | Moderate: wetness. | Severe: low strength. | Moderate: wetness. |
| 25<br>Nanticoke | Severe: ponding. | Severe: flooding, ponding. | Severe: flooding, ponding. | Severe: flooding, ponding. | Severe: ponding, flooding. | Severe: ponding, flooding. |

See footnote at end of table.

TABLE 16.--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 |
|---|---|---|---|---|---|---|
| 26---------- Othello | Severe: cutbanks cave, wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: low strength, wetness. | Severe: wetness. |
| 27*: | | | | | | |
| Othello---------- | Severe: cutbanks cave, ponding. | Severe: ponding. | Severe: ponding. | Severe: ponding. | Severe: ponding. | Severe: ponding. |
| Kentuck---------- | Severe: cutbanks cave, ponding. | Severe: ponding. | Severe: ponding. | Severe: ponding. | Severe: low strength, ponding. | Severe: ponding. |
| 28, 29---------- Pone | Severe: cutbanks cave, ponding. | Severe: ponding. | Severe: ponding. | Severe: ponding. | Severe: ponding. | Severe: ponding. |
| 30---------- Puckum | Severe: excess humus, ponding. | Severe: subsides, flooding, ponding. | Severe: subsides, flooding, ponding. | Severe: subsides, flooding, ponding. | Severe: subsides, ponding, flooding. | Severe: ponding, flooding. |
| 31A, 31B---------- Runclint | Severe: cutbanks cave. | Slight--------- | Moderate: wetness. | Slight--------- | Slight--------- | Severe: droughty. |
| 32---------- Sassafras | Severe: cutbanks cave. | Slight--------- | Slight--------- | Slight--------- | Moderate: frost action. | Slight. |
| 33---------- Sunken | Severe: ponding. | Severe: flooding, ponding. | Severe: flooding, ponding. | Severe: flooding, ponding. | Severe: low strength, ponding, flooding. | Severe: excess salt, ponding. |
| 34---------- Udorthents | Severe: cutbanks cave, wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness, droughty. |
| 35, 36A, 36B------ Woodstown | Severe: cutbanks cave, wetness. | Moderate: wetness. | Severe: wetness. | Moderate: wetness. | Moderate: wetness, frost action. | Moderate: wetness, droughty. |

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "fair," and other terms. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

| Soil name and map symbol | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary landfill | Daily cover for landfill |
|---|---|---|---|---|---|
| 1*<br>Beaches | Severe:<br>flooding,<br>wetness,<br>poor filter. | Severe:<br>seepage,<br>flooding. | Severe:<br>flooding,<br>seepage,<br>wetness. | Severe:<br>flooding,<br>seepage,<br>wetness. | Poor:<br>seepage,<br>too sandy,<br>wetness. |
| 2*: | | | | | |
| Bestpitch | Severe:<br>subsides,<br>flooding,<br>ponding. | Severe:<br>seepage,<br>flooding,<br>excess humus. | Severe:<br>flooding,<br>ponding,<br>excess humus. | Severe:<br>flooding,<br>seepage,<br>ponding. | Poor:<br>ponding,<br>excess humus,<br>excess salt. |
| Transquaking | Severe:<br>subsides,<br>flooding,<br>ponding. | Severe:<br>seepage,<br>flooding,<br>excess humus. | Severe:<br>flooding,<br>ponding,<br>excess humus. | Severe:<br>flooding,<br>seepage,<br>ponding. | Poor:<br>ponding,<br>excess humus,<br>excess salt. |
| 3<br>Chicone | Severe:<br>flooding,<br>ponding,<br>poor filter. | Severe:<br>seepage,<br>flooding,<br>excess humus. | Severe:<br>flooding,<br>seepage,<br>ponding. | Severe:<br>flooding,<br>seepage,<br>ponding. | Poor:<br>ponding,<br>excess humus. |
| 4C<br>Downer | Severe:<br>poor filter. | Severe:<br>seepage,<br>slope. | Severe:<br>seepage,<br>too sandy. | Severe:<br>seepage. | Poor:<br>seepage,<br>too sandy. |
| 5A, 5B<br>Downer | Severe:<br>poor filter. | Severe:<br>seepage. | Severe:<br>seepage,<br>too sandy. | Severe:<br>seepage. | Poor:<br>seepage,<br>too sandy. |
| 6, 7<br>Elkton | Severe:<br>wetness,<br>percs slowly. | Severe:<br>seepage. | Severe:<br>seepage,<br>wetness. | Severe:<br>wetness. | Poor:<br>wetness. |
| 8<br>Elkton | Severe:<br>ponding,<br>percs slowly. | Severe:<br>ponding. | Severe:<br>seepage,<br>ponding,<br>too clayey. | Severe:<br>ponding. | Poor:<br>too clayey,<br>hard to pack,<br>ponding. |
| 9C<br>Evesboro | Severe:<br>poor filter. | Severe:<br>seepage,<br>slope. | Severe:<br>seepage,<br>too sandy. | Severe:<br>seepage. | Poor:<br>too sandy. |
| 9E<br>Evesboro | Severe:<br>poor filter,<br>slope. | Severe:<br>seepage,<br>slope. | Severe:<br>seepage,<br>slope,<br>too sandy. | Severe:<br>seepage,<br>slope. | Poor:<br>too sandy,<br>slope. |
| 10<br>Fallsington | Severe:<br>wetness,<br>percs slowly,<br>poor filter. | Severe:<br>seepage,<br>wetness. | Severe:<br>seepage,<br>wetness,<br>too sandy. | Severe:<br>seepage,<br>wetness. | Poor:<br>seepage,<br>too sandy,<br>wetness. |
| 11<br>Fluvaquents | Severe:<br>flooding,<br>wetness,<br>poor filter. | Severe:<br>seepage,<br>flooding,<br>wetness. | Severe:<br>flooding,<br>seepage,<br>wetness. | Severe:<br>flooding,<br>seepage,<br>wetness. | Poor:<br>seepage,<br>too sandy,<br>wetness. |

See footnote at end of table.

TABLE 17.--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 |
|---|---|---|---|---|---|
| 12A, 12B---------- Fort Mott | Severe: poor filter. | Severe: seepage. | Severe: seepage. | Severe: seepage. | Poor: seepage. |
| 13E*: | | | | | |
| Fort Mott---------- | Severe: poor filter, slope. | Severe: seepage, slope. | Severe: seepage, slope. | Severe: seepage, slope. | Poor: seepage, slope. |
| Evesboro---------- | Severe: poor filter, slope. | Severe: seepage, slope. | Severe: seepage, slope, too sandy. | Severe: seepage, slope. | Poor: too sandy, slope. |
| Downer---------- | Severe: poor filter, slope. | Severe: seepage, slope. | Severe: seepage, slope, too sandy. | Severe: seepage, slope. | Poor: seepage, too sandy, slope. |
| 14A, 14B---------- Galestown | Severe: poor filter. | Severe: seepage. | Severe: seepage, too sandy. | Severe: seepage. | Poor: seepage, too sandy. |
| 15A, 15B---------- Hambrook | Severe: poor filter. | Severe: seepage. | Severe: wetness, too sandy. | Severe: seepage. | Poor: seepage, too sandy. |
| 16---------- Hammonton | Severe: wetness, poor filter. | Severe: seepage, wetness. | Severe: seepage, wetness, too sandy. | Severe: seepage, wetness. | Poor: seepage, too sandy. |
| 17---------- Honga | Severe: flooding, ponding, percs slowly. | Severe: seepage, flooding, excess humus. | Severe: flooding, ponding, excess salt. | Severe: flooding, seepage, ponding. | Poor: ponding, excess salt. |
| 18---------- Hurlock | Severe: wetness, poor filter. | Severe: seepage, wetness. | Severe: wetness, too sandy. | Severe: seepage, wetness. | Poor: seepage, too sandy, wetness. |
| 19A, 19B---------- Ingleside | Severe: wetness, percs slowly. | Severe: seepage. | Severe: wetness. | Severe: seepage. | Poor: thin layer. |
| 20---------- Keyport | Severe: wetness, percs slowly. | Slight---------- | Severe: seepage, wetness. | Moderate: wetness. | Poor: too clayey, hard to pack. |
| 21*: | | | | | |
| Klej---------- | Severe: wetness, percs slowly, poor filter. | Severe: seepage, wetness. | Severe: wetness. | Severe: seepage, wetness. | Poor: seepage, wetness. |
| Hammonton---------- | Severe: wetness, poor filter. | Severe: seepage, wetness. | Severe: seepage, wetness, too sandy. | Severe: seepage, wetness. | Poor: seepage, too sandy. |

See footnote at end of table.

TABLE 17.--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 |
|---|---|---|---|---|---|
| 22A, 22B---------- Matapeake | Severe: percs slowly. | Severe: seepage. | Severe: seepage, wetness. | Severe: seepage. | Fair: too clayey, thin layer. |
| 23, 24A, 24B-------- Mattapex | Severe: wetness, percs slowly. | Severe: seepage, wetness. | Severe: seepage, wetness. | Severe: seepage, wetness. | Fair: too sandy, wetness. |
| 25---------- Nanticoke | Severe: flooding, ponding, percs slowly. | Severe: flooding, ponding. | Severe: flooding, ponding. | Severe: flooding, ponding. | Poor: ponding. |
| 26---------- Othello | Severe: wetness, percs slowly. | Severe: seepage, wetness. | Severe: seepage, wetness. | Severe: wetness. | Poor: wetness. |
| 27*: | | | | | |
| Othello---------- | Severe: ponding, percs slowly. | Severe: seepage, ponding. | Severe: seepage, ponding. | Severe: ponding. | Poor: ponding. |
| Kentuck---------- | Severe: ponding, percs slowly. | Severe: seepage, ponding. | Severe: seepage, ponding. | Severe: ponding. | Poor: ponding. |
| 28, 29---------- Pone | Severe: ponding, percs slowly, poor filter. | Severe: seepage, ponding. | Severe: ponding. | Severe: seepage, ponding. | Poor: ponding. |
| 30---------- Puckum | Severe: flooding, ponding. | Severe: seepage, flooding, excess humus. | Severe: flooding, seepage, ponding. | Severe: flooding, seepage, ponding. | Poor: ponding, excess humus. |
| 31A, 31B---------- Runclint | Severe: poor filter. | Severe: seepage. | Severe: wetness, too sandy. | Severe: seepage. | Poor: seepage, too sandy. |
| 32---------- Sassafras | Severe: percs slowly. | Severe: seepage. | Severe: seepage. | Slight---------- | Fair: thin layer. |
| 33---------- Sunken | Severe: flooding, ponding, percs slowly. | Severe: flooding, ponding. | Severe: flooding, seepage, ponding. | Severe: flooding, ponding. | Poor: ponding. |
| 34---------- Udorthents | Severe: wetness, poor filter. | Severe: seepage, slope, wetness. | Severe: seepage, wetness. | Severe: seepage, wetness. | Poor: seepage, too sandy. |
| 35, 36A, 36B-------- Woodstown | Severe: wetness, percs slowly. | Severe: seepage, wetness. | Severe: seepage, wetness. | Severe: seepage, wetness. | Poor: seepage, too sandy. |

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--WASTE MANAGEMENT INTERPRETATIONS

| Soil name and map symbol | Land application of manure and food processing waste | Land application of municipal sewage sludge | Disposal of wastewater by irrigation | Treatment of wastewater by slow rate | Treatment of wastewater by rapid infiltration |
|---|---|---|---|---|---|
| 1---------- Beaches | Severe:* poor filter, wetness, excess salt, flooding, droughty. | Severe:* poor filter, wetness, excess salt, flooding, droughty. | Severe:* excess salt, wetness, poor filter, droughty, flooding. | Severe:* excess salt, wetness, poor filter, flooding. | Severe: wetness, flooding. |
| 2: | | | | | |
| Bestpitch---- | Severe: percs slowly, wetness, excess salt, flooding. | Severe: percs slowly, wetness, excess salt, flooding. | Severe: excess salt, wetness, percs slowly, flooding. | Severe: excess salt, wetness, flooding. | Severe: percs slowly, wetness, flooding. |
| Transquaking- | Severe: wetness, excess salt, flooding. | Severe: wetness, excess salt, flooding. | Severe: excess salt, wetness, flooding. | Severe: excess salt, wetness, flooding. | Severe: percs slowly, wetness, flooding. |
| 3---------- Chicone | Severe: ponding, flooding. | Severe: ponding, flooding. | Severe: ponding, flooding. | Severe: ponding, flooding. | Severe: percs slowly, ponding, flooding. |
| 4C---------- Downer | Moderate: slope. | Moderate: slope. | Moderate: slope. | Moderate: slope. | Severe: percs slowly. |
| 5A---------- Downer | Slight---------- | Slight---------- | Slight---------- | Slight---------- | Severe: percs slowly. |
| 5B---------- Downer | Slight---------- | Slight---------- | Slight---------- | Slight---------- | Moderate: percs slowly. |
| 6---------- Elkton | Severe: percs slowly, wetness. | Severe: percs slowly, wetness. | Severe: wetness, percs slowly. | Severe: wetness, percs slowly. | Severe: percs slowly, wetness. |
| 7---------- Elkton | Severe: percs slowly, wetness. | Severe: percs slowly, wetness. | Severe: wetness, percs slowly. | Severe: wetness, percs slowly. | Severe: percs slowly, wetness. |
| 8---------- Elkton | Severe: percs slowly, ponding. | Severe: percs slowly, ponding. | Severe: ponding, percs slowly. | Severe: ponding. | Severe: percs slowly, ponding. |
| 9C---------- Evesboro | Moderate: poor filter, slope, droughty. | Moderate: poor filter, slope, droughty. | Moderate: poor filter, slope, droughty. | Moderate: slope, poor filter. | Moderate: slope, percs slowly. |
| 9E---------- Evesboro | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 10---------- Fallsington | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: percs slowly, wetness. |
| 11---------- Fluvaquents | Severe: wetness, flooding. | Severe: wetness, flooding. | Severe: wetness, flooding. | Severe: wetness, flooding. | Severe: percs slowly, wetness, flooding. |

