



United States  
Department of  
Agriculture

Soil  
Conservation  
Service

In cooperation with  
Virginia Polytechnic  
Institute and State  
University

# Soil Survey of Accomack County, Virginia





# How To Use This Soil Survey

## General Soil Map

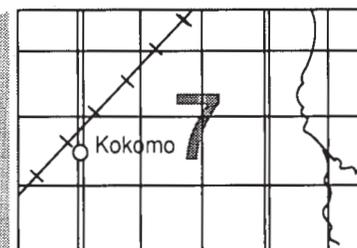
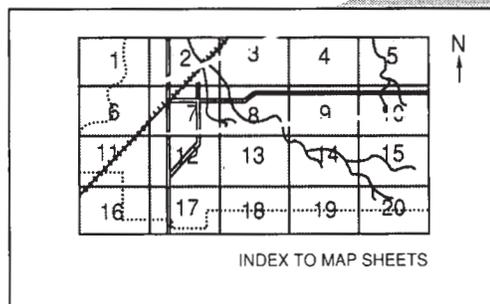
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

## Detailed Soil Maps

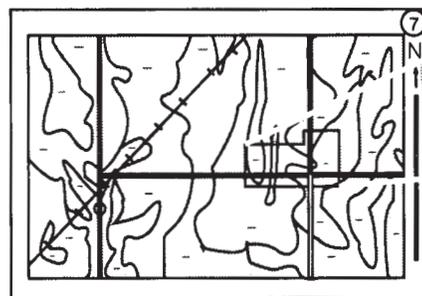
The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.

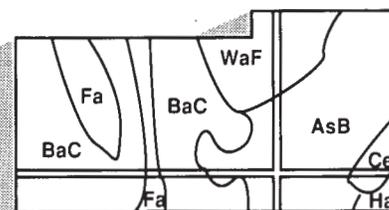


MAP SHEET

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



MAP SHEET



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

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This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1988. Soil names and descriptions were approved in 1990. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1988. This survey was made cooperatively by the Soil Conservation Service and the Virginia Polytechnic Institute and State University. It is part of the technical assistance furnished to the Eastern Shore Soil and Water Conservation District. The Virginia Department of Conservation and Historic Resources and the Accomack County Board of Supervisors provided financial assistance for the survey.

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

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

**Cover: An area of Bojac sandy loam, 0 to 2 percent slopes, used for crops. The Bojac soils are the major agricultural soils in the survey area.**

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# Index to Map Units

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# Foreword

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This soil survey contains information that can be used in land-planning programs in Accomack 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.

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 Soil Conservation Service or the Cooperative Extension Service.

George C. Norris  
State Conservationist  
Soil Conservation Service



# Soil Survey of Accomack County, Virginia

By Carl D. Peacock, Jr., and William J. Edmonds, Virginia Polytechnic Institute and State University

Fieldwork by Carl D. Peacock, Jr., Michael E. Newhouse, David W. Smith, and Gary N. Thomas, Virginia Polytechnic Institute and State University

United States Department of Agriculture, Soil Conservation Service,  
in cooperation with  
Virginia Polytechnic Institute and State University

ACCOMACK COUNTY is in the easternmost part of Virginia on the Delmarva Peninsula (fig. 1). It is bounded on the north by Worcester County, Maryland; on the east by the Atlantic Ocean; on the south by Northampton County, Virginia; and on the west by the Chesapeake Bay. The county has a total of 386,400 acres, or about 604 square miles. It is served by U.S. Highway 13, a four-lane highway, and also has rail service.

Farming and its related industries and the seafood industry are the major enterprises in the county. The major crops are vegetables, soybeans, small grain, and ornamental trees and shrubs.

This soil survey updates the soil survey of Accomack County published in 1920 (3). It provides additional information and has larger maps, which show the soils in greater detail.

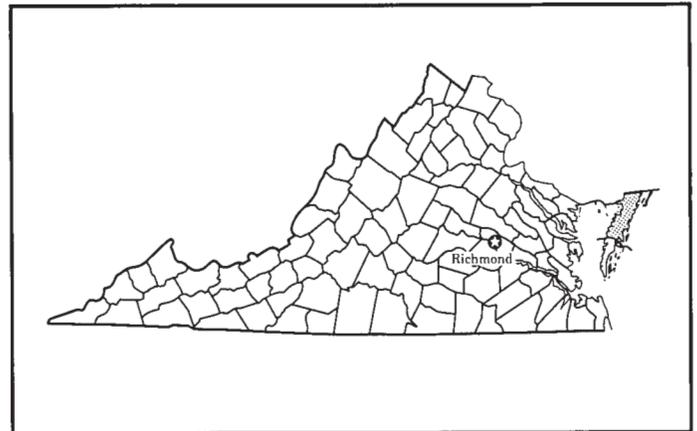


Figure 1.—Location of Accomack County in Virginia.

## General Nature of the County

This section provides information regarding some of the natural and cultural influences on land use and on the soils in the survey area. It describes history; climate; physiography, relief, and drainage; and industry.

## History

The Eastern Shore of Virginia, including the area that is now Accomack County, was inhabited by Algonquin

Indian tribes for several centuries before the arrival of Europeans. These tribes called the area "Acchawmake," which meant "land beyond the water." Areas that have retained their Indian names include many of the creeks along the bay, such as Occohannock, Nandua, Pungoteague, Onancock, and Chesconessee Creeks, and Chincoteague and Assateague Islands along the eastern shore.

The first recorded European to visit the area was Giovanni de Verrazano, who arrived in 1524. Captain Bartholomew Gilbert of England visited the region in 1603. In 1608, Captain John Smith explored the area

and found small tribes of Accomack and Occohannock Indians living along tidal creeks. The English permanently settled an area known as Accomack Plantation, which was obtained from the Indians in 1614. In 1643, the name of the area was changed to Northampton.

Accomack County was formed in 1663. The first courthouse was at Onancock, which is one of the oldest towns on the peninsula. In 1786, a new courthouse was constructed midway between the Atlantic Ocean and the Chesapeake Bay on land owned by Richard Drummond. Thus the county seat, Accomac, is sometimes called Drummondtown. Farming was the primary occupation in colonial Accomack County. The colonists produced salt, cider, brandy, nails, brick, furniture, fabrics, shoes, and ships.

Accomack County is mainly rural. It is separated from the mainland by the Chesapeake Bay but has direct access to the mainland by the Chesapeake Bay Bridge-Tunnel, which was completed in 1964.

Before 1970, the population of the county had been declining. Between 1970 and 1980, however, the population increased to 31,268.

## Climate

Prepared by Virginia Polytechnic Institute and State University.

The climate of Accomack County is mild in winter and hot and humid in summer. The winds from the Atlantic Ocean and the Chesapeake Bay provide some relief from the summer heat and intensify the cold of winter, although extended periods of bitter cold are rare. Light snowfall is occasional in winter, but snow cover for extended periods is uncommon. Precipitation is well distributed throughout the year and generally is adequate for most of the commonly grown crops.

The southern end of the county is narrower than the northern end and thus is more subject to the moderating influences of the ocean and the bay and their effects on the growing season. For example, farmers in the southern part of the county can plant Irish potatoes about 2 weeks earlier than farmers in the northern part.

The county is subject to frequent steady storms in winter, fall, and spring. These storms result in local flooding and severe shoreline erosion. Although it is north of the usual track of hurricanes and tropical storms, the county was struck by a hurricane in 1933. This storm caused extensive damage and some loss of life on the mainland and decimated settlements on the barrier islands.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Wallops Island during the period 1967 to 1979 and at Painter during

the period 1956 to 1981. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

At Wallops Island, the average temperature in winter is 37.1 degrees F and the average daily minimum temperature is 29.6 degrees. The lowest temperature on record at Wallops Island, which occurred on January 17, 1977, is 5 degrees F. In summer, the average temperature at Wallops Island is 73.7 degrees F and the average daily maximum temperature is 80.2 degrees. The highest temperature recorded at Wallops Island was 101 degrees on July 21, 1977.

At Painter, the average temperature in winter is 39.1 degrees F and the average daily minimum temperature is 30 degrees. The lowest temperature recorded at Painter, which occurred on January 17, 1965, was -5 degrees. In summer, the average temperature at Painter is 75 degrees F and the average daily maximum temperature is 84.4 degrees. The highest temperature recorded at Painter was 98 degrees on June 10, 1965.

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

The total annual precipitation at Wallops Island is 40.8 inches. Of this, 20.6 inches, or 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 14.8 inches. The heaviest 1-day rainfall during the period of record at Wallops island was 4.0 inches on July 18, 1973. Thunderstorms occur on an average of about 18 days per year.

The total annual precipitation at Painter is 42.7 inches. Of this, 21.5 inches, or 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 23.7 inches. The heaviest 1-day rainfall during the period of record at Painter was 6.18 inches on August 4, 1958. Thunderstorms occur on an average of about 5 days per year.

The average seasonal snowfall is about 9.8 inches. The greatest snow depth at any one time during the periods of record was 6 inches. On the average, 4 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the

average at dawn is about 80 percent. The sun shines 65 percent of the time possible in summer and about 55 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 20 miles per hour, in March.

### Physiography, Relief, and Drainage

Accomack County is in the Tidewater region of the Embayed section of the Atlantic Coastal Plain. It has three major landforms—mainland, tidal marsh, and barrier island.

The mainland is divided into a low terrace and a high terrace, both extending the length of the county. These terraces are separated by a discontinuous escarpment that is 25 feet above sea level.

The low terrace is generally west of U.S. Route 13 and comprises about one-third of the mainland. It consists of broad flats, which are broken by large meandering tidal creeks bordered by sloping to steep side slopes. These creeks helped to form the long, irregularly shaped necks, or peninsulas, that are characteristic of areas bordering the Chesapeake Bay. Another low terrace is at the extreme eastern edge of the mainland. This terrace consists of broad to narrow flats bordered by tidal marshes on the east and a discontinuous escarpment on the west.

The high terrace ranges in elevation from about 25 to 55 feet above sea level. The topography, which is more complex than that of the low terrace, is level to very gently undulating and is characterized by elliptical shallow depressions surrounded by gently sloping ridges. Locally, these depressions are known as whale wallows or Carolina bays. Steep slopes are along most drainageways. The soils on this terrace generally are in a more complex pattern than those on the low terrace. The high terrace is drained by tidal creeks, which narrow into small freshwater streams that are beyond tidal influence.

Extensive areas of vegetated tidal marshes are between the mainland and barrier islands, and fringe tidal marshes are along the Chesapeake Bay and its tributaries (6). These tidal marshes are flooded regularly by saltwater and are drained by an extensive system of meandering creeks. The soils in these marshes are immature. Low tides expose extensive areas of barren tidal mud flats.

The barrier islands form a chain broken by inlets, such as Quinby Inlet, Wachapreague Inlet, Metomkin Inlet, Gargatha Inlet, Assawoman Inlet, and Chincoteague Inlet. The islands are roughly parallel to the mainland, are generally less than 10 feet above sea level, and are nearly level to steep. The soils are immature and very poorly drained to excessively

drained. Tidal drainageways extend into the interior of some of the larger islands, and freshwater is scarce.

### Industry

The economy of the county is based on agriculture. In 1987 the county had 323 farms, which average 287 acres in size. For several decades Accomack County has been a leading producer of vegetables. The trend in farming from 1982 to 1987 was toward smaller acreages of soybeans, corn, and small grain and larger acreages of vegetables and more poultry, especially chickens. Most of the vegetable harvest is processed at several packing facilities and canneries within the county. Poultry is processed at two major processing plants.

Several nurseries in the county produce ornamental plants and shrubs (fig. 2). The seafood industry, operating primarily at Chincoteague, Tangier, Quinby, Wachapreague, and Saxis, consists mainly of harvesting and processing blue crabs, oysters, hard clams, sea clams, and several species of finfish. Sport fishing, waterfowl hunting, camping, and water sports are major parts of the recreation and tourist industries.

### How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; 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 in the survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

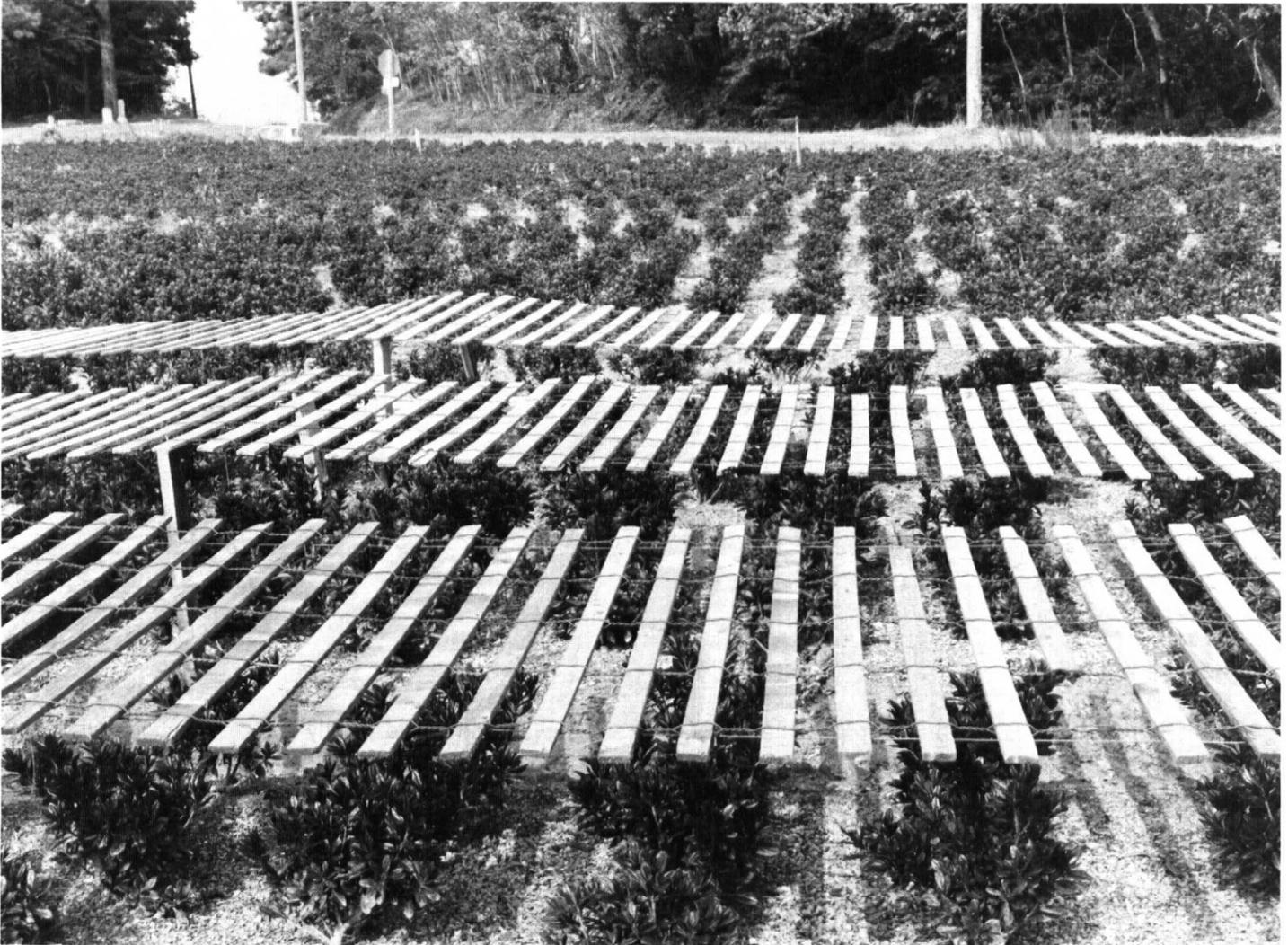


Figure 2.—Nursery stock in an area of Bojac loamy sand, 2 to 6 percent slopes.

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 soil 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. 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 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 farm records and from 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 assure 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.

## Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by two or three kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for

the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. 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 soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns 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 (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

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



# General Soil Map Units

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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. Typically, it consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up 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.