TABLE 18.--WASTE MANAGEMENT INTERPRETATIONS--Continued

| Soil name and map symbol | Land application of manure and food processing waste | Land application of municipal sewage sludge | Disposal of wastewater by irrigation | Treatment of wastewater by slow rate | Treatment of wastewater by rapid infiltration |
|---|---|---|---|---|---|
| 12A---------- Fort Mott | Slight---------- | Slight---------- | Slight---------- | Slight---------- | Severe: percs slowly. |
| 12B---------- Fort Mott | Slight---------- | Slight---------- | Slight---------- | Slight---------- | Severe: percs slowly. |
| 13E: | | | | | |
| Fort Mott---- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope, percs slowly. |
| Evesboro----- | Severe: poor filter, slope. | Severe: poor filter, slope. | Severe: slope, poor filter. | Severe: slope, poor filter. | Severe: slope. |
| Downer------- | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope, percs slowly. |
| 14A---------- Galestown | Severe: poor filter. | Severe: poor filter. | Severe: poor filter. | Severe: poor filter. | Slight. |
| 14B---------- Galestown | Severe: poor filter. | Severe: poor filter. | Severe: poor filter. | Severe: poor filter. | Slight. |
| 15A---------- Hambrook | Slight---------- | Slight---------- | Slight---------- | Slight---------- | Severe: percs slowly, wetness. |
| 15B---------- Hambrook | Slight---------- | Slight---------- | Slight---------- | Slight---------- | Severe: percs slowly, wetness. |
| 16---------- Hammonton | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: percs slowly, wetness. |
| 17---------- Honga | Severe: percs slowly, wetness, excess salt, flooding. | Severe: percs slowly, wetness, excess salt, flooding. | Severe: excess salt, wetness, percs slowly, flooding. | Severe: excess salt, wetness, flooding. | Severe: percs slowly, wetness, flooding. |
| 18---------- Hurlock | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: percs slowly, wetness. |
| 19A---------- Ingleside | Slight---------- | Slight---------- | Slight---------- | Slight---------- | Severe: percs slowly, wetness. |
| 19B---------- Ingleside | Slight---------- | Slight---------- | Slight---------- | Slight---------- | Severe: percs slowly, wetness. |
| 20---------- Keyport | Severe: percs slowly, wetness. | Severe: percs slowly, wetness. | Severe: wetness, percs slowly. | Severe: wetness, percs slowly. | Severe: percs slowly, wetness. |

TABLE 18.--WASTE MANAGEMENT INTERPRETATIONS--Continued

| Soil name and map symbol | Land application of manure and food processing waste | Land application of municipal sewage sludge | Disposal of wastewater by irrigation | Treatment of wastewater by slow rate | Treatment of wastewater by rapid infiltration |
|---|---|---|---|---|---|
| 21: | | | | | |
| Klej | Severe: poor filter, wetness. | Severe: poor filter, wetness. | Severe: wetness, poor filter. | Severe: wetness, poor filter. | Severe: wetness. |
| Hammonton | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: percs slowly, wetness. |
| 22A Matapeake | Slight | Slight | Slight | Slight | Severe: percs slowly, wetness. |
| 22B Matapeake | Slight | Slight | Slight | Slight | Severe: percs slowly, wetness. |
| 23 Mattapex | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: percs slowly, wetness. |
| 24A Mattapex | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: percs slowly, wetness. |
| 24B Mattapex | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: percs slowly, wetness. |
| 25 Nanticoke | Severe: wetness, flooding. | Severe: wetness, flooding. | Severe: wetness, flooding. | Severe: wetness, flooding. | Severe: percs slowly, wetness, flooding. |
| 26 Othello | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: percs slowly, wetness. |
| 27: | | | | | |
| Othello | Severe: ponding. | Severe: ponding. | Severe: ponding. | Severe: ponding. | Severe: percs slowly, ponding. |
| Kentuck | Severe: percs slowly, ponding. | Severe: percs slowly, ponding. | Severe: ponding, percs slowly. | Severe: ponding. | Severe: percs slowly, ponding. |
| 28 Pone | Severe: ponding. | Severe: ponding. | Severe: ponding. | Severe: ponding. | Severe: ponding. |
| 29 Pone | Severe: percs slowly, ponding. | Severe: percs slowly, ponding. | Severe: ponding, percs slowly. | Severe: ponding. | Severe: percs slowly, ponding. |
| 30 Puckum | Severe: ponding, flooding. | Severe: ponding, flooding. | Severe: ponding, flooding. | Severe: ponding, flooding. | Severe: ponding, flooding. |
| 31A Runclint | Moderate: poor filter, droughty. | Moderate: poor filter, droughty. | Moderate: poor filter, droughty. | Moderate: poor filter. | Severe: percs slowly, wetness. |

TABLE 18.--WASTE MANAGEMENT INTERPRETATIONS--Continued

| Soil name and map symbol | Land application of manure and food processing waste | Land application of municipal sewage sludge | Disposal of wastewater by irrigation | Treatment of wastewater by slow rate | Treatment of wastewater by rapid infiltration |
|---|---|---|---|---|---|
| 31B---------- Runclint | Moderate: poor filter, droughty. | Moderate: poor filter, droughty. | Moderate: poor filter, droughty. | Moderate: poor filter. | Severe: percs slowly, wetness. |
| 32---------- Sassafras | Slight---------- | Slight---------- | Slight---------- | Slight---------- | Severe: percs slowly. |
| 33---------- Sunken | Severe: percs slowly, wetness, excess salt, flooding. | Severe: percs slowly, wetness, excess salt, flooding. | Severe: excess salt, wetness, percs slowly. | Severe: excess salt, wetness. | Severe: percs slowly, wetness. |
| 34---------- Udorthents | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. |
| 35---------- Woodstown | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: percs slowly, wetness. |
| 36A---------- Woodstown | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: percs slowly, wetness. |
| 36B---------- Woodstown | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: percs slowly, wetness. |

TABLE 19.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

| Soil name and map symbol | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 1*<br>Beaches | Poor:<br>wetness. | Probable | Improbable:<br>too sandy. | Poor:<br>area reclaim,<br>too sandy,<br>excess salt. |
| 2*:<br>Bestpitch | Poor:<br>wetness. | Improbable:<br>excess humus. | Improbable:<br>excess humus. | Poor:<br>excess humus,<br>excess salt,<br>wetness. |
| Transquaking | Poor:<br>wetness. | Improbable:<br>excess humus. | Improbable:<br>excess humus. | Poor:<br>excess humus,<br>excess salt,<br>wetness. |
| 3<br>Chicone | Poor:<br>wetness. | Probable | Improbable:<br>too sandy. | Poor:<br>excess humus,<br>wetness. |
| 4C, 5A, 5B<br>Downer | Good | Probable | Improbable:<br>too sandy. | Fair:<br>small stones. |
| 6, 7, 8<br>Elkton | Poor:<br>wetness. | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>too clayey,<br>wetness. |
| 9C<br>Evesboro | Good | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>too sandy. |
| 9E<br>Evesboro | Fair:<br>slope. | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>too sandy,<br>slope. |
| 10<br>Fallsington | Poor:<br>wetness. | Probable | Improbable:<br>too sandy. | Poor:<br>wetness. |
| 11<br>Fluvaquents | Poor:<br>wetness. | Probable | Improbable:<br>too sandy. | Poor:<br>too sandy,<br>wetness. |
| 12A, 12B<br>Fort Mott | Good | Probable | Improbable:<br>too sandy. | Fair:<br>too sandy,<br>small stones. |
| 13E*:<br>Fort Mott | Fair:<br>slope. | Probable | Improbable:<br>too sandy. | Poor:<br>slope. |
| Evesboro | Fair:<br>slope. | Improbable:<br>excess fines. | Improbable:<br>excess fines. | Poor:<br>too sandy,<br>slope. |

See footnote at end of table.

TABLE 19.--CONSTRUCTION MATERIALS--Continued

| Soil name and map symbol | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 13E*: | | | | |
| Downer | Fair: slope. | Probable | Improbable: too sandy. | Poor: slope. |
| 14A, 14B | Good | Probable | Improbable: too sandy. | Poor: too sandy. |
| Galestown | | | | |
| 15A, 15B | Good | Probable | Improbable: too sandy. | Fair: area reclaim. |
| Hambrook | | | | |
| 16 | Fair: wetness. | Probable | Probable | Poor: area reclaim. |
| Hammonton | | | | |
| 17 | Poor: low strength, wetness. | Improbable: excess fines. | Improbable: excess fines. | Poor: excess salt, wetness. |
| Honga | | | | |
| 18 | Poor: wetness. | Probable | Improbable: too sandy. | Poor: wetness. |
| Hurlock | | | | |
| 19A, 19B | Good | Improbable: excess fines. | Improbable: excess fines. | Fair: area reclaim. |
| Ingleside | | | | |
| 20 | Fair: low strength, wetness. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey. |
| Keyport | | | | |
| 21*: | | | | |
| Klej | Fair: wetness. | Improbable: thin layer. | Improbable: too sandy. | Fair: too sandy, thin layer. |
| Hammonton | Fair: wetness. | Probable | Probable | Poor: area reclaim. |
| 22A, 22B | Good | Probable | Improbable: too sandy. | Fair: too clayey. |
| Matapeake | | | | |
| 23, 24A, 24B | Fair: wetness. | Probable | Improbable: too sandy. | Fair: too clayey. |
| Mattapex | | | | |
| 25 | Poor: wetness. | Improbable: excess fines. | Improbable: excess fines. | Poor: wetness. |
| Nanticoke | | | | |
| 26 | Poor: wetness. | Probable | Improbable: too sandy. | Poor: wetness. |
| Othello | | | | |
| 27*: | | | | |
| Othello | Poor: wetness. | Probable | Improbable: too sandy. | Poor: wetness. |
| Kentuck | Poor: wetness. | Probable | Improbable: too sandy. | Poor: wetness. |
| 28, 29 | Poor: wetness. | Improbable: excess fines. | Improbable: excess fines. | Poor: wetness. |
| Pone | | | | |
| 30 | Poor: wetness. | Improbable: excess humus. | Improbable: excess humus. | Poor: excess humus, wetness. |
| Puckum | | | | |

See footnote at end of table.

TABLE 19.--CONSTRUCTION MATERIALS--Continued

| Soil name and map symbol | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| 31A, 31B---------- Runclint | Good---------- | Probable---------- | Improbable: thin layer. | Poor: too sandy. |
| 32---------- Sassafras | Good---------- | Probable---------- | Probable---------- | Good. |
| 33---------- Sunken | Poor: wetness. | Probable---------- | Improbable: too sandy. | Poor: wetness. |
| 34---------- Udorthents | Poor: wetness. | Probable---------- | Improbable: too sandy. | Poor: too sandy, wetness. |
| 35, 36A, 36B---------- Woodstown | Fair: wetness. | Probable---------- | Improbable: too sandy. | Good. |

* See description of the map unit for composition and behavior characteristics of the map unit.

## TABLE 20.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

| Soil name and map symbol | Limitations for-- | | | Features affecting-- | | | |
|---|---|---|---|---|---|---|---|
| | Pond reservoir areas | Embankments, dikes, and levees | Aquifer-fed excavated ponds | Drainage | Irrigation | Terraces and diversions | Grassed waterways |
| 1*<br>Beaches | Severe: seepage. | Severe: seepage, piping, wetness. | Severe: salty water, cutbanks cave. | Flooding, slope, cutbanks cave. | Slope, wetness, droughty. | Wetness, too sandy. | Wetness, excess salt. |
| 2*: | | | | | | | |
| Bestpitch | Slight | Severe: excess humus, ponding, excess salt. | Severe: salty water. | Ponding, flooding, subsides. | Ponding, percs slowly, flooding. | Ponding | Wetness, excess salt. |
| Transquaking | Slight | Severe: excess humus, ponding, excess salt. | Severe: salty water. | Ponding, flooding, subsides. | Ponding, flooding, excess salt. | Ponding | Wetness, excess salt. |
| 3<br>Chicone | Severe: seepage. | Severe: excess humus, ponding. | Severe: cutbanks cave. | Ponding, flooding. | Ponding, flooding. | Erodes easily, ponding. | Wetness, erodes easily. |
| 4C<br>Downer | Severe: seepage. | Severe: seepage, piping. | Deep to water, slope. | Deep to water | Slope, droughty, soil blowing. | Too sandy, soil blowing. | Droughty, rooting depth. |
| 5A<br>Downer | Severe: seepage. | Severe: seepage, piping. | Deep to water | Deep to water | Droughty, soil blowing. | Too sandy, soil blowing. | Droughty, rooting depth. |
| 5B<br>Downer | Severe: seepage. | Severe: seepage, piping. | Deep to water, slope. | Deep to water | Slope, droughty, soil blowing. | Too sandy, soil blowing. | Droughty, rooting depth. |
| 6, 7<br>Elkton | Moderate: seepage. | Severe: piping, wetness. | Moderate: slow refill. | Percs slowly | Wetness | Erodes easily, wetness. | Wetness, erodes easily, percs slowly. |
| 8<br>Elkton | Slight | Severe: thin layer, ponding. | Moderate: slow refill, cutbanks cave. | Ponding, percs slowly. | Ponding, percs slowly. | Erodes easily, ponding, percs slowly. | Wetness, erodes easily, percs slowly. |

See footnote at end of table.

TABLE 20.--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 | Terraces and diversions | Grassed waterways |
| 9C---------- Evesboro | Severe: seepage. | Severe: seepage, piping. | Severe: no water. | Deep to water | Droughty, fast intake, soil blowing. | Too sandy, soil blowing. | Droughty. |
| 9E---------- Evesboro | Severe: seepage, slope. | Severe: seepage, piping. | Severe: no water. | Deep to water | Droughty, fast intake, soil blowing. | Slope, too sandy, soil blowing. | Slope, droughty. |
| 10---------- Fallsington | Severe: seepage. | Severe: seepage, piping, wetness. | Severe: slow refill, cutbanks cave. | Cutbanks cave | Wetness, soil blowing. | Wetness, too sandy. | Wetness, rooting depth. |
| 11---------- Fluvaquents | Severe: seepage. | Severe: seepage, piping, wetness. | Severe: cutbanks cave. | Flooding, cutbanks cave. | Wetness, droughty, flooding. | Wetness, too sandy. | Wetness, droughty. |
| 12A, 12B---------- Fort Mott | Severe: seepage. | Severe: seepage, piping. | Severe: no water. | Deep to water | Droughty, fast intake, soil blowing. | Too sandy, soil blowing. | Droughty. |
| 13E*: | | | | | | | |
| Fort Mott-------- | Severe: seepage, slope. | Severe: seepage, piping. | Severe: no water. | Deep to water | Droughty, fast intake, soil blowing. | Slope, too sandy, soil blowing. | Slope, droughty. |
| Evesboro--------- | Severe: seepage, slope. | Severe: seepage, piping. | Severe: no water. | Deep to water | Droughty, fast intake, soil blowing. | Slope, too sandy, soil blowing. | Slope, droughty. |
| Downer---------- | Severe: seepage, slope. | Severe: seepage, piping. | Deep to water, slope. | Deep to water | Slope, droughty, soil blowing. | Slope, too sandy, soil blowing. | Slope, droughty, rooting depth. |
| 14A---------- Galestown | Severe: seepage. | Severe: seepage, piping. | Severe: no water. | Deep to water | Droughty, fast intake. | Too sandy, soil blowing. | Droughty. |
| 14B---------- Galestown | Severe: seepage. | Severe: seepage, piping. | Severe: no water. | Deep to water | Slope, droughty, fast intake. | Too sandy, soil blowing. | Droughty. |
| 15A---------- Hambrook | Severe: seepage. | Severe: seepage, piping. | Severe: slow refill, cutbanks cave. | Deep to water | Favorable------ | Erodes easily, too sandy. | Erodes easily. |

See footnote at end of table.