## Soil Descriptions

### 1. Melfa-Hobucken

*Level, very poorly drained, loamy soils that formed in marine and fluvial sediments*

#### **Setting**

*Landform:* Brackish tidal marshes

*Landscape position:* Flats and depressions

*Vegetation:* Black needlerush, saltmarsh cordgrass, saltmeadow hay, saltgrass, marshelder, groundsel tree, saltwort, and glasswort

*Slope range:* 0 to 1 percent

*Elevation:* Less than 1 foot

*Flooding:* Frequent; by tides

#### **Composition**

*Percent of survey area:* 8 percent

*Extent of components in the map unit:*

Melfa soils and similar soils—55 percent

Hobucken soils and similar soils—42 percent

Minor soils—3 percent

## **Soil Properties and Qualities**

### **Melfa**

*Depth:* Very deep

*Drainage class:* Very poorly drained

*Parent material:* Unconsolidated sediments

*Permeability:* Moderately rapid

*Subsoil:* Gray, coarse-loamy material

### **Hobucken**

*Depth:* Very deep

*Drainage class:* Very poorly drained

*Parent material:* Unconsolidated sediments

*Permeability:* Moderate or moderately rapid

*Subsoil:* Gray, coarse-loamy material

### **Minor Soils**

- The very poorly drained, very deep, gray, coarse-loamy Arapahoe soils in landscape positions similar to those of the major soils
- The very poorly drained, very deep, gray, sandy Polawana soils on flood plains
- Udorthents and Udipsamments in excavated and filled areas and in borrow pits

## **Use and Management**

*Major land use:* Wildlife habitat

### **Cropland**

*Suitability:* Very poorly suited

*Major management factors:* Flooding, wetness, excess salt, excess sodium

### **Woodland**

*Suitability:* Very poorly suited

*Major management factors:* Flooding, wetness, excess salt, excess sodium

### **Sanitary facilities**

*Suitability:* Very poorly suited

*Major management factors:* Flooding, wetness

### **Building site development**

*Suitability:* Very poorly suited

*Major management factors:* Flooding, wetness

## 2. Nimmo-Dragston-Munden

*Nearly level, poorly drained to moderately well drained, loamy soils that formed in marine and fluvial sediments*

### Setting

*Landform:* Coastal-plain uplands and stream terraces

*Landscape position:* Level areas, the rims of depressions, depressions, and drainageways

*Vegetation:* Mixed hardwoods and loblolly pine

*Slope range:* 0 to 2 percent

*Elevation:* 2 to 25 feet

*Flooding:* None

### Composition

*Percent of survey area:* 17 percent

*Extent of components in the map unit:*

Nimmo soils and similar soils—55 percent

Dragston soils and similar soils—27 percent

Munden soils and similar soils—15 percent

Minor soils—3 percent

### Soil Properties and Qualities

#### Nimmo

*Depth:* Very deep

*Drainage class:* Poorly drained

*Parent material:* Unconsolidated sediments

*Permeability:* Moderate in the subsoil and moderately rapid or rapid in the substratum

*Subsoil:* Gray, coarse-loamy material

#### Dragston

*Depth:* Very deep

*Drainage class:* Somewhat poorly drained

*Parent material:* Unconsolidated sediments

*Permeability:* Moderately rapid in the subsoil and rapid in the substratum

*Subsoil:* Light olive brown, coarse-loamy material mottled with gray in the upper part and gray, coarse-loamy material in the lower part

#### Munden

*Depth:* Very deep

*Drainage class:* Moderately well drained

*Parent material:* Unconsolidated sediments

*Permeability:* Moderately rapid in the subsoil and rapid or very rapid in the substratum

*Subsoil:* Yellowish brown, coarse-loamy material mottled with gray in the lower part

### Minor Soils

- The very poorly drained, very deep, gray, coarse-loamy Arapahoe soils in landscape positions similar to those of the major soils

- The well drained, very deep, strong brown, coarse-loamy Bojac soils on the summits of ridges and on side slopes

- The very poorly drained, very deep, dark gray Chincoteague soils in salt marshes

- The very poorly drained, very deep, dark gray Melfa soils in brackish tidal marshes

- The very poorly drained, very deep, gray, sandy Polawana soils on flood plains

### Use and Management

*Major land use:* Cropland

#### Cropland

*Suitability:* Moderately suited

*Major management factors:* Wetness, low organic matter content, wind erosion

#### Woodland

*Suitability:* Well suited

*Major management factors:* Wetness

#### Sanitary facilities

*Suitability:* Poorly suited

*Major management factors:* Wetness, seepage, sloughing of excavation walls

#### Building site development

*Suitability:* Poorly suited

*Major management factors:* Wetness

## 3. Nimmo-Arapahoe-Polawana

*Nearly level, poorly drained and very poorly drained, loamy and sandy soils that formed in marine and fluvial sediments*

### Setting

*Landform:* Coastal-plain uplands, stream terraces, and flood plains

*Landscape position:* Flats, depressions, and areas adjacent to drainageways and streams

*Vegetation:* Mixed hardwoods and loblolly pine

*Slope range:* 0 to 2 percent

*Elevation:* 2 to 25 feet

*Flooding:* Rare

### Composition

*Percent of survey area:* 19 percent

*Extent of components in the map unit:*

Nimmo soils and similar soils—65 percent

Arapahoe soils and similar soils—19 percent

Polawana soils and similar soils—14 percent

Minor soils—2 percent

### **Soil Properties and Qualities**

#### **Nimmo**

*Depth:* Very deep  
*Drainage class:* Poorly drained  
*Parent material:* Unconsolidated sediments  
*Permeability:* Moderate in the subsoil and moderately rapid or rapid in the substratum  
*Subsoil:* Gray, coarse-loamy material

#### **Arapahoe**

*Depth:* Very deep  
*Drainage class:* Very poorly drained  
*Parent material:* Unconsolidated sediments  
*Permeability:* Moderately rapid  
*Subsoil:* Gray, coarse-loamy material

#### **Polawana**

*Depth:* Very deep  
*Drainage class:* Very poorly drained  
*Parent material:* Unconsolidated sediments  
*Permeability:* Rapid  
*Subsoil:* Gray, sandy material

#### **Minor Soils**

- The well drained, very deep, strong brown, coarse-loamy Bojac soils on the summits of ridges and on side slopes
- The very poorly drained, very deep, gray, coarse-loamy Melfa soils in brackish tidal marshes

#### **Use and Management**

*Major land use:* Wildlife habitat

#### **Cropland**

*Suitability:* Very poorly suited  
*Major management factors:* Flooding, wetness

#### **Woodland**

*Suitability:* Well suited  
*Major management factors:* Flooding, wetness

#### **Sanitary facilities**

*Suitability:* Very poorly suited  
*Major management factors:* Flooding, wetness

#### **Building site development**

*Suitability:* Very poorly suited  
*Major management factors:* Flooding, wetness

## **4. Bojac-Munden-Molena**

*Nearly level to steep, moderately well drained to somewhat excessively drained, loamy and sandy soils that formed in marine and fluvial sediments*

#### **Setting**

*Landform:* Coastal-plain uplands and stream terraces

*Landscape position:* Nearly level and undulating areas  
*Vegetation:* Crops  
*Slope range:* 0 to 35 percent  
*Elevation:* 25 to 55 feet  
*Flooding:* None

#### **Composition**

*Percent of survey area:* 34 percent  
*Extent of components in the map unit:*  
 Bojac soils and similar soils—64 percent  
 Munden soils and similar soils—23 percent  
 Molena soils and similar soils—10 percent  
 Minor soils—3 percent

### **Soil Properties and Qualities**

#### **Bojac**

*Depth:* Very deep  
*Drainage class:* Well drained  
*Parent material:* Unconsolidated sediments  
*Permeability:* Moderately rapid  
*Subsoil:* Strong brown, coarse-loamy material

#### **Munden**

*Depth:* Very deep  
*Drainage class:* Moderately well drained  
*Parent material:* Unconsolidated sediments  
*Permeability:* Moderately rapid in the subsoil and moderately rapid or rapid in the substratum  
*Subsoil:* Yellowish brown, coarse-loamy material mottled with gray in the lower part

#### **Molena**

*Depth:* Very deep  
*Drainage class:* Somewhat excessively drained  
*Parent material:* Unconsolidated sediments  
*Permeability:* Rapid  
*Subsoil:* Strong brown, sandy material

#### **Minor Soils**

- The somewhat poorly drained, very deep, olive brown and gray, coarse-loamy Dragston soils on toe slopes and in depressions
- The poorly drained, very deep, gray, coarse-loamy Nimmo soils in depressions
- The very poorly drained, very deep, gray, sandy Polawana soils in depressions on flood plains
- The moderately well drained, very deep, sandy Seabrook soils on toe slopes
- Udorthents and Udipsamments in excavated and filled areas and in borrow pits

#### **Use and Management**

*Major land use:* Cropland

#### **Cropland**

*Suitability:* Well suited

*Major management factors:* Wetness, slope, droughtiness

#### **Woodland**

*Suitability:* Well suited

*Major management factors:* Slope, sandy material

#### **Sanitary facilities**

*Suitability:* Well suited

*Major management factors:* Wetness, poor filter, seepage, sloughing of excavation walls

#### **Building site development**

*Suitability:* Well suited

*Major management factors:* Wetness, slope, sandy material

## **5. Chincoteague**

*Level, very poorly drained, silty soils that formed in marine sediments*

### **Setting**

*Landform:* Tidal salt marshes (fig. 3)

*Landscape position:* Level areas in marshes

*Vegetation:* Saltmarsh cordgrass, saltmeadow hay, saltgrass, marshelder, groundsel tree, saltwort, and glasswort

*Slope range:* 0 to 1 percent

*Elevation:* Less than 1 foot

*Flooding:* Frequent

### **Composition**

*Percent of survey area:* 16 percent

*Extent of components in the map unit:*

Chincoteague soils and similar soils—94 percent

Minor soils—6 percent

### **Soil Properties and Qualities**

#### **Chincoteague**

*Depth:* Very deep

*Drainage class:* Very poorly drained

*Parent material:* Unconsolidated sediments

*Permeability:* Moderately slow to rapid

*Subsoil:* Gray, fine-silty material

#### **Minor Soils**

- The very poorly drained, very deep, gray, coarse-loamy Arapahoe soils in landscape positions similar to those of the major soils
- The poorly drained, very deep, gray, sandy Camocca soils in landscape positions similar to those of the major soils
- The poorly drained, very deep, gray, coarse-loamy Magotha soils on high salt marshes

- The very poorly drained, very deep, gray, sandy Polawana soils on flood plains
- Udorthents and Udipsamments in excavated and filled areas and in borrow pits

### **Use and Management**

*Major land use:* Wildlife habitat

#### **Cropland**

*Suitability:* Very poorly suited

*Major management factors:* Flooding, wetness, excess salt, excess sodium

#### **Woodland**

*Suitability:* Very poorly suited

*Major management factors:* Flooding, wetness, excess salt, excess sodium

#### **Sanitary facilities**

*Suitability:* Very poorly suited

*Major management factors:* Flooding, wetness

#### **Building site development**

*Suitability:* Very poorly suited

*Major management factors:* Flooding, wetness

## **6. Camocca-Fisherman-Beaches**

*Nearly level to gently sloping, moderately well drained to poorly drained, sandy soils that formed in marine, fluvial, and eolian sediments and deposits*

### **Setting**

*Landform:* Intermingled marshes and dunes and adjacent beaches

*Landscape position:* Depressions, flats, and undulating areas

*Vegetation:* Marshhay cordgrass, coastal saltgrass, seashore saltgrass, waxmyrtle, loblolly pine, eastern redcedar, beachgrass, and searocket

*Slope range:* 0 to 6 percent

*Elevation:* 0 to 55 feet

*Flooding:* Frequent; by storm and spring tides

### **Composition**

*Percent of survey area:* 6 percent

*Extent of components in the map unit:*

Camocca soils and similar soils—35 percent

Fisherman soils and similar soils—26 percent

Beaches—14 percent

Minor soils—25 percent

### **Soil Properties and Qualities**

#### **Camocca**

*Depth:* Very deep

*Drainage class:* Poorly drained



Figure 3.—Tidal marshes in an area of the Chincoteague general soil map unit.

*Parent material:* Unconsolidated sediments  
*Permeability:* Very rapid  
*Subsoil:* Gray, sandy material

**Fisherman**

*Depth:* Very deep  
*Drainage class:* Moderately well drained  
*Parent material:* Unconsolidated sediments  
*Permeability:* Very rapid

*Subsoil:* Yellowish brown, sandy material in the upper part and grayish brown, sandy material in the lower part

**Beaches**

*Depth:* Very deep  
*Drainage class:* Variable  
*Parent material:* Unconsolidated sediments  
*Permeability:* Rapid

**Minor Soils**

- The excessively drained, very deep, white, sandy Assateague soils on dunes
- The very poorly drained, very deep, gray, silty Chincoteague soils in tidal salt marshes
- Udorthents and Udipsamments in excavated and filled areas and in borrow pits

**Use and Management**

*Major land uses:* Wildlife habitat, recreation

**Cropland**

*Suitability:* Very poorly suited

*Major management factors:* Flooding, wetness, excess salt, excess sodium

**Woodland**

*Suitability:* Poorly suited

*Major management factors:* Flooding, wetness, excess salt, excess sodium

**Sanitary facilities**

*Suitability:* Very poorly suited

*Major management factors:* Flooding, wetness, seepage, sloughing of excavation walls, poor filter

**Building site development**

*Suitability:* Very poorly suited

*Major management factors:* Flooding, wetness, sloughing of excavation walls

## Detailed Soil Map Units

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

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

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

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

Soils of one series can differ in texture of the surface layer or of the substratum. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Bojac sandy loam, 0 to 2 percent slopes, is a phase of the Bojac series.

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

A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Fisherman-Camocca complex, 0 to 6 percent slopes, frequently flooded, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped

as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in the mapped areas are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Udorthents and Udipsamments soils, 0 to 30 percent slopes, is an undifferentiated group in this survey area.

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

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Beaches, 1 to 5 percent slopes, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

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

The suitability for cultivated crops, pasture grasses and legumes, building site development, and septic tank absorption fields is rated in each detailed soil map unit description. State and local ordinances that affect use and management are not considered. The ratings and the general criteria used for their selection are as follows:

*Well suited.*—The intended use may be initiated and maintained by using the standard materials and methods typically required. Good results can be expected.

*Moderately suited.*—The soil has limitations that make special planning, design, or maintenance necessary for the intended use.

*Poorly suited.*—The intended use is difficult or costly

to initiate and maintain because of such limitations as steep slopes, a high water table, or flooding. Major soil reclamation, special design, or intensive management practices are needed.

*Very poorly suited.*—The intended use is very difficult or costly to initiate and maintain and generally should not be undertaken.

## Soil Descriptions

### AhA—Arapahoe mucky loam, 0 to 2 percent slopes, rarely flooded

#### Setting

*Landform:* Coastal-plain stream terraces and uplands

*Landscape position:* Flats and depressions

*Size of areas:* 5 to 400 acres

#### Composition

Arapahoe and similar soils: 85 to 95 percent

Dissimilar inclusions: 5 to 15 percent

#### Inclusions

*Dissimilar inclusions:*

- Dragston soils, which have a browner subsoil than the Arapahoe soil; on the rims of depressions, on flats, and in depressions
- Munden soils, which have a browner subsoil than the Arapahoe soil; in the higher, nearly level areas
- Seabrook soils, which have a sandier subsoil than the Arapahoe soil; in the higher, nearly level areas

*Similar soils:*

- Soils that have about 5 to 15 percent gravel in the subsoil and substratum; in landscape positions similar to those of the Arapahoe soil

#### Typical Profile

0 to 7 inches—black mucky loam

7 to 13 inches—very dark gray loam

13 to 26 inches—dark gray loam

26 to 34 inches—dark gray sandy loam

34 to 85 inches—dark gray sand

#### Soil Properties and Qualities

*Drainage class:* Very poorly drained

*Permeability:* Moderately rapid

*Available water capacity:* Moderate

*Organic matter content:* High or very high

*Soil reaction:* Extremely acid to strongly acid in the surface layer and the upper part of the subsoil, strongly acid to slightly alkaline in the lower part of the subsoil and in the underlying layers

*Surface runoff:* Slow

*Hazard of water erosion:* Low

*Hazard of wind erosion:* Medium

*Depth to water table:* 0 to 12 inches

*Root zone:* More than 60 inches

*Shrink-swell potential:* Low

*Corrosivity:* To concrete—high; to steel—high

## Use and Management

### Cropland

*Suitability for cultivated crops:* Very poor

*Suitability for nursery crops:* Very poor

*Management concerns:*

- Wetness, which can be reduced by installing a drainage system
- The hazard of wind erosion, which can be reduced by establishing windbreaks, leaving plant residue on the surface, and using a conservation tillage system

### Pasture

*Suitability for grasses and legumes:* Very poor

*Management concerns:*

- Wetness, which can be reduced by installing a drainage system

### Woodland

*Potential productivity for loblolly pine:* Very high

*Site index for loblolly pine:* 93

*Estimated annual production of loblolly pine:* 140 cubic feet per acre

*Management concerns:*

- Wetness, flooding, windthrow hazard

### Septic tank absorption fields

*Suitability:* Very poor

*Management concerns:*

- Wetness, which can be reduced by placing the absorption field above the level of the seasonal high water table
- The hazard of flooding, which can be reduced by providing flood-control measures