TABLE 20.--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 | Terraces and diversions | Grassed waterways |
| 15B---------- Hambrook | Severe: seepage. | Severe: seepage, piping. | Severe: slow refill, cutbanks cave. | Deep to water | Slope---------- | Erodes easily, too sandy. | Erodes easily. |
| 16---------- Hammonton | Severe: seepage. | Severe: seepage, piping, wetness. | Severe: cutbanks cave. | Frost action, cutbanks cave. | Wetness, droughty. | Wetness, too sandy, soil blowing. | Droughty, rooting depth. |
| 17---------- Honga | Slight--------- | Severe: ponding, excess salt. | Severe: salty water. | Ponding, percs slowly, flooding. | Ponding, percs slowly, flooding. | Ponding, percs slowly. | Wetness, excess salt, percs slowly. |
| 18---------- Hurlock | Severe: seepage. | Severe: seepage, piping, wetness. | Severe: slow refill, cutbanks cave. | Cutbanks cave | Wetness, droughty. | Wetness, too sandy, soil blowing. | Wetness, droughty, rooting depth. |
| 19A---------- Ingleside | Severe: seepage. | Severe: piping. | Severe: slow refill, cutbanks cave. | Deep to water | Soil blowing--- | Soil blowing--- | Favorable. |
| 19B---------- Ingleside | Severe: seepage. | Severe: piping. | Severe: slow refill, cutbanks cave. | Deep to water | Slope, soil blowing. | Soil blowing--- | Favorable. |
| 20---------- Keyport | Slight--------- | Severe: hard to pack. | Moderate: deep to water. | Percs slowly, frost action. | Wetness-------- | Erodes easily, wetness. | Erodes easily, percs slowly. |
| 21*: | | | | | | | |
| Klej---------- | Severe: seepage. | Severe: seepage, piping, wetness. | Severe: slow refill, cutbanks cave. | Cutbanks cave | Wetness, droughty. | Wetness, too sandy, soil blowing. | Wetness, droughty, rooting depth. |
| Hammonton-------- | Severe: seepage. | Severe: seepage, piping, wetness. | Severe: cutbanks cave. | Frost action, cutbanks cave. | Wetness, droughty. | Wetness, too sandy, soil blowing. | Droughty, rooting depth. |
| 22A---------- Matapeake | Severe: seepage. | Severe: piping. | Severe: slow refill, cutbanks cave. | Deep to water | Rooting depth, erodes easily. | Erodes easily | Erodes easily, rooting depth. |

See footnote at end of table.

TABLE 20.--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 | Terraces and diversions | Grassed waterways |
| 22B---------- Matapeake | Severe: seepage. | Severe: piping. | Severe: slow refill, cutbanks cave. | Deep to water | Slope, rooting depth, erodes easily. | Erodes easily | Erodes easily, rooting depth. |
| 23---------- Mattapex | Severe: seepage. | Severe: seepage, piping, wetness. | Severe: slow refill, cutbanks cave. | Cutbanks cave | Wetness, soil blowing. | Erodes easily, wetness. | Erodes easily. |
| 24A---------- Mattapex | Severe: seepage. | Severe: seepage, piping, wetness. | Severe: slow refill, cutbanks cave. | Cutbanks cave | Wetness-------- | Erodes easily, wetness. | Erodes easily. |
| 24B---------- Mattapex | Severe: seepage. | Severe: seepage, piping, wetness. | Severe: slow refill, cutbanks cave. | Slope, cutbanks cave. | Slope, wetness. | Erodes easily, wetness. | Erodes easily. |
| 25---------- Nanticoke | Slight--------- | Severe: piping, ponding. | Slight--------- | Ponding, flooding. | Ponding, flooding. | Erodes easily, ponding. | Wetness, erodes easily. |
| 26---------- Othello | Moderate: seepage. | Severe: piping, wetness. | Severe: cutbanks cave. | Favorable------ | Wetness, rooting depth. | Erodes easily, wetness. | Wetness, erodes easily, rooting depth. |
| 27*: | | | | | | | |
| Othello---------- | Moderate: seepage. | Severe: thin layer, ponding. | Severe: cutbanks cave. | Ponding-------- | Ponding-------- | Erodes easily, ponding. | Wetness, erodes easily. |
| Kentuck---------- | Moderate: seepage. | Severe: ponding. | Severe: cutbanks cave. | Ponding, percs slowly. | Ponding, percs slowly. | Erodes easily, ponding, percs slowly. | Wetness, erodes easily, percs slowly. |
| 28---------- Pone | Severe: seepage. | Severe: piping, ponding. | Severe: slow refill, cutbanks cave. | Ponding-------- | Ponding, soil blowing, percs slowly. | Ponding, soil blowing, percs slowly. | Wetness, rooting depth. |
| 29---------- Pone | Severe: seepage. | Severe: piping, ponding. | Severe: slow refill, cutbanks cave. | Ponding-------- | Ponding, percs slowly. | Ponding, percs slowly. | Wetness, rooting depth. |

See footnote at end of table.

TABLE 20.--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 | Terraces and diversions | Grassed waterways |
| 30---------- Puckum | Severe: seepage. | Severe: excess humus, ponding. | Slight--------- | Ponding, flooding, subsides. | Ponding, flooding. | Ponding-------- | Wetness. |
| 31A, 31B---------- Runclint | Severe: seepage. | Severe: seepage, piping. | Severe: cutbanks cave. | Deep to water | Droughty, fast intake, soil blowing. | Too sandy, soil blowing. | Droughty, rooting depth. |
| 32---------- Sassafras | Severe: seepage. | Severe: piping. | Severe: no water. | Deep to water | Favorable------ | Erodes easily | Erodes easily. |
| 33---------- Sunken | Moderate: seepage. | Severe: piping, ponding, excess salt. | Severe: cutbanks cave. | Ponding, percs slowly, flooding. | Ponding, percs slowly, rooting depth. | Erodes easily, ponding. | Wetness, excess salt, erodes easily. |
| 34---------- Udorthents | Severe: seepage. | Severe: seepage, piping, wetness. | Severe: cutbanks cave. | Slope, cutbanks cave. | Slope, wetness, droughty. | Wetness, too sandy. | Wetness, droughty. |
| 35, 36A---------- Woodstown | Severe: seepage. | Severe: seepage, piping, wetness. | Severe: slow refill, cutbanks cave. | Cutbanks cave | Wetness, droughty. | Wetness, too sandy. | Droughty. |
| 36B---------- Woodstown | Severe: seepage. | Severe: seepage, piping, wetness. | Severe: slow refill, cutbanks cave. | Slope, cutbanks cave. | Slope, wetness, droughty. | Wetness, too sandy. | Droughty. |

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 21.--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 | Percentage passing sieve number-- | | | | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 1*---------- | 0-8 | Sand---------- | SP | A-1, A-3 | 0 | 100 | 75-100 | 5-85 | 0-5 | 0-14 | NP |
| Beaches | 8-72 | Coarse sand, sand, fine sand. | SP | A-1, A-3 | 0 | 100 | 75-100 | 5-85 | 0-5 | 0-14 | NP |
| 2*: | | | | | | | | | | | |
| Bestpitch------- | 0-9 | Peat---------- | PT | A-8 | 0 | --- | --- | --- | --- | --- | NP |
| | 9-33 | Mucky peat, muck | PT | A-8 | 0 | --- | --- | --- | --- | --- | NP |
| | 33-42 | Muck, mucky peat | PT | A-8 | 0 | --- | --- | --- | --- | --- | NP |
| | 42-72 | Silty clay, silty clay loam. | CL, CH | A-6, A-7 | 0 | 100 | 100 | 100 | 70-95 | 35-60 | 20-35 |
| Transquaking---- | 0-9 | Peat---------- | PT | A-8 | 0 | --- | --- | --- | --- | --- | NP |
| | 9-46 | Mucky peat, muck | PT | A-8 | 0 | --- | --- | --- | --- | --- | NP |
| | 46-65 | Muck, mucky peat | PT | A-8 | 0 | --- | --- | --- | --- | --- | NP |
| | 65-80 | Silty clay, silty clay loam. | CL, CH | A-6, A-7 | 0 | 100 | 100 | 80-100 | 70-95 | 35-60 | 20-35 |
| 3---------- | 0-3 | Mucky silt loam | OL, ML, CL-ML | A-4, A-8 | 0 | 100 | 100 | 80-95 | 70-90 | 15-25 | NP-10 |
| Chicone | 3-15 | Silt loam-------- | ML, CL-ML, CL | A-4 | 0 | 100 | 100 | 80-95 | 70-90 | 15-25 | NP-10 |
| | 15-24 | Silt loam-------- | ML, CL-ML, CL | A-4 | 0 | 100 | 100 | 80-95 | 70-85 | 18-30 | NP-10 |
| | 24-65 | Muck, mucky peat | PT | A-8 | 0 | --- | --- | --- | --- | --- | NP |
| | 65-72 | Sand, loamy sand | SM, SP-SM | A-2, A-1 | 0 | 80-100 | 70-100 | 20-70 | 5-30 | 0-20 | NP-5 |
| 4C---------- | 0-9 | Loamy sand------- | SM, SP-SM | A-2, A-1 | 0 | 80-100 | 75-100 | 40-75 | 10-30 | 15-20 | NP-4 |
| Downer | 9-44 | Sandy loam------- | SM, SC, SC-SM | A-2, A-4 | 0 | 80-100 | 75-100 | 45-70 | 25-40 | 15-25 | NP-8 |
| | 44-50 | Stratified very gravelly loamy sand to sandy loam. | GM, SM, SP-SM, GP-GM | A-3, A-1, A-2 | 0 | 45-100 | 35-100 | 20-70 | 5-15 | 10-15 | NP-4 |
| | 50-72 | Stratified gravelly sand to sandy clay loam. | SC, SM, SP-SM, SC-SM | A-1, A-2, A-3, A-4 | 0 | 75-100 | 70-100 | 35-90 | 5-55 | 10-30 | NP-10 |
| 5A---------- | 0-11 | Sandy loam------- | SM, SC-SM | A-2, A-4 | 0 | 80-100 | 75-100 | 50-70 | 25-45 | 15-20 | NP-4 |
| Downer | 11-35 | Sandy loam------- | SM, SC, SC-SM | A-2, A-4 | 0 | 80-100 | 75-100 | 45-70 | 25-40 | 15-25 | NP-8 |
| | 35-48 | Stratified very gravelly loamy sand to sandy loam. | GM, SM, SP-SM, GP-GM | A-3, A-1, A-2 | 0 | 45-100 | 35-100 | 20-70 | 5-15 | 10-15 | NP-4 |
| | 48-70 | Stratified gravelly sand to sandy clay loam. | SC, SM, SP-SM, SC-SM | A-1, A-2, A-3, A-4 | 0 | 75-100 | 70-100 | 35-90 | 5-55 | 10-30 | NP-10 |
| 5B---------- | 0-10 | Sandy loam------- | SM, SC-SM | A-2, A-4 | 0 | 80-100 | 75-100 | 50-70 | 25-45 | 15-20 | NP-4 |
| Downer | 10-40 | Sandy loam------- | SM, SC, SC-SM | A-2, A-4 | 0 | 80-100 | 75-100 | 45-70 | 25-40 | 15-25 | NP-8 |
| | 40-65 | Stratified very gravelly loamy sand to sandy loam. | GM, SM, SP-SM, GP-GM | A-3, A-1, A-2 | 0 | 45-100 | 35-100 | 20-70 | 5-15 | 10-15 | NP-4 |

See footnote at end of table.

TABLE 21.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Fragments | Percentage passing sieve number-- | | | | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 6---------- Elkton | 0-15 | Loam---------- | CL-ML | A-4, A-6 | 0 | 100 | 100 | 90-100 | 50-95 | 20-45 | 5-20 |
| | 15-36 | Silty clay loam, silty clay. | CL, CH | A-6, A-7 | 0 | 100 | 100 | 95-100 | 85-95 | 30-55 | 10-35 |
| | 36-65 | Very fine sandy loam, fine sandy loam. | SC, ML, CL | A-4 | 0 | 100 | 95-100 | 85-95 | 45-75 | 20-30 | NP-10 |
| 7---------- Elkton | 0-10 | Silt loam-------- | CL-ML | A-4, A-6 | 0 | 100 | 100 | 90-100 | 50-95 | 20-45 | 5-20 |
| | 10-40 | Silty clay loam, silty clay. | CL, CH | A-6, A-7 | 0 | 100 | 100 | 95-100 | 85-95 | 30-55 | 10-35 |
| | 40-65 | Very fine sandy loam, fine sandy loam. | SC, ML, CL | A-4 | 0 | 100 | 95-100 | 85-95 | 45-75 | 20-30 | NP-10 |
| 8---------- Elkton | 0-6 | Mucky silt loam | CL, CL-ML | A-4, A-6 | 0 | 100 | 100 | 90-100 | 75-95 | 15-45 | 5-20 |
| | 6-15 | Silt loam-------- | CL, CL-ML | A-4, A-6 | 0 | 100 | 100 | 90-100 | 80-95 | 20-35 | 5-15 |
| | 15-40 | Silty clay loam, silty clay. | CL, CH | A-6, A-7 | 0 | 100 | 100 | 95-100 | 80-95 | 30-55 | 10-30 |
| | 40-65 | Clay loam, very fine sandy loam, loam. | CL, CL-ML, SC-SM | A-4, A-6 | 0 | 100 | 100 | 70-95 | 45-85 | 15-40 | 5-20 |
| | 65-72 | Fine sand, loamy fine sand. | SM, SC-SM | A-2, A-3 | 0 | 90-100 | 85-100 | 60-85 | 5-40 | 0-20 | NP-10 |
| 9C---------- Evesboro | 0-4 | Sand---------- | SM, SP-SM | A-1, A-3, A-2 | 0 | 90-100 | 85-100 | 40-70 | 5-15 | 10-15 | NP-3 |
| | 4-34 | Sand, loamy sand | SM, SP-SM | A-1, A-3, A-2 | 0 | 90-100 | 85-100 | 40-70 | 5-25 | 10-15 | NP-3 |
| | 34-72 | Stratified sand to sandy loam. | SM, SC-SM | A-2, A-3, A-1 | 0 | 75-100 | 65-100 | 35-90 | 5-35 | 10-15 | NP-5 |
| 9E---------- Evesboro | 0-14 | Sand---------- | SM, SP-SM | A-1, A-3, A-2 | 0 | 90-100 | 85-100 | 40-70 | 5-15 | 10-15 | NP-3 |
| | 14-36 | Sand, loamy sand | SM, SP-SM | A-1, A-3, A-2 | 0 | 90-100 | 85-100 | 40-70 | 5-25 | 10-15 | NP-3 |
| | 36-72 | Stratified sand to sandy loam. | SM, SC-SM | A-2, A-3, A-1 | 0 | 75-100 | 65-100 | 35-90 | 5-35 | 10-15 | NP-5 |
| 10---------- Fallsington | 0-7 | Sandy loam------- | SM, CL-ML, ML, SC-SM | A-2, A-4 | 0 | 95-100 | 90-100 | 65-90 | 30-60 | <19 | NP-5 |
| | 7-30 | Sandy loam, loam, sandy clay loam. | SM, SC, CL, ML | A-2, A-4, A-6 | 0 | 95-100 | 90-100 | 65-85 | 30-55 | <30 | NP-15 |
| | 30-72 | Stratified sand to sandy clay loam. | SM, SP-SM, CL, CL-ML | A-2, A-3, A-4 | 0 | 95-100 | 90-100 | 50-85 | 5-55 | <30 | NP-15 |
| 11---------- Fluvaquents | 0-12 | Loam---------- | CL-ML, SC-SM, CL | A-4, A-2 | 0 | 90-100 | 90-100 | 60-95 | 30-75 | 15-25 | 5-15 |
| | 12-20 | Sandy loam------- | SM, SC-SM, SC | A-2, A-4 | 0 | 90-100 | 90-100 | 60-90 | 30-40 | 10-25 | NP-10 |
| | 20-48 | Sand, loamy sand | SM, SP-SM, SP | A-2, A-1 | 0 | 90-100 | 85-100 | 40-90 | 0-25 | --- | NP-5 |
| | 48-72 | Gravelly sand, sand, loamy sand. | SP, SM, SP-SM | A-2, A-1 | 0 | 75-100 | 70-100 | 40-90 | 0-20 | --- | NP |
| 12A---------- Fort Mott | 0-30 | Loamy sand------- | SM, SP-SM | A-2 | 0 | 90-100 | 85-100 | 50-90 | 10-25 | 15-20 | NP-3 |
| | 30-72 | Sandy loam, sandy clay loam, coarse sandy loam. | SM, SC, SC-SM | A-2, A-4, A-6 | 0 | 90-100 | 80-100 | 50-90 | 25-45 | 20-35 | 3-12 |

See footnote at end of table.