### Building sites

*Suitability:* Very poor

*Management concerns:*

- Sloughing, which can be prevented by shoring excavation walls
- Wetness, which can be reduced by installing a drainage system
- The hazard of flooding, which can be reduced by providing flood-control measures

### Recreational areas

*Suitability:* Very poor

*Management concerns:*

- Wetness, flooding

### **Interpretive Groups**

*Land capability classification:* VIw  
*Woodland ordination symbol:* 10W

### **AmA—Arapahoe-Melfa complex, 0 to 2 percent slopes, frequently flooded**

#### **Setting**

*Landform:* Arapahoe—stream terraces; Melfa—brackish marshes

*Landscape position:* Arapahoe—flats and depressions; Melfa—level marsh areas

*Size of areas:* 5 to 1,000 acres

#### **Composition**

Arapahoe and similar soils: 40 to 50 percent

Melfa and similar soils: 35 to 45 percent

Dissimilar inclusions: 5 to 15 percent

#### **Inclusions**

*Dissimilar inclusions:*

- Munden soils, which have a browner subsoil than the major soils; in the higher, nearly level areas
- Dragston soils, which have a browner subsoil than the major soils; on the rims of depressions, on flats, and in depressions

*Similar soils:*

- Soils that have about 5 to 15 percent gravel in the subsoil and substratum; in landscape positions similar to those of the major soils

#### **Typical Profile**

##### **Arapahoe**

0 to 7 inches—black mucky loam  
 7 to 13 inches—very dark gray loam  
 13 to 26 inches—dark gray loam  
 26 to 34 inches—dark gray sandy loam  
 34 to 85 inches—dark gray sand

##### **Melfa**

0 to 6 inches—black mucky peat  
 6 to 13 inches—very dark gray sandy loam  
 13 to 26 inches—dark gray sandy loam  
 26 to 40 inches—gray sandy loam  
 40 to 50 inches—dark gray sandy loam  
 50 to 85 inches—light gray coarse sand that has light yellowish brown mottles

#### **Soil Properties and Qualities**

*Drainage class:* Very poorly drained

*Permeability:* Moderately rapid

*Available water capacity:* Arapahoe—moderate; Melfa—high

*Organic matter content:* High or very high

*Soil reaction:* Arapahoe—extremely acid to strongly acid in the surface layer and subsoil, strongly acid to slightly alkaline in the underlying layers; Melfa—strongly acid to slightly alkaline

*Surface runoff:* Arapahoe—slow; Melfa—very slow

*Hazard of water erosion:* Low

*Hazard of wind erosion:* Arapahoe—medium; Melfa—low

*Depth to water table:* 0 to 12 inches

*Root zone:* More than 60 inches

*Shrink-swell potential:* Low

*Corrosivity:* To concrete—high; to steel—high

### **Use and Management**

#### **Cropland**

*Suitability for cultivated crops:* Arapahoe—very poor; Melfa—unsuited

*Suitability for nursery crops:* Arapahoe—very poor; Melfa—unsuited

*Management concerns:*

- Wetness, which can be reduced by installing a drainage system
- Arapahoe—the hazard of wind erosion, which can be reduced by establishing windbreaks, leaving plant residue on the surface, and using a conservation tillage system
- Melfa—excess salt

#### **Pasture**

*Suitability for grasses and legumes:* Arapahoe—very poor; Melfa—unsuited

*Management concerns:*

- Wetness, which can be reduced by installing a drainage system
- Melfa—excess salt

#### **Woodland**

*Potential productivity for loblolly pine:* Arapahoe—very high; Melfa—very low (unsuited)

*Site index for loblolly pine:* Arapahoe—93

*Estimated annual production of loblolly pine:* Arapahoe—140 cubic feet per acre

*Management concerns:*

- Wetness, flooding, excess salt (fig. 4), windthrow hazard

#### **Septic tank absorption fields**

*Suitability:* Very poor

*Management concerns:*

- Wetness, which can be reduced by installing a drainage system
- The hazard of flooding, which can be reduced by providing flood-control measures

#### **Building sites**

*Suitability:* Very poor



Figure 4.—An area of Arapahoe-Melfa complex, 0 to 2 percent slopes, frequently flooded. The dead and dying trees are the result of saltwater encroachment.

*Management concerns:*

- Sloughing, which can be prevented by shoring excavation walls
- Wetness, which can be reduced by installing a drainage system
- The hazard of flooding, which can be reduced by providing flood-control measures

**Recreational areas**

*Suitability:* Very poor

*Management concerns:*

- Wetness, flooding, excess humus

**Interpretive Groups**

*Land capability classification:* Arapahoe—VIw; Melfa—VIIw

*Woodland ordination symbol:* Arapahoe—10W; Melfa—unassigned

**AtD—Assateague fine sand, 2 to 35 percent slopes, rarely flooded**

**Setting**

*Landform:* Sand dunes

*Landscape position:* Back slopes and faces of dunes

*Size of areas:* 5 to 50 acres

**Composition**

Assateague and similar soils: 85 to 95 percent

Dissimilar inclusions: 5 to 15 percent

**Inclusions**

*Dissimilar inclusions:*

- Camocca soils, which have a grayer subsoil than the Assateague soil; in flats and depressions between dunes
- Chincoteague soils, which have a grayer subsoil than

the Assateague soil; in level marsh areas

- Fisherman soils, which have a grayer subsoil than the Assateague soil; in depressions and in undulating areas that are associated with dunes and are slightly elevated above marshes

*Similar soils:*

- Soils that have about 15 to 35 percent shell fragments; in landscape positions similar to those of the Assateague soil

### **Typical Profile**

- 1 inch to 0—undecomposed and partially decomposed pine needles, hardwood leaves, and twigs
- 0 to 2 inches—dark grayish brown fine sand
- 2 to 40 inches—pale brown fine sand
- 40 to 85 inches—very pale brown fine sand

### **Soil Properties and Qualities**

*Drainage class:* Excessively drained

*Permeability:* Very rapid

*Available water capacity:* Very low

*Organic matter content:* Low

*Soil reaction:* Very strongly acid to slightly alkaline in the surface layer, moderately acid to moderately alkaline in the substratum

*Surface runoff:* Slow

*Hazard of water erosion:* Medium

*Hazard of wind erosion:* High

*Depth to water table:* More than 60 inches

*Root zone:* More than 60 inches

*Shrink-swell potential:* Low

*Corrosivity:* To concrete—low; to steel—moderate

### **Use and Management**

#### **Cropland**

*Suitability for cultivated crops:* Very poor

*Suitability for nursery crops:* Very poor

*Management concerns:*

- Content of sand, droughtiness, wind erosion, slope

#### **Pasture**

*Suitability for grasses and legumes:* Very poor

*Management concerns:*

- Content of sand, droughtiness, slope

#### **Woodland**

*Potential productivity for loblolly pine:* Moderately high

*Site index for loblolly pine:* 60

*Estimated annual production of loblolly pine:* 70 cubic feet per acre

*Management concerns:*

- Droughtiness, flooding, slope

#### **Septic tank absorption fields**

*Suitability:* Very poor

*Management concerns:*

- Poor filtering capacity, which can be overcome by increasing the size of the field
- The slope, which can be overcome by establishing the field on the contour

#### **Building sites**

*Suitability:* Very poor

*Management concerns:*

- Sloughing, which can be prevented by shoring excavation walls
- The slope, which can be overcome by special architectural design
- Droughtiness, which can be overcome by applying irrigation water

#### **Recreational areas**

*Suitability:* Very poor

*Management concerns:*

- Sandy textures, droughtiness, slope

### **Interpretive Groups**

*Land capability classification:* VIe

*Woodland ordination symbol:* 5S

## **BeB—Beaches, 1 to 5 percent slopes**

### **Setting**

*Landform:* Beaches

*Landscape position:* Adjacent to bodies of water (fig. 5)

*Size of areas:* 5 to 350 acres

### **Composition**

Beaches and similar inclusions: 85 to 95 percent

Dissimilar inclusions: 5 to 15 percent

### **Inclusions**

*Dissimilar inclusions:*

- Camocca soils, which have a grayer subsoil than the Beaches; in depressions and flats between dunes
- Chincoteague soils, which have a grayer and siltier subsoil than the Beaches; in level marsh areas

*Similar inclusions:*

- Assateague soils, which have a browner subsoil than the Beaches; on dunes
- Sediments that have 15 to 50 percent shell fragments; in landscape positions similar to those of the Beaches

### **Properties and Qualities**

*Drainage class:* Variable

*Permeability:* Rapid

*Available water capacity:* Very low

*Organic matter content:* Very low

*Soil reaction:* Variable



Figure 5.—An area of Beaches, 1 to 5 percent slopes.

*Surface runoff:* Slow

*Hazard of water erosion:* High

*Hazard of wind erosion:* High

*Depth to water table:* More than 60 inches

*Root zone:* 0 to 60 inches

*Shrink-swell potential:* Low

*Corrosivity:* To concrete—variable; to steel—variable

### ***Use and Management***

#### **Cropland**

*Suitability for cultivated crops:* Very poor

*Suitability for nursery crops:* Very poor

*Management concerns:*

- Content of sand, flooding, excess salt, wind erosion, slope

#### **Pasture**

*Suitability for grasses and legumes:* Very poor

*Management concerns:*

- Content of sand, flooding, excess salt, slope

#### **Woodland**

*Suitability:* Very poor

*Site index:* Not assigned

*Estimated annual production of wood:* Not assigned

*Management concerns:*

- Flooding, excess salt, slope

**Septic tank absorption fields***Suitability:* Very poor*Management concerns:*

- The hazard of flooding, which can be reduced by providing flood-control measures
- Wetness, which can be reduced by installing a drainage system
- Poor filtering capacity, which can be overcome by special design of the system

**Building sites***Suitability:* Very poor*Management concerns:*

- Sloughing, which can be prevented by shoring excavation walls
- Wetness, which can be reduced by installing a drainage system
- The hazard of flooding, which can be reduced by providing flood-control measures or special architectural design
- Droughtiness, which can be overcome by applying irrigation water
- Blowing sand, which can be overcome by establishing a vegetative cover and wind barriers

**Recreational areas***Suitability:* Very poor*Management concerns:*

- Flooding, wetness, sandy textures, excess salt, blowing sand

**Interpretive Groups***Land capability classification:* Unassigned*Woodland ordination symbol:* Unassigned**BhB—Bojac loamy sand, 2 to 6 percent slopes****Setting***Landform:* Stream terraces*Landscape position:* Undulating surfaces and rims of Carolina bays (fig. 6)*Size of areas:* 5 to 175 acres**Composition**

Bojac and similar soils: 85 to 95 percent

Dissimilar inclusions: 5 to 15 percent

**Inclusions***Dissimilar inclusions:*

- Dragston soils, which have a grayer subsoil than the

Bojac soil; on the rims of depressions, on flats, and in depressions

*Similar soils:*

- Soils that have about 2 to 15 percent gravel in the subsoil and about 5 to 50 percent gravel in the substratum; in landscape positions similar to those of the Bojac soil

**Typical Profile**

0 to 7 inches—brown loamy sand

7 to 27 inches—strong brown loam

27 to 33 inches—strong brown sandy loam

33 to 40 inches—strong brown loamy sand

40 to 85 inches—pale brown sand

**Soil Properties and Qualities***Drainage class:* Well drained*Permeability:* Moderately rapid*Available water capacity:* Low*Organic matter content:* Low*Soil reaction:* Extremely acid to slightly acid in the surface layer and subsoil, very strongly acid to moderately acid in the substratum*Natural fertility:* Low*Surface runoff:* Medium*Hazard of water erosion:* Medium*Hazard of wind erosion:* High*Depth to water table:* More than 48 inches*Root zone:* More than 60 inches*Shrink-swell potential:* Low*Corrosivity:* To concrete—high; to steel—low**Use and Management****Cropland***Suitability for cultivated crops:* Well suited*Suitability for nursery crops:* Well suited*Management concerns:*

- Droughtiness, which can be overcome by applying irrigation water
- The hazard of wind erosion, which can be reduced by establishing windbreaks, leaving plant residue on the surface, and using a conservation tillage system
- Low content of organic matter, which can be increased by incorporating plant residue into the soil

**Pasture***Suitability for grasses and legumes:* Well suited*Management concerns:*

- Droughtiness, which can be overcome by applying irrigation water

**Woodland***Potential productivity for loblolly pine:* High*Site index for loblolly pine:* 80



Figure 6.—Bojac loamy sand, 2 to 6 percent slopes, in the elliptical, lighter colored area along the rim of a Carolina bay. Nimmo sandy loam, 0 to 2 percent slopes, is in the area inside the bay rim, and Bojac sandy loam, 0 to 2 percent slopes, is in the area outside the rim.

*Estimated annual production of loblolly pine:* 115 cubic feet per acre

*Management concerns:*

- No major concerns

#### **Septic tank absorption fields**

*Suitability:* Well suited

*Management concerns:*

- Seasonal wetness, which can be reduced by placing the absorption field above the high water table

#### **Building sites**

*Suitability:* Well suited

*Management concerns:*

- Sloughing, which can be prevented by shoring excavation walls
- Wetness, which can be reduced by installing a drainage system

- Droughtiness, which can be overcome by applying irrigation water

#### **Recreational areas**

*Suitability:* Well suited

*Management concerns:*

- No major concerns

#### **Interpretive Groups**

*Land capability classification:* IIe

*Woodland ordination symbol:* 8S

#### **BkA—Bojac sandy loam, 0 to 2 percent slopes**

##### **Setting**

*Landform:* Stream terraces

*Landscape position:* Nearly level and undulating surfaces

*Size of areas:* 5 to 1,200 acres

### **Composition**

Bojac and similar soils: 85 to 95 percent

Dissimilar inclusions: 5 to 15 percent

### **Inclusions**

*Dissimilar inclusions:*

- Dragston soils, which have a grayer subsoil than the Bojac soil; on the rims of depressions, on flats, and in depressions

*Similar soils:*

- Soils that have about 2 to 15 percent gravel in the subsoil and about 5 to 50 percent gravel in the substratum; in landscape positions similar to those of the Bojac soil

### **Typical Profile**

0 to 7 inches—brown sandy loam

7 to 27 inches—strong brown loam

27 to 33 inches—strong brown sandy loam

33 to 40 inches—strong brown loamy sand

40 to 85 inches—pale brown sand

### **Soil Properties and Qualities**

*Drainage class:* Well drained

*Permeability:* Moderately rapid

*Available water capacity:* Low

*Organic matter content:* Low

*Soil reaction:* Extremely acid to slightly acid in the surface layer and subsoil, very strongly acid to moderately acid in the substratum

*Natural fertility:* Low

*Surface runoff:* Slow

*Hazard of water erosion:* Low

*Hazard of wind erosion:* Medium

*Depth to water table:* 48 to 72 inches

*Root zone:* More than 60 inches

*Shrink-swell potential:* Low

*Corrosivity:* To concrete—high; to steel—low

### **Use and Management**

#### **Cropland**

*Suitability for cultivated crops:* Well suited

*Suitability for nursery crops:* Well suited (fig. 7)

*Management concerns:*

- Droughtiness, which can be overcome by applying irrigation water
- The hazard of wind erosion, which can be reduced by establishing windbreaks, leaving plant residue on the surface, and using a conservation tillage system

- Low content of organic matter, which can be increased by incorporating plant residue into the soil

#### **Pasture**

*Suitability for grasses and legumes:* Well suited

*Management concerns:*

- Droughtiness, which can be overcome by applying irrigation water

#### **Woodland**

*Potential productivity for loblolly pine:* High

*Site index for loblolly pine:* 80

*Estimated annual production of loblolly pine:* 115 cubic feet per acre

*Management concerns:*

- No major concerns

#### **Septic tank absorption fields**

*Suitability:* Well suited

- Seasonal wetness, which can be reduced by placing the absorption field above the high water table

#### **Building sites**

*Suitability:* Well suited

*Management concerns:*

- Sloughing, which can be prevented by shoring excavation walls
- Wetness, which can be reduced by installing a drainage system
- Droughtiness, which can be overcome by applying irrigation water

#### **Recreational areas**

*Suitability:* Well suited

*Management concerns:*

- No major concerns

### **Interpretive Groups**

*Land capability classification:* IIs

*Woodland ordination symbol:* 8A

## **BoA—Bojac fine sandy loam, 0 to 2 percent slopes**

### **Setting**

*Landform:* Stream terraces

*Landscape position:* Nearly level and undulating surfaces

*Size of areas:* 5 to 1,300 acres

### **Composition**

Bojac and similar soils: 85 to 95 percent

Dissimilar inclusions: 5 to 15 percent



Figure 7.—Tomatoes in an area of Bojac sandy loam, 0 to 2 percent slopes.

### ***Inclusions***

#### *Dissimilar inclusions:*

- Dragston soils, which have a grayer subsoil than the Bojac soil; on the rims of depressions, on flats, and in depressions

#### *Similar soils:*

- Soils that have about 2 to 15 percent gravel in the subsoil and about 5 to 50 percent gravel in the

substratum; in landscape positions similar to those of the Bojac soil

### ***Typical Profile***

0 to 7 inches—brown fine sandy loam  
 7 to 27 inches—strong brown loam  
 27 to 33 inches—strong brown sandy loam  
 33 to 40 inches—strong brown loamy sand  
 40 to 85 inches—pale brown sand

### ***Soil Properties and Qualities***

*Drainage class:* Well drained

*Permeability:* Moderately rapid

*Available water capacity:* Low

*Organic matter content:* Low

*Soil reaction:* Extremely acid to slightly acid in the surface layer and subsoil, very strongly acid to moderately acid in the substratum

*Natural fertility:* Low

*Surface runoff:* Slow

*Hazard of water erosion:* Low

*Hazard of wind erosion:* Medium

*Depth to water table:* More than 48 inches

*Root zone:* More than 60 inches

*Shrink-swell potential:* Low

*Corrosivity:* To concrete—high; to steel—low

### ***Use and Management***

#### **Cropland**

*Suitability for cultivated crops:* Well suited

*Suitability for nursery crops:* Well suited (fig. 8)

*Management concerns:*

- Droughtiness, which can be overcome by applying irrigation water
- The hazard of wind erosion, which can be reduced by establishing windbreaks, leaving plant residue on the



Figure 8.—Spinach in an area of Bojac fine sandy loam, 0 to 2 percent slopes.

surface, and using a conservation tillage system

- Low content of organic matter, which can be increased by incorporating plant residue into the soil

#### **Pasture**

*Suitability for grasses and legumes:* Well suited

*Management concerns:*

- Droughtiness, which can be overcome by applying irrigation water

#### **Woodland**

*Potential productivity for loblolly pine:* High

*Site index for loblolly pine:* 80

*Estimated annual production of loblolly pine:* 115 cubic feet per acre

*Management concerns:*

- No major concerns

#### **Septic tank absorption fields**

*Suitability:* Well suited

*Management concerns:*

- Seasonal wetness, which can be reduced by placing the absorption field above the high water table

#### **Building sites**

*Suitability:* Well suited

*Management concerns:*

- Sloughing, which can be prevented by shoring excavation walls
- Wetness, which can be reduced by installing a drainage system
- Droughtiness, which can be overcome by applying irrigation water

#### **Recreational areas**

*Suitability:* Well suited

*Management concerns:*

- No major concerns

### ***Interpretive Groups***

*Land capability classification:* IIs

*Woodland ordination symbol:* 8A

### **CaA—Camocca fine sand, 0 to 2 percent slopes, frequently flooded**

#### ***Setting***

*Landform:* Intermingled dunes and marshes

*Landscape position:* Depressions and flats between dunes

*Size of areas:* 5 to 200 acres

#### ***Composition***

Camocca and similar soils: 85 to 95 percent

Dissimilar inclusions: 5 to 15 percent

### ***Inclusions***

*Dissimilar inclusions:*

- Assateague soils, which have a browner subsoil than the Camocca soil; on dunes

*Similar soils:*

- Chincoteague soils, which have a siltier subsoil than the Camocca soil; in level marsh areas
- Fisherman soils, which have a browner subsoil than the Camocca soil; in depressions and in undulating areas that are associated with dunes and are slightly elevated above marshes

### ***Typical Profile***

0 to 6 inches—dark grayish brown fine sand

6 to 85 inches—gray fine sand

### ***Soil Properties and Qualities***

*Drainage class:* Poorly drained

*Permeability:* Very rapid

*Available water capacity:* Very low

*Organic matter content:* Low

*Soil reaction:* Extremely acid to moderately alkaline

*Surface runoff:* Very slow

*Hazard of water erosion:* Low

*Hazard of wind erosion:* High

*Depth to water table:* 0 to 12 inches

*Root zone:* More than 60 inches

*Shrink-swell potential:* Low

*Corrosivity:* To concrete—low; to steel—low

### ***Use and Management***

#### **Cropland**

*Suitability for cultivated crops:* Very poor

*Suitability for nursery crops:* Very poor

*Management concerns:*

- Flooding, excess salt, wetness

#### **Pasture**

*Suitability for grasses and legumes:* Very poor

*Management concerns:*

- Flooding, excess salt, wetness

#### **Woodland**

*Potential productivity:* Very low

*Site index:* Not assigned

*Estimated annual production of wood:* Not assigned

*Management concerns:*

- Excess salt, flooding, wetness

#### **Septic tank absorption fields**

*Suitability:* Very poor

*Management concerns:*

- The hazard of flooding, which can be reduced by providing flood-control measures

- Wetness, which can be reduced by installing a drainage system and by special design of the absorption system
- Poor filtering capacity, which can be overcome by special design of the absorption system

#### **Building sites**

*Suitability:* Very poor

*Management concerns:*

- The hazard of flooding, which can be reduced by providing flood-control measures
- Sloughing, which can be prevented by shoring excavation walls
- Wetness, which can be reduced by installing a drainage system

#### **Recreational areas**

*Suitability:* Very poor

*Management concerns:*

- Wetness, flooding, sandy textures

#### **Interpretive Groups**

*Land capability classification:* VIIIw

*Woodland ordination symbol:* Unassigned

### **ChA—Chincoteague silt loam, 0 to 1 percent slopes, frequently flooded**

#### **Setting**

*Landform:* Tidal salt marshes

*Landscape position:* Level marsh surfaces

*Size of areas:* 5 to 4,000 acres

#### **Composition**

Chincoteague and similar soils: 85 to 95 percent

Dissimilar inclusions: 5 to 15 percent

#### **Inclusions**

*Dissimilar inclusions:*

- Dragston and Munden soils, which have a browner subsoil than the Chincoteague soil; on the higher stream terraces and coastal-plain uplands

*Similar soils:*

- Camocca soils, which have a sandier subsoil than the Chincoteague soil; in depressions and on flats associated with dunes
- Magotha soils, which have a sandier subsoil than the Chincoteague soil; in landscape positions similar to those of the Chincoteague soil
- Nimmo soils, which have a sandier subsoil than the Chincoteague soil; on the higher terraces and uplands
- Areas of tidal mudflats

#### **Typical Profile**

0 to 40 inches—dark gray silt loam

40 to 85 inches—dark gray loamy fine sand

#### **Soil Properties and Qualities**

*Drainage class:* Very poorly drained

*Permeability:* Moderately slow to rapid

*Available water capacity:* Very low

*Organic matter content:* Moderate to very high

*Soil reaction:* Moderately acid to slightly alkaline

*Surface runoff:* Very slow

*Hazard of water erosion:* Low

*Hazard of wind erosion:* Low

*Depth to water table:* Ponded 0 to 36 inches above the surface

*Root zone:* More than 60 inches

*Shrink-swell potential:* Moderate

*Corrosivity:* To concrete—high; to steel—high

#### **Use and Management**

##### **Cropland**

*Suitability for cultivated crops:* Very poor

*Suitability for nursery crops:* Very poor

*Management concerns:*

- Flooding, wetness, excess salt

##### **Pasture**

*Suitability for grasses and legumes:* Very poor

*Management concerns:*

- Flooding, wetness, excess salt

##### **Woodland**

*Suitability:* Very poor

*Site index:* Not assigned

*Estimated annual production of wood:* Not assigned

*Management concerns:*

- Excess salt, flooding, wetness

##### **Septic tank absorption fields**

*Suitability:* Very poor

*Management concerns:*

- The hazard of flooding, which can be reduced by providing flood-control measures
- Ponding, which can be overcome by special design of the absorption system and a drainage system if outlets are available
- Slow permeability, which can be overcome by special design of the system

##### **Building sites**

*Suitability:* Very poor

*Management concerns:*

- Sloughing, which can be prevented by shoring excavation walls

- Ponding, which can be overcome by a drainage system if outlets are available
- The hazard of flooding, which can be reduced by providing flood-control measures
- Low strength, which can be overcome by providing suitable base material and by special design of the foundation
- Excess salt, excess sulfur

#### **Recreational areas**

*Suitability:* Very poor

*Management concerns:*

- Flooding, ponding, excess salt

#### **Interpretive Groups**

*Land capability classification:* VIIIw

*Woodland ordination symbol:* Unassigned

### **DrA—Dragston fine sandy loam, 0 to 2 percent slopes**

#### **Setting**

*Landform:* Stream terraces

*Landscape position:* Rims of depressions, flats, and depressions

*Size of areas:* 5 to 150 acres

#### **Composition**

Dragston and similar soils: 85 to 95 percent

Dissimilar inclusions: 5 to 15 percent

#### **Inclusions**

*Dissimilar inclusions:*

- Arapahoe soils, which have a darker surface layer than the Dragston soil; on flats and in depressions
- Seabrook soils, which have a less developed subsoil than the Dragston soil; in nearly level, slightly elevated areas

*Similar soils:*

- Munden soils, which have a browner subsoil than the Dragston soil; in nearly level, slightly elevated areas
- Soils that have about 2 to 15 percent gravel in the subsoil and about 5 to 50 percent gravel in the substratum; in landscape positions similar to those of the Dragston soil

#### **Typical Profile**

- 0 to 6 inches—dark grayish brown fine sandy loam
- 6 to 15 inches—light olive brown loam that has light brownish gray and strong brown mottles
- 15 to 30 inches—gray loam that has yellowish red mottles
- 30 to 40 inches—gray fine sandy loam that has yellowish red mottles

40 to 85 inches—light gray fine sand that has yellowish red and brownish yellow mottles

#### **Soil Properties and Qualities**

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderately rapid in the subsoil and rapid in the substratum

*Available water capacity:* Moderate

*Organic matter content:* Low

*Soil reaction:* Very strongly acid or strongly acid in the surface layer and the upper part of the subsoil, very strongly acid to slightly acid in the lower part of the subsoil and in the substratum

*Surface runoff:* Slow

*Hazard of water erosion:* Low

*Hazard of wind erosion:* Medium

*Depth to water table:* 12 to 30 inches

*Root zone:* More than 60 inches

*Shrink-swell potential:* Low

*Corrosivity:* To concrete—high; to steel—low

#### **Use and Management**

##### **Cropland**

*Suitability for cultivated crops:* Moderate

*Suitability for nursery crops:* Moderate

*Management concerns:*

- Wetness, which can be reduced by installing a drainage system
- Low content of organic matter, which can be increased by incorporating plant residue into the soil
- The hazard of wind erosion in drained areas, which can be reduced by establishing windbreaks, leaving plant residue on the surface, and using a conservation tillage system

##### **Pasture**

*Suitability for grasses and legumes:* Moderate

*Management concerns:*

- Wetness, which can be reduced by installing a drainage system

##### **Woodland**

*Potential productivity for loblolly pine:* Very high

*Site index for loblolly pine:* 86

*Estimated annual production of loblolly pine:* 123 cubic feet per acre

*Management concerns:*

- Wetness

##### **Septic tank absorption fields**

*Suitability:* Poor

*Management concerns:*

- Wetness, which can be reduced by providing a drainage system and placing the absorption field above the level of the seasonal high water table

- Poor filtering capacity, which can be overcome by increasing the size of the field

#### **Building sites**

*Suitability:* Poor

*Management concerns:*

- Wetness, which can be reduced by installing a drainage system
- Sloughing, which can be prevented by shoring excavation walls
- Droughtiness, which can be overcome by applying irrigation water

#### **Recreational areas**

*Suitability:* Poor

*Management concerns:*

- Wetness

### **Interpretive Groups**

*Land capability classification:* IVw

*Woodland ordination symbol:* 9W

## **FhB—Fisherman fine sand, 0 to 6 percent slopes, occasionally flooded**

### **Setting**

*Landform:* Intermingled marshes and dunes

*Landscape position:* Depressions and undulating areas associated with dunes, slightly elevated above marshes

*Size of areas:* 5 to 250 acres

### **Composition**

Fisherman and similar soils: 85 to 95 percent

Dissimilar inclusions: 5 to 15 percent

### **Inclusions**

*Dissimilar inclusions:*

- Assateague soils, which have a browner subsoil than the Fisherman soil; on dunes
- Chincoteague soils, which have a siltier subsoil than the Fisherman soil; in level marsh areas

*Similar soils:*

- Soils that have about 15 to 35 percent shell fragments; in landscape positions similar to those of the Fisherman soil

### **Typical Profile**

0 to 6 inches—dark grayish brown fine sand

6 to 26 inches—yellowish brown fine sand

26 to 85 inches—grayish brown fine sand

### **Soil Properties and Qualities**

*Drainage class:* Moderately well drained

*Permeability:* Very rapid

*Available water capacity:* Very low

*Organic matter content:* Low

*Soil reaction:* Very strongly acid to moderately alkaline

*Surface runoff:* Slow

*Hazard of water erosion:* Low

*Hazard of wind erosion:* High

*Depth to water table:* 18 to 36 inches

*Root zone:* More than 60 inches

*Shrink-swell potential:* Low

*Corrosivity:* To concrete—low; to steel—low

### **Use and Management**

#### **Cropland**

*Suitability for cultivated crops:* Very poor

*Suitability for nursery crops:* Very poor

*Management concerns:*

- Content of sand, flooding, wetness, wind erosion

#### **Pasture**

*Suitability for grasses and legumes:* Very poor

*Management concerns:*

- Content of sand, flooding, wetness

#### **Woodland**

*Potential productivity for loblolly pine:* Moderately high

*Site index for loblolly pine:* 60

*Estimated annual production of loblolly pine:* 70 cubic feet per acre

*Management concerns:*

- Flooding, wetness

#### **Septic tank absorption fields**

*Suitability:* Very poor

*Management concerns:*

- The hazard of flooding, which can be reduced by providing flood-control measures
- Wetness, which can be reduced by installing a drainage system
- Poor filtering capacity, which can be overcome by increasing the size of the field

#### **Building sites**

*Suitability:* Very poor

*Management concerns:*

- Sloughing, which can be prevented by shoring excavation walls
- Wetness, which can be reduced by installing a drainage system
- The hazard of flooding, which can be reduced by providing flood-control measures
- Droughtiness, which can be overcome by applying irrigation water

#### **Recreational areas**

*Suitability:* Very poor

*Management concerns:*

- Flooding, sandy textures

**Interpretive Groups***Land capability classification:* IVs*Woodland ordination symbol:* 5S**FmD—Fisherman-Assateague complex, 0 to 35 percent slopes, rarely flooded****Setting***Landform:* Dunes and marshes*Landscape position:* Depressions and undulating areas associated with dunes, slightly elevated above marshes (Fisherman) and dunes (Assateague)*Slope range:* Fisherman—0 to 6 percent; Assateague—2 to 35 percent*Size of areas:* 5 to 100 acres**Composition**

Fisherman and similar soils: 40 to 50 percent

Assateague and similar soils: 35 to 45 percent

Dissimilar inclusions: 5 to 15 percent

**Inclusions***Dissimilar inclusions:*

- Chincoteague soils, which have a siltier subsoil than the major soils; in level marsh areas

*Similar soils:*

- Camocca soils, which have a grayer subsoil than the major soils; in depressions and on flats between dunes
- Soils that have about 5 to 15 percent shell fragments in the substratum; in landscape positions similar to those of the major soils

**Typical Profile****Fisherman**

0 to 6 inches—dark grayish brown fine sand

6 to 26 inches—yellowish brown fine sand

26 to 85 inches—grayish brown fine sand

**Assateague**

1 inch to 0—undecomposed and partially decomposed pine needles, hardwood leaves, and twigs

0 to 2 inches—dark grayish brown fine sand

2 to 40 inches—pale brown fine sand

40 to 85 inches—very pale brown fine sand

**Soil Properties and Qualities***Drainage class:* Fisherman—moderately well drained; Assateague—excessively drained*Permeability:* Very rapid*Available water capacity:* Very low*Organic matter content:* Low*Soil reaction:* Fisherman—very strongly acid to moderately alkaline; Assateague—very strongly acid to slightly alkaline in the surface layer, moderately acid to moderately alkaline in the substratum*Surface runoff:* Slow*Hazard of water erosion:* Low*Hazard of wind erosion:* Fisherman—high; Assateague—medium*Depth to water table:* Fisherman—18 to 36 inches; Assateague—more than 60 inches*Root zone:* More than 60 inches*Shrink-swell potential:* Low*Corrosivity:* To concrete—low; to steel—low in the Fisherman soil, moderate in the Assateague soil**Use and Management****Cropland***Suitability for cultivated crops:* Poor*Suitability for nursery crops:* Poor*Management concerns:*