TABLE 21.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Fragments | Percentage passing sieve number-- | | | | Liquid limit | Plasticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 12B---------- | 0-24 | Loamy sand------- | SM, SP-SM | A-2 | 0 | 90-100 | 85-100 | 50-90 | 10-25 | 15-20 | NP-3 |
| Fort Mott | 24-36 | Sandy loam, sandy clay loam, coarse sandy loam. | SM, SC, SC-SM | A-2, A-4, A-6 | 0 | 90-100 | 80-100 | 50-90 | 25-45 | 20-35 | 3-12 |
| | 36-72 | Stratified gravelly sandy loam to sand. | SM, SC-SM, SP-SM | A-1, A-2, A-3 | 0 | 80-100 | 75-100 | 40-80 | 5-35 | 15-25 | NP-6 |
| 13E*: | | | | | | | | | | | |
| Fort Mott------- | 0-24 | Loamy sand------- | SM, SP-SM | A-2 | 0 | 90-100 | 85-100 | 50-90 | 10-25 | 15-20 | NP-3 |
| | 24-44 | Sandy loam, sandy clay loam, coarse sandy loam. | SM, SC, SC-SM | A-2, A-4, A-6 | 0 | 90-100 | 80-100 | 50-90 | 25-45 | 20-35 | 3-12 |
| | 44-66 | Stratified gravelly sandy loam to sand. | SM, SC-SM, SP-SM | A-1, A-2, A-3 | 0 | 80-100 | 75-100 | 40-80 | 5-35 | 15-25 | NP-6 |
| Evesboro-------- | 0-4 | Sand---------- | SM, SP-SM | A-1, A-3, A-2 | 0 | 90-100 | 85-100 | 40-70 | 5-15 | 10-15 | NP-3 |
| | 4-64 | Sand, loamy sand | SM, SP-SM | A-1, A-3, A-2 | 0 | 90-100 | 85-100 | 40-70 | 5-25 | 10-15 | NP-3 |
| | 64-72 | Stratified sand to sandy loam. | SM, SC-SM | A-2, A-3, A-1 | 0 | 75-100 | 65-100 | 35-90 | 5-35 | 10-15 | NP-5 |
| Downer---------- | 0-24 | Sandy loam------- | SM, SC-SM | A-2, A-4 | 0 | 80-100 | 75-100 | 50-70 | 25-45 | 15-20 | NP-4 |
| | 24-42 | Sandy loam------- | SM, SC, SC-SM | A-2, A-4 | 0 | 80-100 | 75-100 | 45-70 | 25-40 | 15-25 | NP-8 |
| | 42-72 | Stratified gravelly sand to sandy clay loam. | SC, SM, SP-SM, SC-SM | A-1, A-2, A-3, A-4 | 0 | 75-100 | 70-100 | 35-90 | 5-55 | 10-30 | NP-10 |
| 14A---------- | 0-11 | Loamy sand------- | SP-SM, SM | A-1, A-2, A-3 | 0 | 95-100 | 75-100 | 45-70 | 4-20 | --- | NP |
| Galestown | 11-40 | Loamy sand, sand, loamy fine sand. | SM, SP-SM | A-1, A-2, A-3 | 0 | 95-100 | 95-100 | 45-75 | 4-20 | --- | NP |
| | 40-65 | Sand, loamy sand, gravelly sand. | SP, SP-SM | A-1, A-3, A-2 | 0 | 75-100 | 55-100 | 30-75 | 4-10 | --- | NP |
| 14B---------- | 0-10 | Loamy sand------- | SP-SM, SM | A-1, A-2, A-3 | 0 | 95-100 | 75-100 | 45-70 | 4-20 | --- | NP |
| Galestown | 10-52 | Loamy sand, sand, loamy fine sand. | SM, SP-SM | A-1, A-2, A-3 | 0 | 95-100 | 95-100 | 45-75 | 4-20 | --- | NP |
| | 52-72 | Sand, loamy sand, gravelly sand. | SP, SP-SM | A-1, A-3, A-2 | 0 | 75-100 | 55-100 | 30-75 | 4-10 | --- | NP |
| 15A---------- | 0-10 | Loam---------- | SM, ML, CL-ML | A-2, A-4 | 0 | 90-100 | 85-100 | 50-95 | 25-60 | 15-35 | NP-10 |
| Hambrook | 10-14 | Loam, sandy loam | SM, ML, CL-ML | A-2, A-4 | 0 | 90-100 | 85-100 | 40-90 | 20-60 | 10-30 | NP-10 |
| | 14-28 | Sandy clay loam, sandy loam, loam. | SC-SM, CL, CL-ML | A-2, A-4, A-6 | 0 | 90-100 | 85-100 | 50-95 | 30-75 | 20-30 | 5-15 |
| | 28-65 | Loamy sand, sand | SM, SP-SM | A-1, A-2 | 0 | 80-100 | 70-100 | 20-70 | 5-30 | 5-10 | NP-5 |
| | 65-72 | Stratified fine sandy loam to silty clay loam. | SC-SM, CL, CL-ML | A-4, A-6 | 0 | 85-100 | 70-100 | 70-90 | 40-85 | 15-25 | 5-15 |

See footnote at end of table.

TABLE 21.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 15B---------- Hambrook | 0-9 | Loam---------- | SM, ML, CL-ML | A-2, A-4 | 0 | 90-100 | 85-100 | 50-95 | 25-60 | 15-35 | NP-10 |
| | 9-38 | Sandy clay loam, sandy loam, loam. | SC-SM, CL, CL-ML | A-2, A-4, A-6 | 0 | 90-100 | 85-100 | 50-95 | 30-75 | 20-30 | 5-15 |
| | 38-72 | Loamy sand, sand | SM, SP-SM | A-1, A-2 | 0 | 80-100 | 70-100 | 20-70 | 5-30 | 5-10 | NP-5 |
| 16---------- Hammonton | 0-11 | Sandy loam------- | SM, SC-SM | A-2, A-4 | 0 | 90-100 | 85-100 | 50-70 | 25-40 | 15-20 | NP-4 |
| | 11-30 | Sandy loam, gravelly sandy loam. | SC, SC-SM | A-2, A-1, A-4 | 0 | 80-100 | 70-100 | 40-90 | 20-40 | 20-25 | 4-8 |
| | 30-65 | Stratified very gravelly sand to sandy clay loam. | SM, SP-SM, SC-SM, GM | A-2, A-1, A-4, A-3 | 0 | 60-100 | 45-100 | 20-80 | 5-50 | 10-30 | NP-10 |
| 17---------- Honga | 0-7 | Peat---------- | PT | A-8 | 0 | --- | --- | --- | --- | --- | NP |
| | 7-13 | Mucky peat, muck | PT | A-8 | 0 | --- | --- | --- | --- | --- | NP |
| | 13-22 | Muck, mucky peat | PT | A-8 | 0 | --- | --- | --- | --- | --- | NP |
| | 22-36 | Silt loam, silty clay loam. | CL, CL-ML | A-4, A-6 | 0 | 100 | 100 | 90-100 | 80-95 | 20-40 | 5-20 |
| | 36-65 | Silty clay loam, clay loam. | CL | A-6, A-7 | 0 | 100 | 100 | 90-100 | 80-95 | 35-50 | 15-25 |
| 18---------- Hurlock | 0-3 | Sandy loam------- | SC-SM, SP-SM, SM | A-2, A-1 | 0 | 100 | 90-100 | 40-90 | 10-35 | <25 | NP-10 |
| | 3-22 | Sandy loam------- | SM, SC, SC-SM | A-2, A-4, A-1 | 0 | 90-100 | 90-95 | 40-90 | 20-50 | 10-25 | NP-10 |
| | 22-60 | Sand, loamy sand | SM, SP-SM | A-2, A-1 | 0 | 80-100 | 75-100 | 20-70 | 5-30 | <20 | NP-5 |
| | 60-72 | Stratified very fine sandy loam to silty clay loam. | SC, ML, CL, CL-ML | A-4, A-6 | 0 | 90-100 | 75-95 | 70-90 | 40-80 | 10-30 | NP-15 |
| 19A---------- Ingleside | 0-10 | Sandy loam------- | SM, SC, SP-SM | A-2, A-1 | 0 | 90-100 | 80-100 | 40-75 | 10-35 | 10-30 | NP-15 |
| | 10-43 | Sandy loam, sandy clay loam. | SM, SC, SC-SM | A-2, A-4 | 0 | 90-100 | 80-100 | 50-90 | 20-40 | 10-25 | NP-10 |
| | 43-56 | Loamy sand, sand, loamy fine sand. | SM, SP-SM | A-2, A-1 | 0 | 80-100 | 60-100 | 20-70 | 5-30 | 15-20 | NP-5 |
| | 56-72 | Stratified fine sandy loam to silty clay loam. | SC-SM, CL-ML, CL | A-4, A-6 | 0 | 95-100 | 90-100 | 70-90 | 40-85 | 10-30 | 5-15 |
| 19B---------- Ingleside | 0-10 | Sandy loam------- | SM, SC, SP-SM | A-2, A-1 | 0 | 90-100 | 80-100 | 40-75 | 10-35 | 10-30 | NP-15 |
| | 10-60 | Sandy loam, sandy clay loam. | SM, SC, SC-SM | A-2, A-4 | 0 | 90-100 | 80-100 | 50-90 | 20-40 | 10-25 | NP-10 |
| | 60-65 | Stratified fine sandy loam to silty clay loam. | SC-SM, CL-ML, CL | A-4, A-6 | 0 | 95-100 | 90-100 | 70-90 | 40-85 | 10-30 | 5-15 |
| 20---------- Keyport | 0-15 | Silt loam-------- | ML, CL, CL-ML | A-4 | 0 | 95-100 | 95-100 | 90-100 | 65-85 | 20-30 | 3-10 |
| | 15-48 | Silty clay loam, clay loam, clay. | ML, CL, CH, MH | A-6, A-7 | 0 | 95-100 | 95-100 | 85-100 | 70-95 | 35-55 | 10-30 |
| | 48-72 | Stratified clay to loamy sand. | SC-SM, SC, CL-ML, CL | A-6, A-4, A-2, A-7 | 0 | 95-100 | 95-100 | 60-95 | 25-85 | 15-55 | NP-30 |

See footnote at end of table.

TABLE 21.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 21*: | | | | | | | | | | | |
| Klej | 0-8 | Loamy sand | SM, SP-SM | A-2 | 0 | 100 | 95-100 | 50-95 | 10-25 | <20 | NP |
| | 8-50 | Loamy sand, loamy fine sand. | SM, SP-SM | A-2 | 0 | 100 | 95-100 | 50-95 | 10-25 | <20 | NP |
| | 50-72 | Sand, fine sand | SP-SM, SM | A-1, A-2, A-3 | 0 | 90-100 | 75-100 | 40-80 | 5-20 | <20 | NP |
| Hammonton | 0-7 | Loamy sand | SM, SP-SM | A-2, A-1 | 0 | 90-100 | 85-100 | 40-75 | 10-30 | 10-15 | NP-3 |
| | 7-24 | Sandy loam, gravelly sandy loam. | SC, SC-SM | A-2, A-1, A-4 | 0 | 80-100 | 70-100 | 40-90 | 20-40 | 20-25 | 4-8 |
| | 24-72 | Stratified very gravelly sand to sandy clay loam. | SM, SP-SM, SC-SM, GM | A-2, A-1, A-4, A-3 | 0 | 60-100 | 45-100 | 20-80 | 5-50 | 10-30 | NP-10 |
| 22A | 0-7 | Silt loam | CL-ML, CL | A-4 | 0 | 100 | 100 | 80-100 | 45-90 | 25-35 | 5-15 |
| Matapeake | 7-13 | Silt loam | CL-ML, CL | A-4 | 0 | 100 | 100 | 80-100 | 45-90 | 25-35 | 5-15 |
| | 13-38 | Silt loam, silty clay loam. | CL, CL-ML | A-4, A-6 | 0 | 100 | 100 | 80-100 | 60-90 | 25-40 | 5-15 |
| | 38-46 | Sandy loam, loam, fine sandy loam. | SM, CL-ML, SC-SM | A-2, A-4 | 0 | 90-100 | 75-100 | 50-95 | 25-60 | 15-35 | NP-10 |
| | 46-72 | Loamy sand, sand, loamy fine sand. | SM, SP-SM, SC-SM | A-1, A-2, A-3 | 0 | 90-100 | 75-100 | 20-70 | 5-30 | 0-20 | NP-5 |
| 22B | 0-8 | Silt loam | CL-ML, CL | A-4 | 0 | 100 | 100 | 80-100 | 45-90 | 25-35 | 5-15 |
| Matapeake | 8-18 | Silt loam | CL-ML, CL | A-4 | 0 | 100 | 100 | 80-100 | 45-90 | 25-35 | 5-15 |
| | 18-34 | Silt loam, silty clay loam. | CL, CL-ML | A-4, A-6 | 0 | 100 | 100 | 80-100 | 60-90 | 25-40 | 5-15 |
| | 34-48 | Sandy loam, loam, fine sandy loam. | SM, CL-ML, SC-SM | A-2, A-4 | 0 | 90-100 | 75-100 | 50-95 | 25-60 | 15-35 | NP-10 |
| | 48-72 | Loamy sand, sand, loamy fine sand. | SM, SP-SM, SC-SM | A-1, A-2, A-3 | 0 | 90-100 | 75-100 | 20-70 | 5-30 | 0-20 | NP-5 |
| 23 | 0-8 | Fine sandy loam | SM, SC-SM, ML | A-4, A-2 | 0 | 95-100 | 90-100 | 80-100 | 30-65 | 15-30 | NP-10 |
| Mattapex | 8-41 | Silty clay loam, silt loam. | CL, CL-ML | A-4, A-6, A-7 | 0 | 100 | 100 | 90-100 | 85-95 | 24-45 | 7-21 |
| | 41-54 | Fine sandy loam, loam, loamy sand. | SM, SC, CL, ML | A-2, A-4, A-6 | 0 | 95-100 | 90-100 | 45-95 | 15-75 | <40 | NP-18 |
| | 54-72 | Sand, loamy sand | SM, SP-SM | A-2 | 0 | 95-100 | 90-100 | 43-85 | 5-30 | <10 | NP |
| 24A | 0-12 | Silt loam | CL-ML, CL | A-4 | 0 | 95-100 | 90-100 | 80-100 | 80-100 | 15-30 | 5-15 |
| Mattapex | 12-38 | Silty clay loam, silt loam. | CL, CL-ML | A-4, A-6, A-7 | 0 | 100 | 100 | 90-100 | 85-95 | 24-45 | 7-21 |
| | 38-46 | Fine sandy loam, loam, loamy sand. | SM, SC, CL, ML | A-2, A-4, A-6 | 0 | 95-100 | 90-100 | 45-95 | 15-75 | <40 | NP-18 |
| | 46-65 | Sand, loamy sand | SM, SP-SM | A-2 | 0 | 95-100 | 90-100 | 43-85 | 5-30 | <10 | NP |
| 24B | 0-13 | Silt loam | CL-ML, CL | A-4 | 0 | 95-100 | 90-100 | 80-100 | 80-100 | 15-30 | 5-15 |
| Mattapex | 13-30 | Silty clay loam, silt loam. | CL, CL-ML | A-4, A-6, A-7 | 0 | 100 | 100 | 90-100 | 85-95 | 24-45 | 7-21 |
| | 30-64 | Fine sandy loam, loam, loamy sand. | SM, SC, CL, ML | A-2, A-4, A-6 | 0 | 95-100 | 90-100 | 45-95 | 15-75 | <40 | NP-18 |
| | 64-72 | Sand, loamy sand | SM, SP-SM | A-2 | 0 | 95-100 | 90-100 | 43-85 | 5-30 | <10 | NP |

See footnote at end of table.