- Fisherman—wetness, which can be reduced by installing a drainage system
- Both soils—the hazard of wind erosion, which can be overcome by establishing windbreaks, leaving plant residue on the surface, and using a conservation tillage system
- Assateague—droughtiness, which can be overcome by applying irrigation water
- Assateague—the slope and the hazard of water erosion, which can be reduced by farming on the contour

**Pasture***Suitability for grasses and legumes:* Poor*Management concerns:*

- Fisherman—wetness; Assateague—droughtiness, slope

**Woodland***Potential productivity for loblolly pine:* Moderately high*Site index for loblolly pine:* 60*Estimated annual production of loblolly pine:* 70 cubic feet per acre*Management concerns:*

- Fisherman—flooding, excess salt, wetness, erosion potential; Assateague—droughtiness, flooding

**Septic tank absorption fields***Suitability:* Poor*Management concerns:*

- Fisherman—the hazard of flooding, which can be reduced by providing flood-control measures
- Fisherman—wetness, which can be reduced by installing a drainage system

- Both soils—poor filtering capacity, which can be overcome by increasing the size of the field
- Assateague—the slope, which can be overcome by establishing the field on the contour

#### **Building sites**

*Suitability:* Poor

*Management concerns:*

- Sloughing, which can be prevented by shoring excavation walls
- Fisherman—wetness, which can be reduced by installing a drainage system
- The hazard of flooding, which can be reduced by providing flood-control measures
- Droughtiness, which can be overcome by applying irrigation water
- Assateague—the slope, which can be overcome by special architectural design

#### **Recreational areas**

*Suitability:* Poor

*Management concerns:*

- Flooding, sandy textures, droughtiness, slope

#### **Interpretive Groups**

*Land capability classification:* Fisherman—Vle;

Assateague—Vle

*Woodland ordination symbol:* Fisherman—5S;

Assateague—5S

### **FrB—Fisherman-Camocca complex, 0 to 6 percent slopes, frequently flooded**

#### **Setting**

*Landform:* Dunes and marshes

*Landscape position:* Depressions and undulating areas associated with dunes, slightly elevated above marshes (Fisherman) and depressions and flats between dunes (Camocca)

*Slope range:* Fisherman—0 to 6 percent; Camocca—0 to 2 percent

*Size of areas:* 5 to 300 acres

#### **Composition**

Fisherman and similar soils: 40 to 50 percent

Camocca and similar soils: 40 to 50 percent

Dissimilar inclusions: 5 to 15 percent

#### **Inclusions**

*Dissimilar inclusions:*

- Chincoteague soils, which have a siltier subsoil than the major soils; in level marsh areas

*Similar soils:*

- Assateague soils, which have a browner subsoil than the major soils; on dunes

- Soils that have about 5 to 15 percent shell fragments in the substratum; in landscape positions similar to those of the major soils

#### **Typical Profile**

##### **Fisherman**

0 to 6 inches—dark grayish brown fine sand

6 to 26 inches—yellowish brown fine sand

26 to 85 inches—grayish brown fine sand

##### **Camocca**

0 to 6 inches—dark grayish brown fine sand

6 to 85 inches—gray fine sand

#### **Soil Properties and Qualities**

*Drainage class:* Fisherman—moderately well drained;

Camocca—poorly drained

*Permeability:* Very rapid

*Available water capacity:* Very low

*Organic matter content:* Low

*Soil reaction:* Fisherman—very strongly acid to

moderately alkaline; Camocca—extremely acid to moderately alkaline

*Surface runoff:* Fisherman—slow; Camocca—very slow

*Hazard of water erosion:* Low

*Hazard of wind erosion:* High

*Depth to water table:* Fisherman—18 to 36 inches;

Camocca—0 to 12 inches

*Root zone:* More than 60 inches

*Shrink-swell potential:* Low

*Corrosivity:* To concrete—low; to steel—low

#### **Use and Management**

##### **Cropland**

*Suitability for cultivated crops:* Fisherman—poor;

Camocca—very poor

*Suitability for nursery crops:* Fisherman—poor;

Camocca—very poor

*Management concerns:*

- Wetness, flooding, excess salt, wind erosion

##### **Pasture**

*Suitability for grasses and legumes:* Poor

*Management concerns:*

- Wetness, excess salt, flooding

##### **Woodland**

*Potential productivity for loblolly pine:* Fisherman—moderately high; Camocca—very low

*Site index for loblolly pine:* Fisherman—60; Camocca—not assigned

*Estimated annual production of loblolly pine:*

Fisherman—70 cubic feet per acre; Camocca—not assigned

**Management concerns:**

- Flooding, excess salt, hazard of erosion

**Septic tank absorption fields**

*Suitability:* Very poor

**Management concerns:**

- The hazard of flooding, which can be reduced by providing flood-control measures
- Wetness, which can be reduced by providing a drainage system and placing the absorption field above the level of the seasonal high water table
- Poor filtering capacity, which can be overcome by increasing the size of the field

**Building sites**

*Suitability:* Very poor

**Management concerns:**

- Sloughing, which can be prevented by shoring excavation walls
- Wetness, which can be reduced by installing a drainage system
- The hazard of flooding, which can be reduced by providing flood-control measures
- Droughtiness, which can be overcome by applying irrigation water

**Recreational areas**

*Suitability:* Very poor

**Management concerns:**

- Flooding, wetness, sandy textures

**Interpretive Groups**

*Land capability classification:* Fisherman—IVs;  
Camocca—VIw

*Woodland ordination symbol:* Fisherman—5S;  
Camocca—unassigned

**MaA—Magotha fine sandy loam, 0 to 2 percent slopes, frequently flooded****Setting**

*Landform:* Tidal salt marshes

*Landscape position:* Level marsh surfaces (fig. 9)

*Size of areas:* 5 to 400 acres

**Composition**

Magotha and similar soils: 85 to 95 percent

Dissimilar inclusions: 5 to 15 percent

**Inclusions**

*Dissimilar inclusions:*

- Dragston soils, which have a browner subsoil than the Magotha soil; on the rims of depressions, on flats, and in depressions

- Munden soils, which have a browner subsoil than the Magotha soil; on the slightly higher terraces and coastal-plain uplands
- Seabrook soils, which have a sandier subsoil than the Magotha soil; on the slightly higher terraces and coastal-plain uplands

*Similar soils:*

- Soils that have about 15 to 35 percent gravel in the subsoil and substratum

**Typical Profile**

0 to 5 inches—dark grayish brown fine sandy loam  
5 to 22 inches—light brownish gray fine sandy loam that has strong brown and olive yellow mottles  
22 to 40 inches—gray fine sandy loam  
40 to 85 inches—light gray fine sand

**Soil Properties and Qualities**

*Drainage class:* Poorly drained

*Permeability:* Moderate to rapid

*Available water capacity:* Moderate

*Organic matter content:* Moderate to high

*Soil reaction:* Very strongly acid to slightly alkaline

*Surface runoff:* Slow

*Hazard of water erosion:* Low

*Hazard of wind erosion:* Low

*Depth to water table:* 0 to 12 inches

*Root zone:* More than 60 inches

*Shrink-swell potential:* Low

*Corrosivity:* To concrete—high; to steel—high

**Use and Management****Cropland**

*Suitability for cultivated crops:* Very poor

*Suitability for nursery crops:* Very poor

*Management concerns:*

- Wetness, flooding, excess sodium, excess salt (fig. 10)

**Pasture**

*Suitability for grasses and legumes:* Very poor

*Management concerns:*

- Wetness, flooding, excess sodium, excess salt

**Woodland**

*Potential productivity:* Very low

*Site index:* Not assigned

*Estimated annual wood production:* Not assigned

*Management concerns:*

- Wetness, flooding, excess sodium, excess salt

**Septic tank absorption fields**

*Suitability:* Very poor

*Management concerns:*

- Tidal flooding, wetness



Figure 9.—Saltmeadow hay, marshelder, and groundsel in an area of Magotha fine sandy loam, 0 to 2 percent slopes, frequently flooded.

#### **Building sites**

*Suitability:* Very poor

*Management concerns:*

- Sloughing, wetness, tidal flooding, excess salt, excess sodium

#### **Recreational areas**

*Suitability:* Very poor

*Management concerns:*

- Flooding, wetness, excess sodium, excess salt

#### **Interpretive Groups**

*Land capability classification:* VIIIw

*Woodland ordination symbol:* Unassigned

#### **McA—Melfa-Hobucken complex, 0 to 1 percent slopes, frequently flooded**

##### **Setting**

*Landform:* Tidal brackish marshes (fig. 11)

*Landscape position:* Melfa—flats; Hobucken—depressions

*Size of areas:* 5 to 4,000 acres

##### **Composition**

Melfa and similar soils: 40 to 50 percent

Hobucken and similar soils: 35 to 45 percent

Dissimilar inclusions: 5 to 15 percent

### ***Inclusions***

#### *Dissimilar inclusions:*

- Bojac, Dragston, and Munden soils, which have a browner subsoil than the major soils; on the slightly higher terraces and coastal-plain uplands
- Seabrook soils, which have a sandier subsoil than the major soils; on the slightly higher terraces and coastal-plain uplands

#### *Similar soils:*

- Chincoteague soils, which have a siltier subsoil than the major soils; in landscape positions similar to those of the major soils

### ***Typical Profile***

#### **Melfa**

0 to 6 inches—black mucky peat



Figure 10.—An area of Magotha fine sandy loam, 0 to 2 percent slopes, frequently flooded. The splotches on the surface are evidence of salt in the soil. The pen is about 5 inches long.



Figure 11.—Black needlerush and saltgrass in an area of Melfa-Hobucken complex, 0 to 1 percent slopes, frequently flooded.

6 to 13 inches—very dark gray sandy loam  
 13 to 26 inches—dark gray sandy loam  
 26 to 40 inches—gray sandy loam  
 40 to 50 inches—dark gray sandy loam  
 50 to 85 inches—light gray coarse sand that has light yellowish brown mottles

#### **Hobucken**

0 to 13 inches—very dark gray loam  
 13 to 40 inches—gray loam that has light olive brown mottles  
 40 to 85 inches—light gray sand

#### ***Soil Properties and Qualities***

*Drainage class:* Very poorly drained

*Permeability:* Melfa—moderately rapid; Hobucken—moderate or moderately rapid

*Available water capacity:* Melfa—high; Hobucken—moderate

*Organic matter content:* Melfa—very high; Hobucken—high

*Soil reaction:* Melfa—strongly acid to slightly alkaline; Hobucken—slightly acid to moderately alkaline

*Surface runoff:* Very slow

*Hazard of water erosion:* Low  
*Hazard of wind erosion:* Low  
*Depth to water table:* Melfa—0 to 12 inches;  
 Hobucken—ponded 12 inches above to 12 inches  
 below the surface  
*Root zone:* More than 60 inches  
*Shrink-swell potential:* Low  
*Corrosivity:* To concrete—high; to steel—high

### **Use and Management**

#### **Cropland**

*Suitability for cultivated crops:* Very poor  
*Suitability for nursery crops:* Very poor  
*Management concerns:*  
 • Wetness, flooding, excess salt

#### **Pasture**

*Suitability for grasses and legumes:* Very poor  
*Management concerns:*  
 • Wetness, flooding, excess salt

#### **Woodland**

*Potential productivity:* Very low  
*Site index:* Not assigned  
*Estimated annual wood production:* Not assigned  
*Management concerns:*  
 • Wetness, flooding, excess salt

#### **Septic tank absorption fields**

*Suitability:* Very poor  
*Management concerns:*  
 • Flooding, wetness, ponding

#### **Building sites**

*Suitability:* Very poor  
*Management concerns:*  
 • Sloughing, flooding, wetness, ponding, excess salt

#### **Recreational areas**

*Suitability:* Very poor  
*Management concerns:*  
 • Flooding, wetness, ponding, excess humus, excess salt

### **Interpretive Groups**

*Land capability classification:* Melfa—VIIIw; Hobucken—VIIIw  
*Woodland ordination symbol:* Melfa—unassigned;  
 Hobucken—unassigned

## **MoB—Molena loamy sand, 0 to 6 percent slopes**

### **Setting**

*Landform:* Coastal-plain uplands and stream terraces

*Landscape position:* Undulating surfaces  
*Size of areas:* 5 to 175 acres

### **Composition**

Molena and similar soils: 85 to 95 percent  
 Dissimilar inclusions: 5 to 15 percent

### **Inclusions**

*Dissimilar inclusions:*

- Dragston soils, which have a grayer subsoil than the Molena soil; on the rims of depressions, on flats, and in depressions

*Similar soils:*

- Soils that have about 15 to 35 percent gravel in the subsoil and substratum; in landscape positions similar to those of the Molena soil

### **Typical Profile**

0 to 8 inches—brown loamy sand  
 8 to 30 inches—strong brown loamy sand  
 30 to 45 inches—yellowish brown loamy sand  
 45 to 85 inches—light yellowish brown sand

### **Soil Properties and Qualities**

*Drainage class:* Somewhat excessively drained  
*Permeability:* Rapid  
*Available water capacity:* Low  
*Organic matter content:* Low  
*Soil reaction:* Very strongly acid to moderately acid  
*Natural fertility:* Low  
*Surface runoff:* Slow  
*Hazard of water erosion:* Medium  
*Hazard of wind erosion:* High  
*Depth to water table:* More than 60 inches  
*Root zone:* More than 60 inches  
*Shrink-swell potential:* Low  
*Corrosivity:* To concrete—high; to steel—low

### **Use and Management**

#### **Cropland**

*Suitability for cultivated crops:* Moderate  
*Suitability for nursery crops:* Moderate  
*Management concerns:*  
 • Droughtiness, which can be overcome by applying irrigation water  
 • The hazard of wind erosion, which can be reduced by establishing windbreaks, leaving plant residue on the surface, and using a conservation tillage system  
 • Low content of organic matter, which can be increased by incorporating plant residue into the soil

#### **Pasture**

*Suitability for grasses and legumes:* Moderate

*Management concerns:*

- Droughtiness, which can be overcome by applying irrigation water

**Woodland**

*Potential productivity for loblolly pine:* High

*Site index for loblolly pine:* 80

*Estimated annual production of loblolly pine:* 110 cubic feet per acre

*Management concerns:*

- Droughtiness

**Septic tank absorption fields**

*Suitability:* Moderate

*Management concerns:*

- Poor filtering capacity, which can be overcome by increasing the size of the field

**Building sites**

*Suitability:* Well suited

*Management concerns:*

- Sloughing, which can be prevented by shoring excavation walls
- Droughtiness, which can be overcome by applying irrigation water

**Recreational areas**

*Suitability:* Well suited

*Management concerns:*

- Sandy textures, slope, droughtiness

**Interpretive Groups**

*Land capability classification:* IIIs

*Woodland ordination symbol:* 8S

**MoD—Molena loamy sand, 6 to 35 percent slopes****Setting**

*Landform:* Coastal-plain uplands and stream terraces

*Landscape position:* Sloping surfaces and escarpments

*Size of areas:* 5 to 175 acres

**Composition**

Molena and similar soils: 85 to 95 percent

Dissimilar inclusions: 5 to 15 percent

**Inclusions***Dissimilar inclusions:*

- Dragston soils, which have a grayer subsoil than the Molena soil; on the rims of depressions, on flats, and in depressions

*Similar soils:*

- Soils that have about 15 to 35 percent gravel in the subsoil and substratum; in landscape positions similar to those of the Molena soil

**Typical Profile**

0 to 8 inches—brown loamy sand

8 to 30 inches—strong brown loamy sand

30 to 45 inches—yellowish brown loamy sand

45 to 85 inches—light yellowish brown sand

**Soil Properties and Qualities**

*Drainage class:* Somewhat excessively drained

*Permeability:* Rapid

*Available water capacity:* Low

*Organic matter content:* Low

*Soil reaction:* Very strongly acid to moderately acid

*Surface runoff:* Medium

*Hazard of water erosion:* High

*Hazard of wind erosion:* High

*Depth to water table:* More than 60 inches

*Root zone:* More than 60 inches

*Shrink-swell potential:* Low

*Corrosivity:* To concrete—high; to steel—low

**Use and Management****Cropland**

*Suitability for cultivated crops:* Poor

*Suitability for nursery crops:* Poor

*Management concerns:*

- Droughtiness, which can be overcome by applying irrigation water
- The slope and the hazard of water erosion, which can be reduced by farming on the contour and using a conservation tillage system
- Low content of organic matter, which can be increased by incorporating plant residue into the soil
- The hazard of wind erosion, which can be reduced by establishing windbreaks, leaving plant residue on the surface, and using a conservation tillage system

**Pasture**

*Suitability for grasses and legumes:* Very poor

*Management concerns:*

- Droughtiness, low content of organic matter

**Woodland**

*Potential productivity for loblolly pine:* High

*Site index for loblolly pine:* 80

*Estimated annual production of loblolly pine:* 110 cubic feet per acre

*Management concerns:*

- Droughtiness, slope

**Septic tank absorption fields**

*Suitability:* Poor

*Management concerns:*

- Poor filtering capacity, which can be overcome by increasing the size of the field or by special design of the absorption system
- The slope, which can be overcome by special design

and installation of the absorption system or by establishing the field on the contour

#### **Building sites**

*Suitability:* Poor

*Management concerns:*

- Sloughing, which can be prevented by shoring excavation walls
- Droughtiness, which can be overcome by applying irrigation water
- The slope, which can be overcome by special architectural design

#### **Recreational areas**

*Suitability:* Poor

*Management concerns:*

- Sandy textures, slope, droughtiness

#### **Interpretive Groups**

*Land capability classification:* V1e

*Woodland ordination symbol:* 8S

### **MuA—Munden sandy loam, 0 to 2 percent slopes**

#### **Setting**

*Landform:* Coastal-plain uplands and stream terraces

*Landscape position:* Nearly level surfaces

*Size of areas:* 5 to 300 acres

#### **Composition**

Munden and similar soils: 85 to 95 percent

Dissimilar inclusions: 5 to 15 percent

#### **Inclusions**

*Dissimilar inclusions:*

- Nimmo soils, which have a grayer subsoil than the Munden soil; on flats and in depressions

*Similar soils:*

- Seabrook soils, which have a sandier subsoil than the Munden soil; in landscape positions similar to those of the Munden soil
- Soils that have about 5 to 35 percent gravel in the subsoil and substratum; in landscape positions similar to those of the Munden soil

#### **Typical Profile**

0 to 8 inches—dark grayish brown sandy loam

8 to 20 inches—yellowish brown loam

20 to 25 inches—yellowish brown sandy loam that has reddish yellow and pale brown mottles

25 to 40 inches—yellowish brown sandy loam that has reddish yellow and light gray mottles

40 to 55 inches—mottled pale brown and grayish brown loamy sand

55 to 85 inches—grayish brown fine sand

#### **Soil Properties and Qualities**

*Drainage class:* Moderately well drained

*Permeability:* Moderately rapid in the subsoil, moderately rapid or rapid in the substratum

*Available water capacity:* Low

*Organic matter content:* Low

*Soil reaction:* Very strongly acid to moderately acid

*Natural fertility:* Low

*Surface runoff:* Slow

*Hazard of water erosion:* Low

*Hazard of wind erosion:* High

*Depth to water table:* 18 to 30 inches

*Root zone:* More than 60 inches

*Shrink-swell potential:* Low

*Corrosivity:* To concrete—high; to steel—low

#### **Use and Management**

##### **Cropland**

*Suitability for cultivated crops:* Well suited

*Suitability for nursery crops:* Well suited (fig. 12)

*Management concerns:*

- Wetness early in the growing season, which can be reduced by installing a drainage system
- Droughtiness later in the growing season, which can be overcome by applying irrigation water
- Low content of organic matter, which can be increased by incorporating plant residue into the soil

##### **Pasture**

*Suitability for grasses and legumes:* Well suited

*Management concerns:*

- Wetness

##### **Woodland**

*Potential productivity for loblolly pine:* Very high

*Site index for loblolly pine:* 90

*Estimated annual production of loblolly pine:* 130 cubic feet per acre

*Management concerns:*

- Wetness

##### **Septic tank absorption fields**

*Suitability:* Moderate

*Management concerns:*

- Wetness, which can be reduced by placing the absorption field above the level of the seasonal high water table
- Poor filtering capacity, which can be overcome by increasing the size of the field

##### **Building sites**

*Suitability:* Well suited



Figure 12.—Kale in an area of Munden sandy loam, 0 to 2 percent slopes.

*Management concerns:*

- Sloughing, which can be prevented by shoring excavation walls
- Wetness, which can be reduced by installing a drainage system
- Droughtiness, which can be overcome by applying irrigation water

**Recreational areas**

*Suitability:* Well suited

*Management concerns:*

- Wetness, droughtiness

***Interpretive Groups***

*Land capability classification:* IIw

*Woodland ordination symbol:* 9W

## NmA—Nimmo sandy loam, 0 to 2 percent slopes

### Setting

*Landform:* Coastal-plain uplands and stream terraces

*Landscape position:* Flats, depressions, and drainageways

*Size of areas:* 5 to 400 acres

### Composition

Nimmo and similar soils: 85 to 95 percent

Dissimilar inclusions: 5 to 15 percent

### Inclusions

*Dissimilar inclusions:*

- Munden soils, which have a browner subsoil than the Nimmo soil; in the slightly higher positions on the landscape
- Seabrook soils, which have a sandier subsoil than the Nimmo soil; in the slightly higher positions on the landscape

*Similar soils:*

- Dragston soils, which have a browner subsoil than the Nimmo soil; in landscape positions similar to those of the Nimmo soil
- Polawana soils, which have a sandier subsoil than the Nimmo soil; adjacent to drainageways
- Soils that have about 5 to 15 percent gravel in the subsoil and substratum; in landscape positions similar to those of the Nimmo soil

### Typical Profile

0 to 6 inches—dark gray sandy loam

6 to 28 inches—gray loam that has brownish yellow mottles

28 to 32 inches—light gray sandy loam that has yellow mottles

32 to 50 inches—light gray sand that has yellow mottles

50 to 85 inches—white sand

### Soil Properties and Qualities

*Drainage class:* Poorly drained

*Permeability:* Moderate in the subsoil, moderately rapid or rapid in the substratum

*Available water capacity:* Low

*Organic matter content:* Low to moderate

*Soil reaction:* Extremely acid to strongly acid

*Surface runoff:* Slow

*Hazard of water erosion:* Low

*Hazard of wind erosion:* High

*Depth to water table:* 0 to 12 inches

*Root zone:* More than 60 inches

*Shrink-swell potential:* Low

*Corrosivity:* To concrete—high; to steel—low

## Use and Management

### Cropland

*Suitability for cultivated crops:* Poor

*Suitability for nursery crops:* Poor

*Management concerns:*

- Wetness, which can be reduced by installing a drainage system
- Low content of organic matter, which can be increased by incorporating plant residue into the soil

### Pasture

*Suitability for grasses and legumes:* Poor

*Management concerns:*

- Wetness

### Woodland

*Potential productivity for loblolly pine:* Very high

*Site index for loblolly pine:* 95

*Estimated annual production of loblolly pine:* 140 cubic feet per acre

*Management concerns:*

- Wetness

### Septic tank absorption fields

*Suitability:* Very poor

*Management concerns:*

- Wetness, which can be reduced by installing a drainage system
- Poor filtering capacity, which can be overcome by special design and installation of the absorption system

### Building sites

*Suitability:* Very poor

*Management concerns:*

- Sloughing, which can be prevented by shoring excavation walls
- Wetness, which can be reduced by installing a drainage system

### Recreational areas

*Suitability:* Very poor

*Management concerns:*

- Wetness

### Interpretive Groups

*Land capability classification:* IVw

*Woodland ordination symbol:* 10W

## PoA—Polawana mucky sandy loam, 0 to 2 percent slopes, frequently flooded

### Setting

*Landform:* Coastal-plain uplands, stream terraces, and flood plains

*Landscape position:* Adjacent to drainageways and streams

*Size of areas:* 5 to 400 acres

### **Composition**

Polawana and similar soils: 85 to 95 percent

Dissimilar inclusions: 5 to 15 percent

### **Inclusions**

*Dissimilar inclusions:*

- Dragston soils, which have more clay in the subsoil than the Polawana soil; on the rims of depressions, on flats, and in depressions
- Munden soils, which have more clay in the subsoil than the Polawana soil; in the slightly higher positions on the landscape
- Seabrook soils, which have a browner subsoil than the Polawana soil; in the slightly higher positions on the landscape

*Similar soils:*

- Nimmo soils, which have more clay in the subsoil than the Polawana soil; on flats and in depressions
- Soils that have about 1 to 35 percent gravel in the subsoil and substratum; in landscape positions similar to those of the Polawana soil

### **Typical Profile**

0 to 22 inches—very dark brown mucky sandy loam

22 to 32 inches—very dark gray loamy fine sand

32 to 85 inches—dark gray sand

### **Soil Properties and Qualities**

*Drainage class:* Very poorly drained

*Permeability:* Rapid

*Available water capacity:* Low

*Organic matter content:* Moderate to very high

*Soil reaction:* Very strongly acid to neutral

*Surface runoff:* Ponded or very slow

*Hazard of water erosion:* Low

*Hazard of wind erosion:* Low

*Depth to water table:* Ponded 12 inches above to 6 inches below the surface

*Root zone:* More than 60 inches

*Shrink-swell potential:* Low

*Corrosivity:* To concrete—high; to steel—high

### **Use and Management**

#### **Cropland**

*Suitability for cultivated crops:* Very poor

*Suitability for nursery crops:* Very poor

*Management concerns:*

- Wetness, which can be reduced by installing a drainage system

#### **Pasture**

*Suitability for grasses and legumes:* Poor

*Management concerns:*

- Wetness

#### **Woodland**

*Potential productivity for loblolly pine:* Very high

*Site index for loblolly pine:* 98

*Estimated annual production of loblolly pine:* 150 cubic feet per acre

*Management concerns:*

- Wetness, flooding

#### **Septic tank absorption fields**

*Suitability:* Very poor

*Management concerns:*

- The hazard of flooding, which can be reduced by providing flood-control measures
- Ponding, which can be overcome by installing a drainage system if suitable outlets are available
- Poor filtering capacity, which can be overcome by special design and installation of the absorption system

#### **Building sites**

*Suitability:* Very poor

*Management concerns:*

- Sloughing, which can be prevented by shoring excavation walls
- Ponding, which can be overcome by installing a drainage system if suitable outlets are available
- The hazard of flooding, which can be reduced by providing flood-control measures

#### **Recreational areas**

*Suitability:* Very poor

*Management concerns:*

- Flooding, ponding

### **Interpretive Groups**

*Land capability classification:* VIIw

*Woodland ordination symbol:* 9W

## **SeA—Seabrook loamy fine sand, 0 to 2 percent slopes**

### **Setting**

*Landform:* Coastal-plain uplands and stream terraces

*Landscape position:* Nearly level surfaces

*Size of areas:* 5 to 300 acres

### **Composition**

Seabrook and similar soils: 85 to 95 percent

Dissimilar inclusions: 5 to 15 percent

### **Inclusions**

*Dissimilar inclusions:*

- Bojac soils, which have a browner subsoil than the Seabrook soil; in the slightly higher positions on the landscape

- Nimmo soils, which have a grayer subsoil than the Seabrook soil; on flats and in depressions

*Similar soils:*

- Dragston soils, which have more clay in the subsoil than the Seabrook soil; on the rims of depressions, on flats, and in depressions
- Soils that have about 15 to 35 percent gravel in the subsoil and about 35 to 50 percent gravel in the substratum; in landscape positions similar to those of the Seabrook soil

### **Typical Profile**

- 0 to 10 inches—dark grayish brown loamy sand
- 10 to 20 inches—brown loamy sand
- 20 to 35 inches—light yellowish brown loamy sand
- 35 to 45 inches—light yellowish brown loamy sand that has brownish yellow and light gray mottles
- 45 to 85 inches—mottled light gray and brownish yellow sand

### **Soil Properties and Qualities**

- Drainage class:* Moderately well drained
- Permeability:* Rapid
- Available water capacity:* Low
- Organic matter content:* Low
- Soil reaction:* Very strongly acid to slightly acid
- Natural fertility:* Low
- Surface runoff:* Slow
- Hazard of water erosion:* Low
- Hazard of wind erosion:* High
- Depth to water table:* 24 to 48 inches
- Root zone:* More than 60 inches
- Shrink-swell potential:* Low
- Corrosivity:* To concrete—moderate; to steel—low

### **Use and Management**

#### **Cropland**

- Suitability for cultivated crops:* Moderate
- Suitability for nursery crops:* Moderate
- Management concerns:*
  - Wetness, which can be reduced by installing a drainage system
  - Droughtiness, which can be overcome by applying irrigation water
  - The hazard of wind erosion, which can be reduced by establishing windbreaks, leaving plant residue on the surface, and using a conservation tillage system
  - Low content of organic matter, which can be increased by incorporating plant residue into the soil

#### **Pasture**

- Suitability for grasses and legumes:* Moderate
- Management concerns:*
  - Wetness, droughtiness

#### **Woodland**

- Potential productivity for loblolly pine:* High
- Site index for loblolly pine:* 81
- Estimated annual production of loblolly pine:* 110 cubic feet per acre
- Management concerns:*
  - Wetness

#### **Septic tank absorption fields**

- Suitability:* Moderate
- Management concerns:*
  - Wetness, which can be reduced by placing the absorption field above the level of the seasonal high water table
  - Poor filtering capacity, which can be overcome by increasing the size of the field

#### **Building sites**

- Suitability:* Well suited
- Management concerns:*
  - Sloughing, which can be prevented by shoring excavation walls
  - Wetness, which can be reduced by installing a drainage system
  - Droughtiness, which can be overcome by applying irrigation water

#### **Recreational areas**

- Suitability:* Well suited
- Management concerns:*
  - Wetness, sandy textures, droughtiness

### **Interpretive Groups**

- Land capability classification:* IVs
- Woodland ordination symbol:* 8S

### **UpD—Udorthents and Udipsamments soils, 0 to 30 percent slopes**

#### **Setting**

- Landform:* Coastal-plain uplands, stream terraces, and marshes
- Landscape position:* Filled areas and borrow pits
- Size of areas:* 5 to 50 acres

#### **Composition**

- Udorthents and similar soils: 40 to 50 percent
- Udipsamments and similar soils: 30 to 40 percent
- Dissimilar inclusions: 5 to 15 percent

#### **Inclusions**

- Dissimilar inclusions:*
  - Chincoteague soils, which have a siltier subsoil than the major soils; in level marsh areas

*Similar soils:*

- Bojac and Molena soils, which have a developed subsoil; on coastal-plain uplands and stream terraces

**Soil Properties and Qualities****Udorthents**

*Drainage class:* Somewhat poorly drained to excessively drained

*Permeability:* Moderately slow to rapid

*Available water capacity:* Very low to high

*Organic matter content:* Low to high

*Soil reaction:* Ultra acid to moderately alkaline

*Surface runoff:* Very slow to rapid

*Hazard of water erosion:* Low to high

*Hazard of wind erosion:* Low to high

*Depth to water table:* 18 to more than 60 inches

*Root zone:* More than 60 inches

*Shrink-swell potential:* Low to moderate

*Corrosivity:* To concrete—variable; to steel—variable

**Use and Management***Major uses:*

- Landfills, borrow pits, and dredge spoils

*Management concerns:*

- The suitability of these soils for any use is variable.

**Interpretive Groups**

*Land capability classification:* Udorthents—unassigned;  
Udipsamments—unassigned

*Woodland ordination symbol:* Udorthents—unassigned;  
Udipsamments—unassigned

**Prime Farmland**

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. 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 the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban or built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal expenditure of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. 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 Soil Conservation Service.

About 179,875 acres in the survey area, or more than 59 percent of the total acreage, meets the soil requirements for prime farmland.

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table qualify as prime farmland only in areas where this limitation has been overcome by drainage measures. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not this limitation has been overcome by corrective measures.



# Use and Management of the Soils

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This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help 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; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and 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 failures caused by unfavorable soil properties.

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

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

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

## Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly

grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

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

According to the 1987 census of agriculture, about 74,134 acres in Accomack County was used for crops. Soybeans and wheat were planted on 50,064 acres (fig. 13). The rest of the acreage consisted mainly of Irish potatoes, tomatoes, cucumbers, snap beans, sweet potatoes, green peppers, spinach and other greens, cabbage, and nursery crops. The main trend in the 1980's was toward fewer acres of small grain and soybeans and more acres of vegetables. On the mainland, the soils and the climate, which provides an average of 230 frost-free days each year, are well suited to most of the crops commonly grown in the area. The salt marshes and barrier islands are generally unsuited to crops and pasture.

Most of the mainland is suited to hay and pasture, but only about 346 acres in the county was used for forage crops in 1987. The forage crops are mainly a mixture of fescue and clover. Proper stocking rates, rotation grazing, deferred grazing, and applications of lime and fertilizer increase the productivity of pastures. The soils that have a seasonal high water table are not suited to alfalfa.

Most of the mainland soils are well suited to nursery stock. A drainage system is needed in areas of the Dragston and Nimmo soils, and irrigation usually is needed throughout the county during the growing season. Applications of lime and of peat, pine bark, and other types of organic matter are the main management practices in areas used for nursery stock.