TABLE 21.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 25---------- Nanticoke | 0-10 | Silt loam-------- | OL, ML, CL-ML | A-4 | 0 | 100 | 100 | 80-95 | 70-90 | 15-25 | NP-10 |
| | 10-24 | Silt loam-------- | ML, CL-ML, CL | A-4 | 0 | 100 | 100 | 80-95 | 70-90 | 15-25 | NP-10 |
| | 24-80 | Silty clay loam | CL, CL-ML | A-4, A-6 | 0 | 100 | 100 | 80-95 | 70-90 | 15-30 | 5-15 |
| 26---------- Othello | 0-11 | Silt loam-------- | ML, CL-ML, SM, CL | A-4, A-6 | 0 | 100 | 100 | 70-100 | 40-95 | 20-35 | NP-15 |
| | 11-28 | Silty clay loam, silt loam. | CL | A-6 | 0 | 100 | 100 | 90-100 | 70-95 | 29-40 | 10-19 |
| | 28-36 | Sandy loam, loam, sandy clay loam. | SM, CL, SC, CL-ML | A-4, A-6 | 0 | 90-100 | 85-100 | 50-90 | 25-65 | 15-35 | NP-17 |
| | 36-65 | Sand, loamy sand, loamy fine sand. | SM, SP-SM | A-1, A-2 | 0 | 90-100 | 85-100 | 20-50 | 5-35 | 0-10 | NP-5 |
| 27*: | | | | | | | | | | | |
| Othello--------- | 0-6 | Silt loam-------- | CL, OL | A-4, A-6 | 0 | 100 | 100 | 90-100 | 75-90 | 30-40 | 5-15 |
| | 6-12 | Silt loam-------- | CL, CL-ML, ML | A-4, A-6 | 0 | 100 | 100 | 80-100 | 50-90 | 15-35 | NP-15 |
| | 12-40 | Silt loam, silty clay loam. | CL | A-6 | 0 | 100 | 100 | 80-100 | 50-90 | 20-30 | 10-15 |
| | 40-48 | Sandy clay loam, sandy loam, fine sandy loam. | SC-SM, CL, ML, SM | A-2, A-4 | 0 | 90-100 | 85-100 | 50-95 | 25-60 | 15-25 | NP-10 |
| | 48-72 | Loamy sand, sand | SM, SP-SM | A-1, A-2, A-3 | 0 | 90-100 | 85-100 | 30-85 | 5-35 | <20 | NP-5 |
| Kentuck--------- | 0-13 | Mucky silt loam | OL, ML, CL-ML | A-4, A-8 | 0 | 100 | 100 | 90-100 | 75-90 | 25-35 | 5-10 |
| | 13-24 | Silt loam-------- | CL, CL-ML | A-4, A-6 | 0 | 100 | 100 | 90-100 | 75-90 | 25-40 | 5-15 |
| | 24-45 | Silt loam, silty clay loam. | CL | A-6, A-7 | 0 | 100 | 100 | 90-100 | 75-95 | 35-45 | 15-20 |
| | 45-56 | Sandy loam, fine sandy loam. | SC-SM, SC | A-4, A-2 | 0 | 100 | 100 | 60-85 | 30-50 | 15-25 | 5-10 |
| | 56-70 | Fine sand, loamy sand, sand. | SM, SP-SM | A-2, A-1, A-3 | 0 | 100 | 100 | 40-80 | 5-35 | 0-20 | NP-5 |
| 28---------- Pone | 0-10 | Mucky sandy loam | SM, SC-SM | A-1, A-2, A-8 | 0 | 100 | 90-100 | 40-90 | 10-35 | 10-20 | NP-10 |
| | 10-33 | Sandy loam, loam | SC-SM, CL-ML | A-2, A-4 | 0 | 90-100 | 85-95 | 40-90 | 20-60 | 10-25 | NP-10 |
| | 33-38 | Loamy sand, sandy loam. | SM, SC, SP-SM | A-1, A-2 | 0 | 90-100 | 85-95 | 30-70 | 10-40 | <20 | NP-10 |
| | 38-72 | Sand, loamy sand | SM, SP-SM | A-1, A-2 | 0 | 80-100 | 75-100 | 20-70 | 5-30 | <20 | NP-5 |
| 29---------- Pone | 0-6 | Mucky loam------- | SC, OL, CL-ML | A-2, A-4, A-8 | 0 | 100 | 90-100 | 40-90 | 15-55 | 20-30 | NP-10 |
| | 6-26 | Sandy loam, loam | SC-SM, CL-ML | A-2, A-4 | 0 | 90-100 | 85-95 | 40-90 | 20-60 | 10-25 | NP-10 |
| | 26-37 | Loamy sand, sandy loam. | SM, SC, SP-SM | A-1, A-2 | 0 | 90-100 | 85-95 | 30-70 | 10-40 | <20 | NP-10 |
| | 37-47 | Sand, loamy sand | SM, SP-SM | A-1, A-2 | 0 | 80-100 | 75-100 | 20-70 | 5-30 | <20 | NP-5 |
| | 47-69 | Very fine sandy loam, silt loam, silty clay loam. | CL-ML, CL | A-4, A-6 | 0 | 90-100 | 85-95 | 70-90 | 60-90 | 10-30 | 5-15 |
| 30---------- Puckum | 0-4 | Muck------------- | PT | A-8 | 0 | --- | --- | --- | --- | --- | --- |
| | 4-80 | Muck, mucky peat | PT | A-8 | 0 | --- | --- | --- | --- | --- | --- |

See footnote at end of table.

TABLE 21.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 31A---------- Runclint | 0-22 | Sand---------- | SP, SP-SM | A-2, A-3 | 0 | 90-100 | 70-100 | 50-90 | 0-15 | --- | NP |
| | 22-40 | Sand, loamy sand | SP-SM, SM | A-2, A-3 | 0 | 90-100 | 70-100 | 50-90 | 5-15 | --- | NP |
| | 40-59 | Sand, loamy sand, gravelly sand. | SP-SM, SP | A-1, A-2, A-3 | 0 | 55-100 | 50-100 | 20-80 | 0-15 | --- | NP |
| | 59-72 | Stratified sand to sandy clay loam. | SP-SM, SC-SM, CL-ML | A-2, A-3, A-4 | 0 | 80-100 | 50-100 | 50-90 | 5-55 | <30 | NP-10 |
| 31B---------- Runclint | 0-8 | Sand---------- | SP, SP-SM | A-2, A-3 | 0 | 90-100 | 70-100 | 50-90 | 0-15 | --- | NP |
| | 8-48 | Sand, loamy sand | SP-SM, SM | A-2, A-3 | 0 | 90-100 | 70-100 | 50-90 | 5-15 | --- | NP |
| | 48-54 | Sand, loamy sand, gravelly sand. | SP-SM, SP | A-1, A-2, A-3 | 0 | 55-100 | 50-100 | 20-80 | 0-15 | --- | NP |
| | 54-72 | Stratified sand to sandy clay loam. | SP-SM, SC-SM, CL-ML | A-2, A-3, A-4 | 0 | 80-100 | 50-100 | 50-90 | 5-55 | <30 | NP-10 |
| 32---------- Sassafras | 0-7 | Loam---------- | ML, CL, CL-ML | A-4 | 0 | 85-100 | 80-100 | 70-95 | 50-75 | 12-32 | NP-10 |
| | 7-36 | Loam, sandy clay loam, sandy loam. | SC-SM, CL, SC, CL-ML | A-2, A-4, A-6 | 0 | 85-100 | 80-100 | 50-95 | 25-75 | 20-33 | 5-15 |
| | 36-72 | Stratified sand to gravelly sandy loam. | SP-SM, SC, SM, SC-SM | A-1, A-2, A-4, A-3 | 0 | 70-100 | 50-100 | 30-90 | 5-55 | <26 | NP-8 |
| 33---------- Sunken | 0-6 | Mucky silt loam | OL, ML | A-8, A-4 | 0 | 100 | 100 | 95-100 | 85-100 | 20-35 | NP-10 |
| | 6-18 | Silt loam-------- | CL, CL-ML | A-4, A-6 | 0 | 100 | 100 | 95-100 | 85-100 | 20-30 | 5-15 |
| | 18-38 | Silty clay loam, silt loam. | CL | A-6 | 0 | 100 | 100 | 95-100 | 85-100 | 30-40 | 10-20 |
| | 38-65 | Very fine sandy loam, fine sandy loam. | SM, CL-ML, ML | A-4 | 0 | 100 | 100 | 80-100 | 40-90 | 15-35 | NP-10 |
| | 65-72 | Fine sand, loamy fine sand, loamy sand. | SM, SP-SM | A-3, A-2, A-4 | 0 | 100 | 100 | 60-90 | 5-40 | --- | NP |
| 34---------- Udorthents | 0-8 | Gravelly sand---- | SP, SM, SP-SM | A-1, A-2, A-3 | 0 | 75-100 | 60-90 | 40-85 | 0-25 | --- | NP |
| | 8-72 | Stratified sand to loam. | SM, ML, SP-SM | A-2, A-4, A-3, A-6 | 0 | 90-100 | 90-100 | 60-95 | 5-60 | 15-30 | NP-15 |
| 35---------- Woodstown | 0-10 | Loam---------- | ML, CL-ML, SC-SM, SM | A-4, A-2 | 0 | 90-100 | 85-100 | 60-95 | 30-75 | <30 | NP-10 |
| | 10-30 | Sandy clay loam, loam, sandy loam. | SM, CL-ML, CL, SC-SM | A-2, A-4, A-6 | 0 | 90-100 | 70-100 | 45-90 | 25-60 | <32 | NP-20 |
| | 30-65 | Stratified gravelly sand to sandy loam. | SM, SP-SM, SC-SM | A-1, A-2, A-3, A-2-4 | 0 | 80-100 | 70-95 | 35-55 | 5-25 | <26 | NP-6 |
| 36A---------- Woodstown | 0-11 | Sandy loam------- | SM, CL-ML, SC-SM | A-2, A-4 | 0 | 90-100 | 80-100 | 60-95 | 30-75 | <28 | NP-7 |
| | 11-29 | Sandy clay loam, loam, sandy loam. | SM, CL-ML, CL, SC-SM | A-2, A-4, A-6 | 0 | 90-100 | 70-100 | 45-90 | 25-60 | <32 | NP-20 |
| | 29-70 | Stratified gravelly sand to sandy loam. | SM, SP-SM, SC-SM | A-1, A-2, A-3, A-2-4 | 0 | 80-100 | 70-95 | 35-55 | 5-25 | <26 | NP-6 |

See footnote at end of table.

TABLE 21.--ENGINEERING INDEX PROPERTIES--Continued

| Soil name and map symbol | Depth | USDA texture | Classification | | Frag-ments | Percentage passing sieve number-- | | | | Liquid limit | Plas-ticity index |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unified | AASHTO | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | In | | | | Pct | | | | | Pct | |
| 36B---------- Woodstown | 0-12 | Sandy loam------- | SM, CL-ML, SC-SM | A-2, A-4 | 0 | 90-100 | 80-100 | 60-95 | 30-75 | <28 | NP-7 |
| | 12-26 | Sandy clay loam, loam, sandy loam. | SM, CL-ML, CL, SC-SM | A-2, A-4, A-6 | 0 | 90-100 | 70-100 | 45-90 | 25-60 | <32 | NP-20 |
| | 26-65 | Stratified gravelly sand to sandy loam. | SM, SP-SM, SC-SM | A-1, A-2, A-3, A-2-4 | 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 22.--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. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