Most of the mainland soils in the county respond well to applications of nitrate, phosphate, and potash. The soils are very strongly acid to moderately acid, and lime

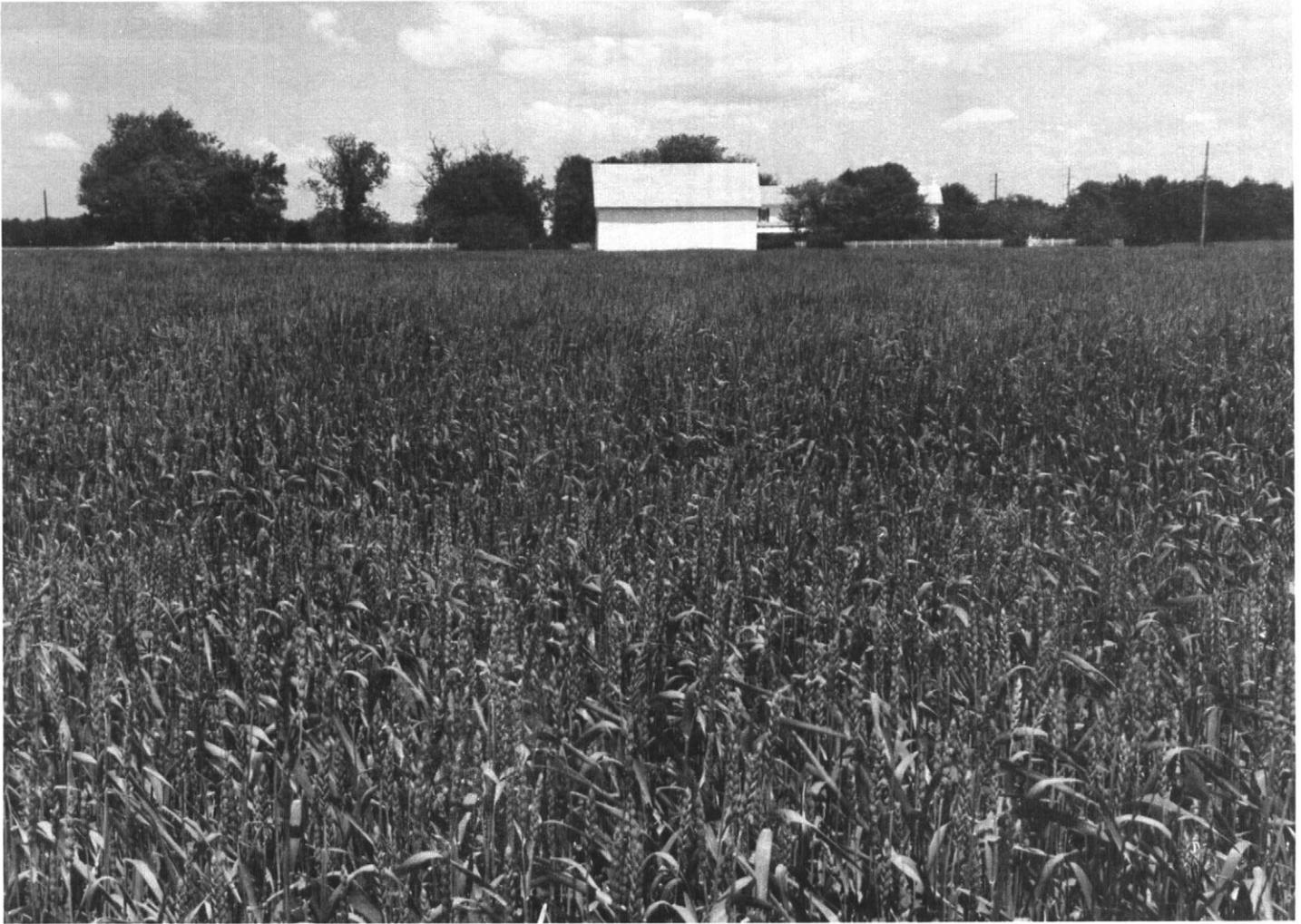


Figure 13.—Wheat in an area of Bojac sandy loam, 0 to 2 percent slopes.

is needed to reduce the level of acidity, which is too high for most crops. Most of these soils have a subsoil of sandy loam, fine sandy loam, or loam and have a sandy substratum at a depth of 2.5 to 4.0 feet. Therefore, the main limitation affecting crops, especially vegetables, is a low available water capacity. Irrigation and conservation cropping systems are used in many areas.

Most of the soils in the survey area that are used for crops have a surface layer of sandy loam or fine sandy loam and a low content of organic matter. Incorporating organic matter, such as manure, into the soil increases water retention and provides a source of nitrogen for crops. It also increases the rate of water infiltration, reduces surface crusting and the hazard of erosion, and promotes good tilth. Leaving crop residue on the surface also helps to prevent crusting and erosion.

The hazard of water erosion is generally slight in the survey area. It occurs mainly in areas of the moderately sloping to steep Molena soils and the gently sloping Bojac soils. Wind erosion, or soil blowing, is a hazard on all of the soils used for crops, particularly Bojac, Molena, Munden, and Seabrook soils. It reduces the amount of available plant nutrients, the content of organic matter, the rate of water infiltration, and the available water capacity and also affects tilth. In many areas of farmland, it results in pollution and sedimentation in the nearby tidal creeks. The main erosion-control practices are no-till farming, strip tilling, stubble mulching and chiseling, planting cover crops, and planting trees for windbreaks. A cover crop also increases the nitrogen in the soil and improves tilth.

Most of the drainage systems in the county are in areas of Dragston and Nimmo soils. The design of the

system depends on the soil. A combined surface and subsurface system is used in some areas of poorly drained soils that are farmed intensively. Adequate drainage outlets are not available in some areas.

### 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 6. 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 farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

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

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

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils 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. 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 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 Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have 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*, *s*, or *c*, 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); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

## Woodland Management and Productivity

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination 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. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 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 *N*, snowpack. 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 *N*.

In table 7, *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 season 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 season 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 seasonal 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 seasonal 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.

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 relative to 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. For example, Arapahoe and Nimmo soils are in productivity

class 10, which indicates very high yields of loblolly pine. Fisherman and Assateague soils are in productivity class 5, which indicates moderately high yields of loblolly pine.

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 the one that determines the ordination class.

*Trees to plant* are those that are suitable for commercial wood production.

## Recreation

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public 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 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

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

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

remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

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

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

*Paths and trails* for hiking 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

The county provides habitat for a large and varied population of wildlife and fish. On the mainland, white-tailed deer, gray squirrel, cottontail rabbit, quail, mourning dove, woodcock, and songbirds inhabit the wooded areas. The county has about 170,000 acres of wetlands, which serve as a major wintering area for many species of migratory waterfowl. It has about 82,000 acres of saltwater, which provides habitat for many species of finfish, crabs, oysters, and clams. The salt marshes and the barrier islands provide habitat for the famous Chincoteague ponies (fig. 14) and for shorebirds, such as rails, sandpipers, plovers, oystercatchers, godwits, and dowitchers.

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

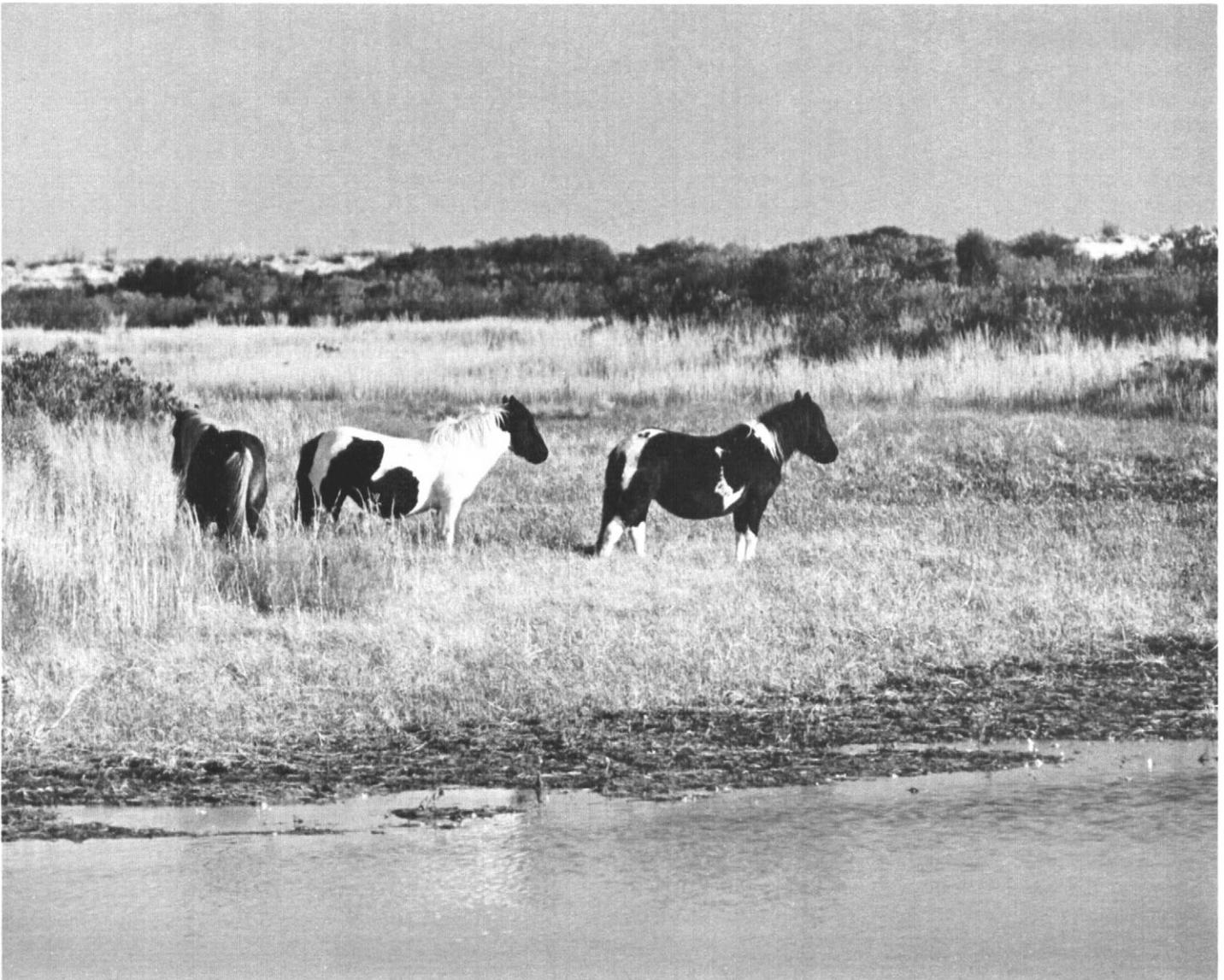


Figure 14.—Accomack County is famous for its Chincoteague ponies. This photograph was taken in an area of Fisherman-Camocca complex, 0 to 6 percent slopes, frequently flooded.

vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult

and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

*Grain and seed crops* are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

*Grasses and legumes* are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, brome grass, 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, goldenrod, beggarweed, wheatgrass, and grama.

*Hardwood trees* and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

*Coniferous plants* furnish browse 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 pine, spruce, fir, cedar, and juniper.

*Wetland plants* are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland

plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

*Shallow water areas* have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

*Habitat for openland wildlife* consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

*Habitat for woodland wildlife* consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

*Habitat for wetland wildlife* consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

## 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, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

*Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.*

*The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the*

*design and construction of engineering works.*

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations 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 seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the 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; 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 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special

planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

*Shallow excavations* are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and 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 11 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 11 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 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage 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 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench 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 wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

### Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good*, *fair*, or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

*Roadfill* is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help 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 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation 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 seasonal 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 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for embankments, dikes, and levees and for 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 for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

*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, or sulfur. Availability of drainage outlets is not considered in the ratings.

*Irrigation* is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

*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 wind erosion 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 wind erosion, low available

water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

# Soil Properties

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Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

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 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

*Depth* to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

*Texture* is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27

percent clay, 28 to 50 percent silt, and less than 52 percent sand. If 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* larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

*Percentage (of soil particles) passing designated sieves* is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

*Liquid limit and plasticity index (Atterberg limits)* indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are 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 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Clay* as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, 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 (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at  $\frac{1}{3}$ -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; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

*Erosion factor K* indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

*Erosion factor T* is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

*Wind erodibility groups* are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

- 4L. Calcareous loams, silt loams, clay loams, and silty clay loams. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

5. Noncalcareous loams and silt loams that are less

than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are very slightly erodible. Crops can be grown if ordinary measures to control wind erosion are used.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control wind erosion are used.

8. Soils that are not subject to wind erosion 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 15, 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 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

*Hydrologic soil groups* are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These

soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 16, 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, nor is water in swamps and marshes.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, or frequent. *None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (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 the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are depth to the seasonal 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 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

*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 16 shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Not shown in the table is subsidence caused by an imposed surface load or by the withdrawal of ground water throughout an extensive area as a result of lowering the water table.

*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.

# Classification of the Soils

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The system of soil classification used by the National Cooperative Soil Survey has six categories (4). 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 17 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

**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 Aquult (*Aqu*, meaning water, 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; 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 Ochraquults (*Ochr*, meaning pale, plus *aquult*, the suborder of the Ultisols that has an aquic moisture regime).

**SUBGROUP.** Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Ochraquults.

**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 class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-loamy, mixed, thermic Typic Ochraquults.

**SERIES.** The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

## Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. 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" (5). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (4). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

### **Arapahoe Series**

*Depth class:* Very deep

*Drainage class:* Very poorly drained

*Permeability:* Moderately rapid

*Parent material:* Unconsolidated sediments  
*Slope range:* 0 to 2 percent

### Typical Pedon

Arapahoe mucky loam, 0 to 2 percent slopes, rarely flooded, about 400 yards south-southwest of the junction of U.S. Highway 13 and Virginia Highway 620 and 0.7 mile north-northeast of the junction of U.S. Highway 13 and Virginia Highway 614, near Painter:

A1—0 to 7 inches; black (10YR 2/1) mucky loam; weak medium granular structure; friable, sticky and slightly plastic; many fine and medium roots; extremely acid; clear smooth boundary.

A2—7 to 13 inches; very dark gray (10YR 3/1) loam; weak medium granular structure; friable, sticky and slightly plastic; common fine and medium roots; extremely acid; clear smooth boundary.

Bg1—13 to 26 inches; dark gray (10YR 4/1) loam; weak medium subangular blocky structure; friable, sticky and slightly plastic; common fine roots; extremely acid; clear smooth boundary.

Bg2—26 to 34 inches; dark gray (10YR 4/1) sandy loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; strongly acid; clear smooth boundary.

Cg1—34 to 45 inches; dark gray (10YR 4/1) sand; single grain; loose; few fine roots; strongly acid; gradual smooth boundary.

Cg2—45 to 85 inches; dark gray (10YR 4/1) sand; single grain; loose; strongly acid.

### Range in Characteristics

*Thickness of the loamy material:* 24 to 60 inches

*Soil reaction:* Extremely acid to strongly acid in the surface layer and subsoil, strongly acid to slightly alkaline in the underlying horizons

#### A horizon:

Hue—10YR to 5Y or neutral

Value—2 or 3

Chroma—0 to 2

Texture—loamy sand, loamy fine sand, sandy loam, fine sandy loam, loam, or the mucky analogs of those textures

#### Bg horizon:

Hue—10YR to 5Y or neutral

Value—4 to 7

Chroma—0 to 2

Other features—high-chroma mottles in some pedons

Texture—sandy loam, fine sandy loam, or loam

#### Cg horizon:

Hue—10YR, 2.5Y, 5Y, 5GY, 5G, 5BG, or neutral

Value—4 to 7

Chroma—0 to 2

Texture—stratified sand, fine sand, loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam

## Assateague Series

*Depth class:* Very deep

*Drainage class:* Excessively drained

*Permeability:* Very rapid

*Parent material:* Eolian sand

*Slope range:* 2 to 35 percent

### Typical Pedon

Assateague fine sand, 2 to 35 percent slopes, rarely flooded, about 1.5 miles south-southeast of the junction of Virginia Highways 2102 and 2113 and 1.7 miles north-northwest of Tom's Cove Visitors' Center, on Assateague Island:

Oi—1 inch to 0; undecomposed and partially decomposed pine needles, hardwood leaves, and twigs.

A—0 to 2 inches; dark grayish brown (10YR 4/2) fine sand; single grain; loose; few fine roots; moderately acid; clear smooth boundary.

C1—2 to 40 inches; pale brown (10YR 6/3) fine sand; single grain; loose; few fine roots; moderately acid; gradual diffuse boundary.

C2—40 to 85 inches; very pale brown (10YR 7/3) fine sand; single grain; loose; moderately acid.