| Soil name and map symbol | Depth | Clay | Moist bulk density | Permeability | Available water capacity | Soil reaction | Salinity | Shrink-swell potential | Erosion factors K | Erosion factors T | Wind erodibility group | Organic matter |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | pH | mmhos/cm | | | | | Pct |
| 1*---------- | 0-8 | 0-1 | 1.35-1.85 | 6.0-20 | 0.03-0.05 | 5.1-7.8 | 4-32 | Low------- | 0.05 | 5 | 1 | 0-.1 |
| Beaches | 8-72 | 0-1 | 1.35-1.85 | 6.0-20 | 0.03-0.05 | 5.1-7.8 | 4-32 | Low------- | 0.05 | | | |
| 2*: | | | | | | | | | | | | |
| Bestpitch------- | 0-9 | --- | 0.10-0.50 | 2.0-20 | 0.30-0.60 | 6.1-7.3 | 8-32 | Low------- | 0.02 | 2 | 8 | 30-80 |
| | 9-33 | --- | 0.10-0.50 | 2.0-20 | 0.30-0.60 | 6.1-7.3 | 8-32 | Low------- | 0.02 | | | |
| | 33-42 | --- | 0.10-0.50 | 2.0-20 | 0.30-0.60 | 6.1-7.3 | 8-32 | Low------- | 0.05 | | | |
| | 42-72 | 30-45 | 0.60-1.00 | 0.06-0.2 | 0.10-0.20 | 6.1-7.3 | 8-32 | Moderate | 0.10 | | | |
| Transquaking---- | 0-9 | --- | 0.10-0.50 | 2.0-20 | 0.30-0.60 | 6.1-7.3 | >8 | Low------- | 0.02 | 2 | 8 | 30-80 |
| | 9-46 | --- | 0.10-0.50 | 2.0-20 | 0.30-0.60 | 6.1-7.3 | >8 | Low------- | 0.02 | | | |
| | 46-65 | --- | 0.10-0.50 | 2.0-20 | 0.30-0.60 | 6.1-7.3 | >8 | Low------- | 0.05 | | | |
| | 65-80 | 30-40 | 0.60-1.00 | 0.06-0.2 | 0.10-0.20 | 6.1-7.3 | >8 | Moderate | 0.10 | | | |
| 3---------- | 0-3 | 8-15 | 1.30-1.50 | 0.6-2.0 | 0.15-0.30 | 3.5-5.5 | 0-0 | Low------- | 0.28 | 5 | 8 | 10-20 |
| Chicone | 3-15 | 8-15 | 1.50-1.70 | 0.6-6.0 | 0.10-0.18 | 3.5-5.5 | 0-0 | Low------- | 0.37 | | | |
| | 15-24 | 8-18 | 1.55-1.70 | 0.6-6.0 | 0.10-0.18 | 3.5-5.5 | 0-0 | Low------- | 0.37 | | | |
| | 24-65 | 0-0 | 0.10-0.50 | 6.0-20 | 0.35-0.45 | 3.5-5.5 | 0-0 | Low------- | 0.05 | | | |
| | 65-72 | 3-8 | 1.40-1.70 | 2.0-20 | 0.05-0.10 | 3.5-5.5 | 0-0 | Low------- | 0.15 | | | |
| 4C---------- | 0-9 | 3-8 | 1.20-1.60 | 6.0-20 | 0.06-0.08 | 3.5-5.5 | <2 | Low------- | 0.20 | 4 | 2 | .5-2 |
| Downer | 9-44 | 6-18 | 1.45-1.65 | 2.0-6.0 | 0.08-0.13 | 4.5-5.5 | <2 | Low------- | 0.32 | | | |
| | 44-50 | 3-5 | 1.40-1.75 | >6.0 | 0.02-0.08 | 4.5-5.5 | <2 | Low------- | 0.17 | | | |
| | 50-72 | 3-25 | 1.40-1.75 | >0.6 | 0.02-0.16 | 4.5-5.5 | <2 | Low------- | 0.20 | | | |
| 5A---------- | 0-11 | 5-10 | 1.20-1.60 | 2.0-6.0 | 0.10-0.14 | 3.5-5.5 | <2 | Low------- | 0.32 | 4 | 3 | 1-3 |
| Downer | 11-35 | 6-18 | 1.45-1.65 | 2.0-6.0 | 0.08-0.13 | 4.5-5.5 | <2 | Low------- | 0.32 | | | |
| | 35-48 | 3-5 | 1.40-1.75 | >6.0 | 0.02-0.08 | 4.5-5.5 | <2 | Low------- | 0.17 | | | |
| | 48-70 | 3-25 | 1.40-1.75 | >0.6 | 0.02-0.16 | 4.5-5.5 | <2 | Low------- | 0.20 | | | |
| 5B---------- | 0-10 | 5-10 | 1.20-1.60 | 2.0-6.0 | 0.10-0.14 | 3.5-5.5 | <2 | Low------- | 0.32 | 4 | 3 | 1-3 |
| Downer | 10-40 | 6-18 | 1.45-1.65 | 2.0-6.0 | 0.08-0.13 | 4.5-5.5 | <2 | Low------- | 0.32 | | | |
| | 40-65 | 3-5 | 1.40-1.75 | >6.0 | 0.02-0.08 | 4.5-5.5 | <2 | Low------- | 0.17 | | | |
| 6---------- | 0-15 | 11-25 | 1.20-1.50 | 0.6-2.0 | 0.18-0.24 | 3.5-5.5 | 0-0 | Low------- | 0.43 | 5 | 5 | 1-4 |
| Elkton | 15-36 | 27-45 | 1.35-1.55 | 0.06-0.2 | 0.12-0.19 | 3.5-5.5 | 0-0 | Moderate | 0.32 | | | |
| | 36-65 | 10-20 | 1.45-1.65 | 0.2-20 | 0.10-0.15 | 3.5-5.5 | 0-0 | Low------- | 0.32 | | | |
| 7---------- | 0-10 | 11-25 | 1.20-1.50 | 0.6-2.0 | 0.18-0.24 | 3.5-5.5 | 0-0 | Low------- | 0.43 | 5 | 5 | 1-4 |
| Elkton | 10-40 | 27-45 | 1.35-1.55 | 0.06-0.2 | 0.12-0.19 | 3.5-5.5 | 0-0 | Moderate | 0.32 | | | |
| | 40-65 | 10-20 | 1.45-1.65 | 0.2-20 | 0.10-0.15 | 3.5-5.5 | 0-0 | Low------- | 0.32 | | | |
| 8---------- | 0-6 | 14-25 | 1.20-1.50 | 0.6-2.0 | 0.20-0.25 | 3.5-5.5 | 0-0 | Low------- | 0.24 | 5 | 8 | 3-10 |
| Elkton | 6-15 | 20-27 | 1.30-1.60 | 0.6-2.0 | 0.16-0.24 | 3.5-5.5 | 0-0 | Low------- | 0.49 | | | |
| | 15-40 | 27-45 | 1.40-1.65 | 0.06-0.2 | 0.18-0.24 | 3.5-5.5 | 0-0 | Moderate | 0.49 | | | |
| | 40-65 | 18-35 | 1.50-1.80 | 0.2-0.6 | 0.12-0.20 | 3.5-5.5 | 0-0 | Low------- | 0.28 | | | |
| | 65-72 | 3-10 | 1.65-1.80 | 2.0-20 | 0.08-0.12 | 3.5-5.5 | 0-0 | Low------- | 0.15 | | | |
| 9C---------- | 0-4 | 2-4 | 1.20-1.55 | 6.0-20 | 0.04-0.07 | 3.6-5.0 | <2 | Low------- | 0.17 | 5 | 1 | <1 |
| Evesboro | 4-34 | 3-6 | 1.30-1.60 | 6.0-20 | 0.04-0.09 | 3.6-5.0 | <2 | Low------- | 0.17 | | | |
| | 34-72 | 2-10 | 1.30-1.60 | 2.0-20 | 0.04-0.12 | 4.5-5.0 | <2 | Low------- | 0.17 | | | |
| 9E---------- | 0-14 | 2-4 | 1.20-1.55 | 6.0-20 | 0.04-0.07 | 3.6-5.0 | <2 | Low------- | 0.17 | 5 | 1 | <1 |
| Evesboro | 14-36 | 3-6 | 1.30-1.60 | 6.0-20 | 0.04-0.09 | 3.6-5.0 | <2 | Low------- | 0.17 | | | |
| | 36-72 | 2-10 | 1.30-1.60 | 2.0-20 | 0.04-0.12 | 4.5-5.0 | <2 | Low------- | 0.17 | | | |

See footnote at end of table.

TABLE 22.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

| Soil name and map symbol | Depth | Clay | Moist bulk density | Permeability | Available water capacity | Soil reaction | Salinity | Shrink-swell potential | Erosion factors | | Wind erodibility group | Organic matter |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | pH | mmhos/cm | | K | T | | Pct |
| 10 | 0-7 | 5-18 | 1.00-1.45 | 0.6-6.0 | 0.15-0.20 | 3.6-5.5 | <2 | Low | 0.24 | 5 | 3 | .5-2 |
| Fallsington | 7-30 | 18-30 | 1.50-1.80 | 0.2-2.0 | 0.15-0.18 | 3.6-5.5 | <2 | Low | 0.28 | | | |
| | 30-72 | 2-30 | 1.50-1.85 | 0.6-20 | 0.06-0.20 | 3.6-5.5 | <2 | Low | 0.20 | | | |
| 11 | 0-12 | 8-20 | 1.30-1.60 | 0.6-2.0 | 0.10-0.20 | 3.6-5.5 | <2 | Low | 0.32 | 4 | 5 | 1-7 |
| Fluvaquents | 12-20 | 8-15 | 1.40-1.65 | 2.0-6.0 | 0.10-0.15 | 3.6-5.5 | <2 | Low | 0.28 | | | |
| | 20-48 | 3-8 | 1.40-1.70 | 6.0-20 | 0.05-0.10 | 3.6-5.5 | <2 | Low | 0.15 | | | |
| | 48-72 | 3-8 | 1.55-1.80 | 6.0-20 | 0.05-0.10 | 3.6-5.5 | <2 | Low | 0.10 | | | |
| 12A | 0-30 | 5-10 | 1.25-1.60 | 6.0-20 | 0.05-0.10 | 3.6-5.5 | 0-0 | Low | 0.20 | 5 | 2 | .5-2 |
| Fort Mott | 30-72 | 10-30 | 1.25-1.80 | 0.6-6.0 | 0.12-0.16 | 3.6-5.5 | 0-0 | Low | 0.32 | | | |
| 12B | 0-24 | 5-10 | 1.25-1.60 | 6.0-20 | 0.05-0.10 | 3.6-5.5 | 0-0 | Low | 0.20 | 5 | 2 | .5-2 |
| Fort Mott | 24-36 | 10-30 | 1.25-1.80 | 0.6-6.0 | 0.12-0.16 | 3.6-5.5 | 0-0 | Low | 0.32 | | | |
| | 36-72 | 5-15 | 1.30-1.80 | 6.0-20 | 0.03-0.12 | 3.6-5.5 | 0-0 | Low | 0.17 | | | |
| 13E*: | | | | | | | | | | | | |
| Fort Mott | 0-24 | 5-10 | 1.25-1.60 | 6.0-20 | 0.05-0.10 | 3.6-5.5 | 0-0 | Low | 0.20 | 5 | 2 | .5-2 |
| | 24-44 | 10-30 | 1.25-1.80 | 0.6-6.0 | 0.12-0.16 | 3.6-5.5 | 0-0 | Low | 0.32 | | | |
| | 44-66 | 5-15 | 1.30-1.80 | 6.0-20 | 0.03-0.12 | 3.6-5.5 | 0-0 | Low | 0.17 | | | |
| Evesboro | 0-4 | 2-4 | 1.20-1.55 | 6.0-20 | 0.04-0.07 | 3.6-5.0 | <2 | Low | 0.17 | 5 | 1 | <1 |
| | 4-64 | 3-6 | 1.30-1.60 | 6.0-20 | 0.04-0.09 | 3.6-5.0 | <2 | Low | 0.17 | | | |
| | 64-72 | 2-10 | 1.30-1.60 | 2.0-20 | 0.04-0.12 | 4.5-5.0 | <2 | Low | 0.17 | | | |
| Downer | 0-24 | 5-10 | 1.20-1.60 | 2.0-6.0 | 0.10-0.14 | 3.5-5.5 | <2 | Low | 0.32 | 4 | 3 | 1-3 |
| | 24-42 | 6-18 | 1.45-1.65 | 2.0-6.0 | 0.08-0.13 | 4.5-5.5 | <2 | Low | 0.32 | | | |
| | 42-72 | 3-25 | 1.40-1.75 | >0.6 | 0.02-0.16 | 4.5-5.5 | <2 | Low | 0.20 | | | |
| 14A | 0-11 | 4-10 | 1.50-1.70 | 6.0-20 | 0.06-0.08 | 3.6-5.5 | <2 | Low | 0.17 | 5 | 2 | .5-2 |
| Galestown | 11-40 | 4-10 | 1.50-1.70 | >6.0 | 0.04-0.08 | 3.6-5.5 | <2 | Low | 0.17 | | | |
| | 40-65 | 2-6 | 1.50-1.65 | >6.0 | 0.04-0.08 | 3.6-5.5 | <2 | Low | 0.17 | | | |
| 14B | 0-10 | 4-10 | 1.50-1.70 | 6.0-20 | 0.06-0.08 | 3.6-5.5 | <2 | Low | 0.17 | 5 | 2 | .5-2 |
| Galestown | 10-52 | 4-10 | 1.50-1.70 | >6.0 | 0.04-0.08 | 3.6-5.5 | <2 | Low | 0.17 | | | |
| | 52-72 | 2-6 | 1.50-1.65 | >6.0 | 0.04-0.08 | 3.6-5.5 | <2 | Low | 0.17 | | | |
| 15A | 0-10 | 12-18 | 1.30-1.60 | 0.6-6.0 | 0.12-0.20 | 3.6-5.5 | 0-0 | Low | 0.28 | 5 | 5 | .5-3 |
| Hambrook | 10-14 | 10-18 | 1.45-1.65 | 0.6-6.0 | 0.10-0.16 | 3.6-5.5 | 0-0 | Low | 0.24 | | | |
| | 14-28 | 18-27 | 1.35-1.70 | 0.6-2.0 | 0.14-0.22 | 3.6-5.5 | 0-0 | Low | 0.37 | | | |
| | 28-65 | 3-8 | 1.40-1.70 | 2.0-20 | 0.05-0.10 | 3.6-5.5 | 0-0 | Low | 0.24 | | | |
| | 65-72 | 15-30 | 1.50-1.70 | 0.06-0.6 | 0.12-0.24 | 3.6-5.5 | 0-0 | Low | 0.49 | | | |
| 15B | 0-9 | 12-18 | 1.30-1.60 | 0.6-6.0 | 0.12-0.20 | 3.6-5.5 | 0-0 | Low | 0.28 | 5 | 5 | .5-3 |
| Hambrook | 9-38 | 18-27 | 1.35-1.70 | 0.6-2.0 | 0.14-0.22 | 3.6-5.5 | 0-0 | Low | 0.37 | | | |
| | 38-72 | 3-8 | 1.40-1.70 | 2.0-20 | 0.05-0.10 | 3.6-5.5 | 0-0 | Low | 0.24 | | | |
| 16 | 0-11 | 5-10 | 1.20-1.60 | 2.0-6.0 | 0.10-0.14 | 3.5-5.5 | 0-0 | Low | 0.32 | 5 | 3 | 1-3 |
| Hammonton | 11-30 | 10-18 | 1.45-1.65 | 2.0-6.0 | 0.08-0.13 | 4.5-5.5 | 0-0 | Low | 0.32 | | | |
| | 30-65 | 2-22 | 1.40-1.75 | 0.6-20 | 0.03-0.15 | 4.5-5.5 | 0-0 | Low | 0.17 | | | |
| 17 | 0-7 | --- | 0.10-0.50 | 2.0-20 | 0.30-0.60 | 6.1-7.3 | >16 | Low | 0.02 | 2 | 8 | 30-80 |
| Honga | 7-13 | --- | 0.10-0.50 | 2.0-20 | 0.30-0.60 | 6.1-7.3 | >16 | Low | 0.02 | | | |
| | 13-22 | --- | 0.10-0.50 | 2.0-20 | 0.30-0.60 | 6.1-7.3 | >16 | Low | 0.05 | | | |
| | 22-36 | 15-35 | 1.40-1.70 | 0.06-0.6 | 0.10-0.20 | 6.1-7.3 | >4 | Low | 0.10 | | | |
| | 36-65 | 28-40 | 1.40-1.70 | 0.06-0.2 | 0.10-0.20 | 6.1-7.3 | >4 | Low | 0.28 | | | |
| 18 | 0-3 | 5-12 | 1.20-1.60 | 2.0-6.0 | 0.10-0.16 | 3.6-5.5 | <2 | Low | 0.15 | 5 | 3 | .5-4 |
| Hurlock | 3-22 | 8-18 | 1.55-1.75 | 2.0-6.0 | 0.10-0.16 | 3.6-5.5 | <2 | Low | 0.24 | | | |
| | 22-60 | 3-8 | 1.40-1.70 | 2.0-20 | 0.05-0.10 | 3.6-5.5 | <2 | Low | 0.15 | | | |
| | 60-72 | 15-30 | 1.50-1.70 | 0.06-0.6 | 0.12-0.24 | 3.6-5.5 | <2 | Low | 0.55 | | | |

See footnote at end of table.

TABLE 22.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

| Soil name and map symbol | Depth | Clay | Moist bulk density | Permeability | Available water capacity | Soil reaction | Salinity | Shrink-swell potential | Erosion factors K | Erosion factors T | Wind erodibility group | Organic matter |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In | Pct | g/cc | In/hr | In/in | pH | mmhos/cm | | | | | Pct |
| 19A | 0-10 | 5-12 | 1.20-1.60 | 2.0-6.0 | 0.10-0.16 | 3.6-5.5 | 0-0 | Low | 0.20 | 5 | 3 | .5-3 |
| Ingleside | 10-43 | 8-25 | 1.45-1.65 | 2.0-6.0 | 0.10-0.16 | 3.6-5.5 | 0-0 | Low | 0.28 | | | |
| | 43-56 | 3-8 | 1.40-1.70 | 2.0-20 | 0.05-0.10 | 3.6-5.5 | 0-0 | Low | 0.15 | | | |
| | 56-72 | 15-30 | 1.50-1.70 | 0.06-0.6 | 0.12-0.24 | 3.6-5.5 | 0-0 | Low | 0.49 | | | |
| 19B | 0-10 | 5-12 | 1.20-1.60 | 2.0-6.0 | 0.10-0.16 | 3.6-5.5 | 0-0 | Low | 0.20 | 5 | 3 | .5-3 |
| Ingleside | 10-60 | 8-25 | 1.45-1.65 | 2.0-6.0 | 0.10-0.16 | 3.6-5.5 | 0-0 | Low | 0.28 | | | |
| | 60-65 | 15-30 | 1.50-1.70 | 0.06-0.6 | 0.12-0.24 | 3.6-5.5 | 0-0 | Low | 0.49 | | | |
| 20 | 0-15 | 10-25 | 1.20-1.60 | 0.2-2.0 | 0.16-0.22 | 3.6-5.5 | <2 | Low | 0.43 | 4 | 5 | 1-3 |
| Keyport | 15-48 | 30-50 | 1.35-1.60 | <0.2 | 0.14-0.20 | 4.5-5.5 | <2 | Moderate | 0.32 | | | |
| | 48-72 | 5-50 | 1.35-1.75 | 0.06-20 | 0.07-0.20 | 3.6-5.5 | <2 | Low | 0.28 | | | |
| 21*: | | | | | | | | | | | | |
| Klej | 0-8 | 2-10 | 1.30-1.60 | >6.0 | 0.06-0.11 | 3.6-5.5 | <2 | Low | 0.17 | 5 | 2 | 1-3 |
| | 8-50 | 2-10 | 1.30-1.60 | >6.0 | 0.06-0.10 | 3.6-5.5 | <2 | Low | 0.17 | | | |
| | 50-72 | 2-10 | 1.50-1.75 | >6.0 | 0.06-0.08 | 3.6-5.5 | <2 | Low | 0.17 | | | |
| Hammonton | 0-7 | 2-7 | 1.20-1.60 | 6.0-20 | 0.06-0.10 | 3.5-5.5 | 0-0 | Low | 0.20 | 5 | 2 | .5-2 |
| | 7-24 | 10-18 | 1.45-1.65 | 2.0-6.0 | 0.08-0.13 | 4.5-5.5 | 0-0 | Low | 0.32 | | | |
| | 24-72 | 2-22 | 1.40-1.75 | 0.6-20 | 0.03-0.15 | 4.5-5.5 | 0-0 | Low | 0.17 | | | |
| 22A | 0-7 | 10-18 | 1.20-1.50 | 0.6-2.0 | 0.16-0.24 | 4.5-7.3 | 0-0 | Low | 0.43 | 4 | 5 | 1-2 |
| Matapeake | 7-13 | 10-18 | 1.20-1.50 | 0.6-2.0 | 0.16-0.24 | 3.6-6.0 | 0-0 | Low | 0.49 | | | |
| | 13-38 | 18-30 | 1.40-1.70 | 0.2-2.0 | 0.18-0.24 | 3.6-5.5 | 0-0 | Low | 0.49 | | | |
| | 38-46 | 10-22 | 1.65-1.80 | 0.6-6.0 | 0.12-0.20 | 3.6-5.5 | 0-0 | Low | 0.28 | | | |
| | 46-72 | 3-10 | 1.65-1.80 | 6.0-20 | 0.05-0.10 | 3.6-5.5 | 0-0 | Low | 0.15 | | | |
| 22B | 0-8 | 10-18 | 1.20-1.50 | 0.6-2.0 | 0.16-0.24 | 4.5-7.3 | 0-0 | Low | 0.43 | 4 | 5 | 1-2 |
| Matapeake | 8-18 | 10-18 | 1.20-1.50 | 0.6-2.0 | 0.16-0.24 | 3.6-6.0 | 0-0 | Low | 0.49 | | | |
| | 18-34 | 18-30 | 1.40-1.70 | 0.2-2.0 | 0.18-0.24 | 3.6-5.5 | 0-0 | Low | 0.49 | | | |
| | 34-48 | 10-22 | 1.65-1.80 | 0.6-6.0 | 0.12-0.20 | 3.6-5.5 | 0-0 | Low | 0.28 | | | |
| | 48-72 | 3-10 | 1.65-1.80 | 6.0-20 | 0.05-0.10 | 3.6-5.5 | 0-0 | Low | 0.15 | | | |
| 23 | 0-8 | 10-18 | 1.10-1.45 | 0.6-2.0 | 0.13-0.20 | 3.6-5.5 | <2 | Low | 0.37 | 4 | 3 | .5-3 |
| Mattapex | 8-41 | 18-30 | 1.25-1.45 | 0.2-2.0 | 0.18-0.22 | 3.6-5.5 | <2 | Low | 0.43 | | | |
| | 41-54 | 8-15 | 1.45-1.65 | 0.6-6.0 | 0.14-0.18 | 3.6-5.5 | <2 | Low | 0.28 | | | |
| | 54-72 | 3-8 | 1.50-1.80 | 6.0-20 | 0.05-0.08 | 3.6-5.5 | <2 | Low | 0.17 | | | |
| 24A | 0-12 | 10-18 | 1.10-1.45 | 0.6-2.0 | 0.20-0.28 | 3.6-5.5 | <2 | Low | 0.43 | 4 | 5 | .5-3 |
| Mattapex | 12-38 | 18-30 | 1.25-1.45 | 0.2-2.0 | 0.18-0.22 | 3.6-5.5 | <2 | Low | 0.43 | | | |
| | 38-46 | 8-15 | 1.45-1.65 | 0.6-6.0 | 0.14-0.18 | 3.6-5.5 | <2 | Low | 0.28 | | | |
| | 46-65 | 3-8 | 1.50-1.80 | 6.0-20 | 0.05-0.08 | 3.6-5.5 | <2 | Low | 0.17 | | | |
| 24B | 0-13 | 10-18 | 1.10-1.45 | 0.6-2.0 | 0.20-0.28 | 3.6-5.5 | <2 | Low | 0.43 | 4 | 5 | .5-3 |
| Mattapex | 13-30 | 18-30 | 1.25-1.45 | 0.2-2.0 | 0.18-0.22 | 3.6-5.5 | <2 | Low | 0.43 | | | |
| | 30-64 | 8-15 | 1.45-1.65 | 0.6-6.0 | 0.14-0.18 | 3.6-5.5 | <2 | Low | 0.28 | | | |
| | 64-72 | 3-8 | 1.50-1.80 | 6.0-20 | 0.05-0.08 | 3.6-5.5 | <2 | Low | 0.17 | | | |
| 25 | 0-10 | 8-15 | 0.10-0.70 | 0.2-0.6 | 0.15-0.25 | 5.6-7.3 | 0-4 | Low | 0.28 | 5 | 8 | 3-10 |
| Nanticoke | 10-24 | 18-25 | 0.10-0.70 | 0.2-0.6 | 0.10-0.20 | 5.6-7.3 | 0-4 | Low | 0.37 | | | |
| | 24-80 | 27-35 | 0.10-0.80 | 0.2-0.6 | 0.10-0.20 | 5.6-7.3 | 0-4 | Low | 0.37 | | | |
| 26 | 0-11 | 15-28 | 1.20-1.50 | 0.6-2.0 | 0.16-0.24 | 4.5-5.5 | 0-0 | Low | 0.37 | 5 | 5 | 1-2 |
| Othello | 11-28 | 18-30 | 1.40-1.70 | 0.2-0.6 | 0.12-0.24 | 3.6-5.5 | 0-0 | Low | 0.43 | | | |
| | 28-36 | 12-27 | 1.65-1.80 | 0.2-2.0 | 0.10-0.16 | 3.6-5.5 | 0-0 | Low | 0.28 | | | |
| | 36-65 | 4-10 | 1.65-1.80 | 2.0-6.0 | 0.06-0.10 | 3.6-5.5 | 0-0 | Low | 0.15 | | | |

See footnote at end of table.

TABLE 22.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

| Soil name and map symbol | Depth | Clay | Moist bulk density | Permeability | Available water capacity | Soil reaction | Salinity | Shrink-swell potential | Erosion factors | | Wind erodibility group | Organic matter |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | K | T | | |
| | In | Pct | g/cc | In/hr | In/in | pH | mmhos/cm | | | | | Pct |
| 27*: | | | | | | | | | | | | |
| Othello | 0-6 | 14-22 | 1.20-1.50 | 0.6-2.0 | 0.20-0.25 | 3.6-5.5 | <2 | Low | 0.24 | 4 | 5 | 3-10 |
| | 6-12 | 12-20 | 1.30-1.50 | 0.6-2.0 | 0.16-0.24 | 3.6-5.5 | <2 | Low | 0.49 | | | |
| | 12-40 | 18-30 | 1.40-1.70 | 0.2-0.6 | 0.18-0.24 | 3.6-5.5 | <2 | Low | 0.49 | | | |
| | 40-48 | 15-24 | 1.65-1.80 | 2.0-6.0 | 0.12-0.20 | 3.6-5.5 | <2 | Low | 0.28 | | | |
| | 48-72 | 3-10 | 1.65-1.80 | 6.0-20 | 0.05-0.10 | 3.6-5.5 | <2 | Low | 0.15 | | | |
| Kentuck | 0-13 | 14-18 | 1.20-1.50 | 0.6-2.0 | 0.20-0.25 | 3.5-5.5 | 0-0 | Low | 0.24 | 4 | 5 | 5-15 |
| | 13-24 | 14-20 | 1.40-1.70 | 0.6-2.0 | 0.15-0.21 | 3.5-5.5 | 0-0 | Low | 0.43 | | | |
| | 24-45 | 24-34 | 1.40-1.70 | 0.06-0.6 | 0.15-0.21 | 3.5-5.5 | 0-0 | Low | 0.43 | | | |
| | 45-56 | 10-15 | 1.65-1.80 | 2.0-6.0 | 0.11-0.15 | 3.5-5.5 | 0-0 | Low | 0.24 | | | |
| | 56-70 | 3-8 | 1.65-1.80 | 6.0-20 | 0.05-0.11 | 3.5-5.5 | 0-0 | Low | 0.15 | | | |
| 28 | 0-10 | 5-12 | 1.20-1.40 | 2.0-6.0 | 0.15-0.24 | 3.6-5.5 | <2 | Low | 0.10 | 5 | 3 | 3-15 |
| Pone | 10-33 | 8-18 | 1.55-1.75 | 2.0-6.0 | 0.10-0.16 | 3.6-5.5 | <2 | Low | 0.24 | | | |
| | 33-38 | 3-15 | 1.40-1.70 | 2.0-6.0 | 0.05-0.10 | 3.6-5.5 | <2 | Low | 0.20 | | | |
| | 38-72 | 3-8 | 1.40-1.70 | 2.0-20 | 0.05-0.10 | 3.6-5.5 | <2 | Low | 0.15 | | | |
| 29 | 0-6 | 10-18 | 1.20-1.40 | 0.6-6.0 | 0.15-0.24 | 3.6-5.5 | <2 | Low | 0.15 | 5 | 5 | 3-15 |
| Pone | 6-26 | 8-18 | 1.55-1.75 | 2.0-6.0 | 0.10-0.16 | 3.6-5.5 | <2 | Low | 0.24 | | | |
| | 26-37 | 3-15 | 1.40-1.70 | 2.0-6.0 | 0.05-0.10 | 3.6-5.5 | <2 | Low | 0.20 | | | |
| | 37-47 | 3-8 | 1.40-1.70 | 2.0-20 | 0.05-0.10 | 3.6-5.5 | <2 | Low | 0.15 | | | |
| | 47-69 | 15-30 | 1.50-1.70 | 0.06-0.6 | 0.12-0.24 | 3.6-5.5 | <2 | Low | 0.55 | | | |
| 30 | 0-4 | --- | 0.10-0.50 | 2.0-6.0 | 0.35-0.45 | 3.5-5.5 | 0-4 | Low | 0.02 | 3 | 8 | 45-90 |
| Puckum | 4-80 | --- | 0.10-0.50 | 2.0-6.0 | 0.35-0.45 | 3.5-5.5 | 0-4 | Low | 0.02 | | | |
| 31A | 0-22 | 1-5 | 1.50-1.75 | 6.0-20 | 0.05-0.10 | 3.6-5.5 | <2 | Low | 0.10 | 5 | 1 | .5-3 |
| Runclint | 22-40 | 1-8 | 1.50-1.75 | 6.0-20 | 0.02-0.10 | 3.6-5.5 | <2 | Low | 0.10 | | | |
| | 40-59 | 1-8 | 1.50-1.75 | 6.0-20 | 0.02-0.10 | 3.6-5.5 | <2 | Low | 0.05 | | | |
| | 59-72 | 1-25 | 1.40-1.70 | 0.6-2.0 | 0.02-0.15 | 3.6-5.5 | <2 | Low | 0.20 | | | |
| 31B | 0-8 | 1-5 | 1.50-1.75 | 6.0-20 | 0.05-0.10 | 3.6-5.5 | <2 | Low | 0.10 | 5 | 1 | .5-3 |
| Runclint | 8-48 | 1-8 | 1.50-1.75 | 6.0-20 | 0.02-0.10 | 3.6-5.5 | <2 | Low | 0.10 | | | |
| | 48-54 | 1-8 | 1.50-1.75 | 6.0-20 | 0.02-0.10 | 3.6-5.5 | <2 | Low | 0.05 | | | |
| | 54-72 | 1-25 | 1.40-1.70 | 0.6-2.0 | 0.02-0.15 | 3.6-5.5 | <2 | Low | 0.20 | | | |
| 32 | 0-7 | 3-12 | 1.00-1.45 | 0.6-2.0 | 0.12-0.20 | 3.6-5.5 | <2 | Low | 0.28 | 5 | 5 | 1-2 |
| Sassafras | 7-36 | 18-27 | 1.40-1.65 | 0.2-2.0 | 0.11-0.22 | 3.6-5.5 | <2 | Low | 0.37 | | | |
| | 36-72 | 3-16 | 1.40-1.70 | 0.6-20 | 0.04-0.12 | 3.6-5.5 | <2 | Low | 0.17 | | | |
| 33 | 0-6 | 15-20 | 1.10-1.50 | 2.0-6.0 | 0.20-0.50 | 5.1-7.3 | >8 | Low | 0.20 | 5 | 8 | 10-15 |
| Sunken | 6-18 | 15-25 | 1.40-1.70 | 0.2-2.0 | 0.15-0.22 | 5.1-7.3 | 2-8 | Low | 0.43 | | | |
| | 18-38 | 18-35 | 1.40-1.70 | 0.06-0.2 | 0.12-0.24 | 5.6-7.3 | 2-8 | Low | 0.43 | | | |
| | 38-65 | 10-20 | 1.65-1.80 | 0.6-2.0 | 0.10-0.16 | 5.6-7.3 | 2-8 | Low | 0.17 | | | |
| | 65-72 | 1-5 | 1.65-1.80 | 2.0-20 | 0.04-0.10 | 5.6-7.3 | 2-8 | Low | 0.17 | | | |
| 34 | 0-8 | 3-8 | 1.40-1.65 | 6.0-20 | 0.05-0.10 | 3.6-5.5 | <2 | Low | 0.10 | 5 | 2 | 0-1 |
| Udorthents | 8-72 | 3-20 | 1.55-1.80 | 2.0-20 | 0.05-0.20 | 3.6-5.5 | <2 | Low | 0.15 | | | |
| 35 | 0-10 | 5-18 | 1.00-1.40 | 0.6-2.0 | 0.10-0.21 | 3.6-5.5 | <2 | Low | 0.32 | 5 | 5 | 1-2 |
| Woodstown | 10-30 | 18-30 | 1.35-1.70 | 0.2-6.0 | 0.06-0.16 | 3.6-5.5 | <2 | Low | 0.28 | | | |
| | 30-65 | 5-20 | 1.35-1.65 | 0.6-6.0 | 0.06-0.16 | 3.6-5.5 | <2 | Low | 0.28 | | | |
| 36A | 0-11 | 5-18 | 1.00-1.40 | 0.6-6.0 | 0.08-0.16 | 3.6-5.5 | <2 | Low | 0.24 | 5 | 3 | 1-2 |
| Woodstown | 11-29 | 18-30 | 1.35-1.70 | 0.2-6.0 | 0.06-0.16 | 3.6-5.5 | <2 | Low | 0.28 | | | |
| | 29-70 | 5-20 | 1.35-1.65 | 0.6-6.0 | 0.06-0.16 | 3.6-5.5 | <2 | Low | 0.28 | | | |
| 36B | 0-12 | 5-18 | 1.00-1.40 | 0.6-6.0 | 0.08-0.16 | 3.6-5.5 | <2 | Low | 0.24 | 5 | 3 | 1-2 |
| Woodstown | 12-26 | 18-30 | 1.35-1.70 | 0.2-6.0 | 0.06-0.16 | 3.6-5.5 | <2 | Low | 0.28 | | | |
| | 26-65 | 5-20 | 1.35-1.65 | 0.6-6.0 | 0.06-0.16 | 3.6-5.5 | <2 | Low | 0.28 | | | |

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 23.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "brief" and "apparent" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

| Soil name and map symbol | Hydrologic group | Flooding | | | High water table | | | Subsidence | | Potential frost action | Risk of corrosion | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Frequency | Duration | Months | Depth | Kind | Months | Initial | Total | | Uncoated steel | Concrete |
| | | | | | Ft | | | In | In | | | |
| 1*----------<br>Beaches | D | Frequent---- | Very brief to long. | Jan-Dec | 0-6.0 | Apparent | Jan-Dec | --- | --- | Low------ | High----- | High. |
| 2*: | | | | | | | | | | | | |
| Bestpitch--------- | D | Frequent---- | Very brief | Jan-Dec | 0-0 | Apparent | Jan-Dec | 15-25 | 25-35 | Low------ | High----- | High. |
| Transquaking----- | D | Frequent---- | Very brief | Jan-Dec | 0-0 | Apparent | Jan-Dec | 15-25 | 25-35 | Low------ | High----- | High. |
| 3----------<br>Chicone | D | Frequent---- | Brief----- | Jan-Dec | +1-0.5 | Apparent | Nov-Jun | --- | --- | Moderate | High----- | High. |
| 4C, 5A, 5B--------<br>Downer | B | None-------- | --- | --- | >6.0 | --- | --- | --- | --- | Low------ | Moderate | High. |
| 6, 7----------<br>Elkton | C/D | None-------- | --- | --- | 0-1.0 | Apparent | Nov-May | --- | --- | Moderate | High----- | High. |
| 8----------<br>Elkton | D | None-------- | --- | --- | +1-0.5 | Apparent | Jan-Dec | --- | --- | Moderate | High----- | High. |
| 9C, 9E----------<br>Evesboro | A | None-------- | --- | --- | >6.0 | --- | --- | --- | --- | Low------ | Low------ | High. |
| 10----------<br>Fallsington | B/D | None-------- | --- | --- | 0-1.0 | Apparent | Dec-May | --- | --- | Moderate | High----- | High. |
| 11----------<br>Fluvaquents | D | Frequent---- | Very brief | Jan-Dec | 0-1.0 | Apparent | Dec-May | --- | --- | Moderate | High----- | High. |
| 12A, 12B----------<br>Fort Mott | A | None-------- | --- | --- | >6.0 | --- | --- | --- | --- | Moderate | Moderate | High. |
| 13E*: | | | | | | | | | | | | |
| Fort Mott--------- | A | None-------- | --- | --- | >6.0 | --- | --- | --- | --- | Moderate | Moderate | High. |
| Evesboro--------- | A | None-------- | --- | --- | >6.0 | --- | --- | --- | --- | Low------ | Low------ | High. |
| Downer----------- | B | None-------- | --- | --- | >6.0 | --- | --- | --- | --- | Low------ | Moderate | High. |
| 14A, 14B----------<br>Galestown | A | None-------- | --- | --- | >6.0 | --- | --- | --- | --- | Low------ | Low------ | High. |

See footnote at end of table.

TABLE 23.--SOIL AND WATER FEATURES--Continued

| Soil name and map symbol | Hydrologic group | Flooding | | | High water table | | | Subsidence | | Potential frost action | Risk of corrosion | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Frequency | Duration | Months | Depth | Kind | Months | Initial | Total | | Uncoated steel | Concrete |
| | | | | | Ft | | | In | In | | | |
| 15A, 15B---------- Hambrook | B | None-------- | --- | --- | 4.0-6.0 | Apparent | Jan-May | --- | --- | Moderate | Moderate | High. |
| 16---------- Hammonton | B | None-------- | --- | --- | 1.5-3.5 | Apparent | Jan-Apr | --- | --- | Moderate | Moderate | High. |
| 17---------- Honga | D | Frequent---- | Very brief | Jan-Dec | 0-0 | Apparent | Jan-Dec | 10-20 | 10-20 | Low------ | High----- | High. |
| 18---------- Hurlock | B/D | None-------- | --- | --- | 0-1.0 | Apparent | Dec-May | --- | --- | Moderate | High----- | High. |
| 19A, 19B---------- Ingleside | B | None-------- | --- | --- | 3.5-6.0 | Apparent | Jan-May | --- | --- | Moderate | Moderate | High. |
| 20---------- Keyport | C | None-------- | --- | --- | 1.5-4.0 | Perched | Nov-May | --- | --- | High----- | High----- | High. |
| 21*: | | | | | | | | | | | | |
| Klej---------- | B/D | None-------- | --- | --- | 1.0-2.0 | Apparent | Dec-Apr | --- | --- | Moderate | Low------ | High. |
| Hammonton-------- | B | None-------- | --- | --- | 1.5-3.5 | Apparent | Jan-Apr | --- | --- | Moderate | Moderate | High. |
| 22A, 22B---------- Matapeake | B | None-------- | --- | --- | 4.0-6.0 | Apparent | Jan-Apr | --- | --- | Moderate | Moderate | High. |
| 23, 24A, 24B------ Mattapex | C | None-------- | --- | --- | 1.5-3.0 | Apparent | Jan-Apr | --- | --- | Moderate | High----- | High. |
| 25---------- Nanticoke | D | Frequent---- | Very brief | Jan-Dec | 0-0.5 | Apparent | Jan-Dec | --- | --- | Low------ | High----- | High. |
| 26---------- Othello | C/D | None-------- | --- | --- | 0-1.0 | Apparent | Jan-May | --- | --- | Moderate | High----- | High. |
| 27*: | | | | | | | | | | | | |
| Othello---------- | D | None-------- | --- | --- | +1-0.5 | Apparent | Jan-Jun | --- | --- | Moderate | High----- | High. |
| Kentuck---------- | B/D | None-------- | --- | --- | +1-0.5 | Apparent | Dec-Jun | --- | --- | Moderate | High----- | High. |
| 28, 29---------- Pone | B/D | None-------- | --- | --- | +1-0.5 | Apparent | Dec-Jun | --- | --- | Moderate | High----- | High. |
| 30---------- Puckum | D | Frequent---- | Brief----- | Jan-Dec | +1-0 | Apparent | Jan-Dec | 10-20 | 20-40 | Low------ | High----- | High. |

See footnote at end of table.

TABLE 23.--SOIL AND WATER FEATURES--Continued

| Soil name and map symbol | Hydrologic group | Flooding | | | High water table | | | Subsidence | | Potential frost action | Risk of corrosion | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Frequency | Duration | Months | Depth | Kind | Months | Initial | Total | | Uncoated steel | Concrete |
| | | | | | Ft | | | In | In | | | |
| 31A, 31B----------<br>Runclint | A | None--------- | --- | --- | 4.0-6.0 | Apparent | Jan-May | --- | --- | Low------ | Low------ | High. |
| 32----------<br>Sassafras | B | None--------- | --- | --- | >6.0 | --- | --- | --- | --- | Moderate | Low------ | High. |
| 33----------<br>Sunken | D | Occasional | Very brief | Jan-Dec | 0-0 | Apparent | Jan-Dec | --- | --- | Moderate | High----- | High. |
| 34----------<br>Udorthents | A/D | None--------- | --- | --- | 0-6.0 | Apparent | Nov-May | --- | --- | Low------ | High----- | High. |
| 35, 36A, 36B------<br>Woodstown | C | None--------- | --- | --- | 1.5-3.5 | Apparent | Jan-Apr | --- | --- | Moderate | Moderate | High. |

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 24.--PHYSICAL ANALYSES OF SELECTED SOILS

| Soil series and sample number | Depth | Horizon | Particle-size distribution: Sand: Very coarse (2-1 mm) | Sand: Coarse (1-0.5 mm) | Sand: Medium (0.5-0.25 mm) | Sand: Fine (0.25-0.1 mm) | Sand: Very fine (0.1-0.05 mm) | Sand: Total (2-0.05 mm) | Silt (0.05-0.002 mm) | Clay (<0.002 mm) | Bulk density (field moist) | Water content (1/3 bar) | Water retention difference |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cm | | Pct | Pct | Pct | Pct | Pct | Pct | Pct | Pct | $g/cm^3$ | Pct | Cm/cm |
| Downer: | | | | | | | | | | | | | |
| S83MD-019-005-1 | 0-28 | Ap | 0.6 | 10.5 | 42.0 | 24.9 | 3.4 | 81.4 | 15.2 | 3.4 | 1.72 | 3.7 | 0.03 |
| -2 | 28-71 | Bt1 | .5 | 10.6 | 35.8 | 20.1 | 3.3 | 70.3 | 24.7 | 5.0 | 1.89 | 6.4 | .09 |
| -3 | 71-86 | Bt2 | .5 | 8.1 | 29.8 | 18.5 | 3.7 | 60.6 | 26.2 | 13.2 | 1.73 | 12.0 | .12 |
| -4 | 86-107 | C1 | .4 | 10.7 | 39.6 | 23.7 | 3.1 | 77.5 | 15.3 | 7.2 | 1.78 | 6.3 | .07 |
| -5 | 107-152 | C2 | .2 | 9.6 | 41.4 | 23.1 | 3.7 | 78.0 | 14.2 | 7.8 | 1.87 | 6.1 | .06 |
| Galestown: | | | | | | | | | | | | | |
| S83MD-019-006-1 | 0-28 | Ap | 0.5 | 4.7 | 31.9 | 49.1 | 5.1 | 91.3 | 5.8 | 2.9 | 1.74 | 3.0 | .02 |
| -2 | 28-74 | Bt1 | .6 | 4.9 | 33.3 | 46.8 | 4.1 | 89.7 | 7.0 | 3.3 | 1.71 | 2.8 | .02 |
| -3 | 74-102 | Bt2 | .9 | 6.5 | 36.3 | 39.3 | 2.9 | 85.5 | 6.8 | 7.7 | 1.59 | 5.2 | .03 |
| -4 | 102-130 | BC | .6 | 5.6 | 38.4 | 46.4 | 2.9 | 93.9 | 1.9 | 4.4 | 1.60 | 3.1 | .02 |
| -5 | 130-147 | C | .9 | 4.7 | 23.1 | 63.7 | 4.8 | 97.2 | 1.0 | 1.8 | 1.60 | --- | --- |

TABLE 25.--CHEMICAL ANALYSES OF SELECTED SOILS

(TR means trace)

| Soil series and sample number | Depth | Horizon | Extractable bases: Ca | Mg | Na | K | Sum | Sum of cations | Base saturation* | Organic carbon | pH ($H_2O$) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cm | | Milliequivalents/100 grams | | | | | | Pct | Pct | |
| Downer: | | | | | | | | | | | |
| (S83MD-019-005-1 | 0-28 | Ap | 1.1 | 0.4 | TR | 0.2 | 1.7 | 3.9 | 44 | 0.43 | 6.0 |
| -2 | 28-71 | Bt1 | .4 | .2 | TR | .1 | .7 | 2.8 | 25 | .12 | 5.2 |
| -3 | 71-86 | Bt2 | .8 | .8 | TR | .3 | 1.9 | 5.8 | 33 | .13 | 4.9 |
| -4 | 86-107 | C1 | .4 | .4 | TR | .2 | 1.0 | 3.5 | 29 | .04 | 5.0 |
| -5 | 107-152 | C2 | .8 | .3 | TR | .2 | 1.3 | 3.6 | 36 | .05 | 5.0 |
| Galestown: | | | | | | | | | | | |
| (S83MD-019-006-1 | 0-28 | Ap | .9 | .3 | TR | .2 | 1.4 | 3.7 | 38 | .54 | 5.9 |
| -2 | 28-74 | Bt1 | .2 | .2 | TR | .1 | .5 | 2.5 | 20 | .14 | 5.2 |
| -3 | 74-102 | Bt2 | .2 | .3 | TR | .2 | .7 | 4.3 | 16 | .15 | 4.8 |
| -4 | 102-130 | BC | --- | .1 | TR | .1 | .2 | 2.7 | 7 | .10 | 4.6 |
| -5 | 130-147 | C | TR | .1 | TR | .1 | .2 | 1.4 | 14 | .04 | 4.8 |

* Soils that exceed 35 percent base saturation due to long-term liming are considered cultural Alfisols.

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