### Range in Characteristics

*Thickness of the sandy material:* More than 80 inches

*Soil reaction:* Very strongly acid to slightly alkaline in the A horizon, moderately acid to moderately alkaline in the C horizon

*Content of coarse fragments:* 0 to 15 percent shell fragments

#### A horizon:

Hue—10YR or 2.5Y

Value—4 to 7

Chroma—1 or 2

Texture—coarse sand, sand, or fine sand

#### C horizon:

Hue—10YR or 2.5Y

Value—6 to 8

Chroma—2 to 8

Other features—low-chroma mottles, which are the result of uncoated sand grains and are not caused by wetness

Texture—coarse sand, sand, or fine sand

**Bojac Series***Depth class:* Very deep*Drainage class:* Well drained*Permeability:* Moderately rapid*Parent material:* Unconsolidated sediments*Slope range:* 0 to 6 percent**Typical Pedon**

Bojac sandy loam, 0 to 2 percent slopes, about 1.3 miles south-southeast of the junction of U.S. Highway 13 (business route) and Virginia Highway 605 and 1.5 miles south-southwest of the junction of U.S. Highway 13 (business route) and Virginia Highway 652, near Accomac:

Ap—0 to 7 inches; brown (10YR 4/3) sandy loam; weak medium granular structure; friable, slightly sticky and slightly plastic; few fine roots; strongly acid; abrupt smooth boundary.

Bt1—7 to 27 inches; strong brown (7.5YR 5/6) loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; many distinct clay bridges between sand grains; few faint clay films in pores; very strongly acid; gradual smooth boundary.

Bt2—27 to 33 inches; strong brown (7.5YR 5/6) sandy loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; many distinct clay bridges between sand grains; few faint clay films in pores; strongly acid; gradual smooth boundary.

Bt3—33 to 40 inches; strong brown (7.5YR 5/8) loamy sand; weak coarse subangular blocky structure; very friable; many distinct clay bridges between sand grains; strongly acid; gradual smooth boundary.

C—40 to 85 inches; pale brown (10YR 6/3) sand; single grain; loose; strongly acid.

**Range in Characteristics***Thickness of the solum:* 30 to 65 inches*Soil reaction:* Extremely acid to slightly acid in the A, E, and Bt horizons, very strongly acid to moderately acid in the C horizon*Content of coarse fragments:* 0 to 5 percent in the solum and 0 to 15 percent in the C horizon*A horizon (not in all pedons):*

Hue—7.5YR to 2.5Y

Value—3 or 4

Chroma—1 to 3

Texture—loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam

*Ap horizon:*

Hue—7.5YR to 2.5Y

Value—4 to 6

Chroma—1 to 4

Texture—loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam

*E horizon (not in all pedons):*

Hue—10YR or 2.5Y

Value—4 to 7

Chroma—4 to 6

Texture—loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam

*Bt horizon:*

Hue—7.5YR or 10YR

Value—4 to 6

Chroma—4 to 8

Texture—sandy loam, fine sandy loam, or loam

Other features—a thin subhorizon of sandy clay loam or clay loam in some pedons, a lower subhorizon of loamy sand or loamy fine sand in other pedons

*C horizon:*

Hue—7.5YR to 2.5Y

Value—4 to 7

Chroma—3 to 8

Other features—high-chroma mottles, low-chroma mottles, or both in many pedons

Texture—stratified coarse sand, sand, fine sand, loamy coarse sand, loamy sand, or loamy fine sand

**Camocca Series***Depth class:* Very deep*Drainage class:* Poorly drained*Permeability:* Very rapid*Parent material:* Eolian sand*Slope range:* 0 to 2 percent**Typical Pedon**

Camocca fine sand, 0 to 2 percent slopes, frequently flooded, about 165 yards west-southwest of the Assateague Visitor's Center and 1.8 miles south-southeast of the Assateague lighthouse, on Assateague Island:

A—0 to 6 inches; dark grayish brown (10YR 4/2) fine sand; weak coarse granular structure; very friable; many fine and medium roots; slightly acid; clear smooth boundary.

Cg1—6 to 18 inches; gray (10YR 5/1) fine sand; single grain; loose; common fine roots; neutral; clear smooth boundary.

Cg2—18 to 85 inches; gray (N 5/0) fine sand; single grain; loose; neutral.

**Range in Characteristics**

*Thickness of the sandy material:* More than 80 inches

*Soil reaction:* Extremely acid to moderately alkaline

*Content of coarse fragments:* 0 to 15 percent shell fragments

*A horizon:*

Hue—10YR to 5Y or neutral

Value—4 to 8

Chroma—0 to 2

Texture—coarse sand, sand, or fine sand

*Cg horizon:*

Hue—10YR to 5Y or neutral

Value—4 to 8

Chroma—0 to 2

Texture—coarse sand, sand, or fine sand

**Chincoteague Series**

*Depth class:* Very deep

*Drainage class:* Very poorly drained

*Permeability:* Moderately slow to rapid

*Parent material:* Silty marine sediments

*Slope range:* 0 to 1 percent

**Typical Pedon**

Chincoteague silt loam, 0 to 1 percent slopes, frequently flooded, about 2.9 miles south-southeast of Quinby Landing and 3.5 miles south-southeast of Quinby:

A—0 to 13 inches; dark gray (N 4/0) silt loam; massive; friable, slightly sticky and slightly plastic; common fine roots; *n* value more than 1.0; EC of 158.8 dS/m; soluble cations 843.3 cmol(+)/liter; SAR of 86.3; many fiddler crab burrows; slightly alkaline, ultra acid after moist incubation; diffuse smooth boundary.

Cg1—13 to 26 inches; dark gray (N 4/0) silt loam; massive; friable, slightly sticky and slightly plastic; common fine roots; *n* value more than 1.0; EC of 114.4 dS/m; soluble cations 553.2 cmol(+)/liter; SAR of 57.5; slightly alkaline, ultra acid after moist incubation; diffuse smooth boundary.

Cg2—26 to 40 inches; dark gray (N 4/0) silt loam; massive; friable, slightly sticky and slightly plastic; few fine roots; *n* value more than 1.0; EC of 129.6 dS/m; soluble cations 571.9 cmol(+)/liter; SAR of 59.4; slightly alkaline, moderately acid after moist incubation; gradual smooth boundary.

Cg3—40 to 85 inches; dark gray (N 4/0) loamy fine sand; single grain; loose; *n* value less than 1.0; slightly alkaline.

**Range in Characteristics**

*Combined thickness of the A and Cg horizons:* More than 60 inches

*Content of salt:* More than 2 percent

*Electrical conductivity:* More than 16 dS/m

*Soluble cations:* More than 80 cmol(+)/liter

*Sodium adsorption ratio:* More than 13

*n value:* More than 0.7

*Soil reaction:* Slightly acid to slightly alkaline; ultra acid with jarosite mottle formation within a depth of 20 inches after 30 days moist incubation

*A horizon:*

Hue—10YR to 5BG or neutral

Value—2 to 5

Chroma—0 to 2

Texture—fine sandy loam, loam, or silt loam

*Cg horizon:*

Hue—10YR to 5BG or neutral

Value—2 to 7

Chroma—0 to 2

Texture—loam, silt loam, silty clay loam, or clay loam within a depth of 40 inches; coarse sand to silty clay loam below a depth of 40 inches

**Dragston Series**

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderately rapid in the subsoil, rapid in the substratum

*Parent material:* Unconsolidated sediments

*Slope range:* 0 to 2 percent

**Typical Pedon**

Dragston fine sandy loam, 0 to 2 percent slopes, about 0.7 mile south-southwest of the junction of Virginia Highways 693 and 793 and 1.2 miles north-northeast of the junction of Virginia Highways 692 and 693, near Hallwood:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium granular structure; friable, slightly sticky and slightly plastic; common fine roots; very strongly acid; clear smooth boundary.

Bt—6 to 15 inches; light olive brown (2.5Y 5/6) loam; many medium distinct light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; many distinct clay bridges between sand grains; few faint clay films in pores; very strongly acid; gradual smooth boundary.

Btg1—15 to 30 inches; gray (10YR 6/1) loam; many medium distinct yellowish red (5YR 5/6) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; many distinct clay bridges between sand grains; few faint clay films in pores; very strongly acid; gradual smooth boundary.

Btg2—30 to 40 inches; gray (10YR 6/1) fine sandy loam; many medium distinct yellowish red (5YR 5/6) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; many distinct clay bridges between sand grains; few faint clay films in pores; very strongly acid; gradual smooth boundary.

Cg—40 to 85 inches; light gray (10YR 7/2) fine sand; many medium distinct yellowish red (5YR 5/6) and brownish yellow (10YR 6/6) mottles; single grain; loose; very strongly acid.

#### Range in Characteristics

*Thickness of the solum:* 25 to 50 inches

*Soil reaction:* Very strongly acid or strongly acid in the Ap and Bt horizons, very strongly acid to slightly acid in the Btg and Cg horizons

*Content of coarse fragments:* 0 to 2 percent in the solum, 0 to 10 percent in the Cg horizon

*A horizon (not in all pedons):*

Hue—10YR to 5Y

Value—2 to 5

Chroma—1 to 4

Texture—loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam

*Ap horizon:*

Hue—10YR to 5Y

Value—2 to 5

Chroma—1 to 4

Texture—loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam

*Bt horizon:*

Hue—10YR to 5Y

Value—4 to 6

Chroma—3 to 8

Other features—high- and low-chroma mottles

Texture—sandy loam, fine sandy loam, or loam

*Btg horizon:*

Hue—10YR to 5Y or neutral

Value—4 to 6

Chroma—0 to 2

Other features—high- and low-chroma mottles

Texture—sandy loam, fine sandy loam, or loam

*Cg horizon:*

Hue—10YR to 5BG or neutral

Value—4 to 7

Chroma—0 to 2

Other features—high- and low-chroma mottles

Texture—sand, fine sand, loamy sand, or loamy fine sand

#### Fisherman Series

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*Permeability:* Very rapid

*Parent material:* Eolian sand

*Slope range:* 0 to 6 percent

#### Typical Pedon

Fisherman fine sand, 0 to 6 percent slopes, occasionally flooded, about 2.2 miles west-southwest of the Assateague lighthouse and 2.2 miles south-southwest of the junction of Virginia Highways 175 and 2124, on Chincoteague Island:

A—0 to 6 inches; dark grayish brown (10YR 4/2) fine sand; single grain; loose; many fine roots; slightly acid; clear smooth boundary.

C—6 to 26 inches; yellowish brown (10YR 5/4) fine sand; single grain; loose; few fine roots; strongly acid; clear smooth boundary.

Cg—26 to 85 inches; grayish brown (10YR 5/2) fine sand, single grain; loose; neutral.

#### Range in Characteristics

*Thickness of the sandy material:* More than 80 inches

*Soil reaction:* Very strongly acid to slightly alkaline

*Content of coarse fragments:* 0 to 15 percent shell fragments

*A horizon:*

Hue—10YR or 2.5Y

Value—2 to 6

Chroma—1 to 3

Texture—coarse sand, sand, or fine sand

*C horizon:*

Hue—10YR or 2.5Y

Value—4 to 7

Chroma—4 to 6

Texture—coarse sand, sand, or fine sand

*Cg horizon:*

Hue—10YR to 5Y or neutral

Value—2 to 8

Chroma—0 to 2

Other features—mottles between depths of 20 and 40 inches

Texture—coarse sand, sand, or fine sand

## Hobucken Series

*Depth class:* Very deep

*Drainage class:* Very poorly drained

*Permeability:* Moderate or moderately rapid

*Parent material:* Unconsolidated sediments

*Slope range:* 0 to 1 percent

### Typical Pedon

Hobucken loam, in an area of Melfa-Hobucken complex, 0 to 1 percent slopes, frequently flooded; about 1.0 mile southwest of the junction of Virginia Highways 782 and 655 at South Chesconessex and 0.9 mile northwest of the junction of Virginia Highways 655 and 653, in Parker's Marsh:

A—0 to 13 inches; very dark gray (10YR 3/1) loam; weak fine granular structure; slightly sticky and slightly plastic; *n* value more than 1; EC of 20.9 dS/m; soluble cations 230.8 cmol(+)/liter; SAR of 39.2; many fine and medium roots; moderately acid; clear smooth boundary.

Cg1—13 to 26 inches; gray (5Y 5/1) loam; common medium prominent light olive brown (2.5Y 5/4) mottles; massive; slightly sticky and slightly plastic; *n* value more than 1; EC of 22.9 dS/m; soluble cations 256.3 cmol(+)/liter; SAR of 41.3; few fine and medium roots; slightly acid; diffuse smooth boundary.

Cg2—26 to 40 inches; gray (5Y 5/1) loam; common medium prominent light olive brown (2.5Y 5/4) mottles; massive; slightly sticky and slightly plastic; *n* value more than 1; EC of 10.7 dS/m; soluble cations 212.7 cmol(+)/liter; SAR of 40.8; few fine and medium roots; slightly acid; diffuse smooth boundary.

Cg3—40 to 85 inches; light gray (5Y 6/1) sand; single grain; nonsticky and nonplastic; *n* value more than 1; slightly acid.

### Range in Characteristics

*Combined thickness of the Ag and Cg horizons:* More than 60 inches

*Electrical conductivity:* More than 7 dS/m

*Soluble cations:* More than 80 cmol(+)/liter

*Sodium adsorption ratio:* More than 13

*n* value: More than 0.7

*Soil reaction:* Slightly acid to moderately alkaline

*Content of coarse fragments:* 0 to 35 percent shell fragments in the Cg horizon

*A horizon:*

Hue—10YR to 5Y

Value—2 or 3

Chroma—1 or 2

Texture—sandy loam, fine sandy loam, loam, silt loam, or the mucky analogs of those textures

*Cg horizon:*

Hue—10YR to 5G or neutral

Value—3 to 7

Chroma—0 to 2

Texture—stratified loamy sand, loamy fine sand, sandy loam, fine sandy loam, loam, silt loam, and sandy clay loam to a depth of 40 inches; stratified sandy, loamy, and clayey sediments below a depth of 40 inches in the fine-earth fraction

## Magotha Series

*Depth class:* Very deep

*Drainage class:* Poorly drained

*Permeability:* Moderate to rapid

*Parent material:* Unconsolidated sediments

*Slope range:* 0 to 2 percent

### Typical Pedon

Magotha fine sandy loam, 0 to 2 percent slopes, frequently flooded, about 1.1 miles south of the junction of Virginia Highways 182 and 605 at Quinby and 1.6 miles south-southeast of the junction of Virginia Highway 182 and the Machipongo River:

A—0 to 5 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; friable, slightly sticky and slightly plastic; few fine roots; common fiddler crab burrows; EC of 410 dS/m; soluble cations 627 cmol(+)/liter; SAR of 57; neutral abrupt smooth boundary.

Btg1—5 to 22 inches; light brownish gray (10YR 6/2) fine sandy loam; many medium distinct strong brown (7.5YR 5/6) and olive yellow (2.5Y 6/8) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; many distinct clay films on sand grains and clay bridges between sand grains; few faint clay films on faces of peds; EC of 208 dS/m; soluble cations 648 cmol(+)/liter; SAR of 59; neutral; gradual smooth boundary.

Btg2—22 to 40 inches; gray (10YR 6/1) fine sandy loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; many distinct clay films on sand grains and clay bridges between sand grains; few faint clay films on faces of peds; EC of 84 dS/m; soluble cations 411 cmol(+)/liter; SAR of 47; neutral; diffuse wavy boundary.

Cg—40 to 85 inches; light gray (10YR 7/2) fine sand; single grain; loose; neutral.

### Range in Characteristics

*Thickness of the solum:* 30 to 60 inches

*Electrical conductivity:* More than 16 dS/m  
*Soluble cations:* More than 80 cmol(+)/liter  
*Sodium adsorption ratio:* More than 13  
*Soil reaction:* Extremely acid to neutral  
*Content of coarse fragments:* 0 to 15 percent rounded gravel and shell fragments

**A horizon:**

Hue—10YR to 5Y or neutral  
 Value—2 to 6  
 Chroma—0 to 2  
 Texture—loamy sand, loamy fine sand, sand loam, fine sandy loam, or loam

**Btg horizon:**

Hue—10YR to 5Y or neutral  
 Value—3 to 7  
 Chroma—0 to 2  
 Other features—mottles in shades of red, brown, yellow, and olive in some pedons  
 Texture—sandy loam, fine sandy loam, or loam; thin subhorizons of loamy sand and sandy clay loam in some pedons

**Cg horizon:**

Hue—10YR to 5Y or neutral  
 Value—5 to 7  
 Chroma—0 to 2  
 Other features—mottles in shades of red, brown, yellow, and olive in some pedons  
 Texture—coarse sand, sand, fine sand, loamy coarse sand, loamy sand, or loamy fine sand

**Melfa Series**

*Depth class:* Very deep  
*Drainage class:* Very poorly drained  
*Permeability:* Moderately rapid  
*Parent material:* Unconsolidated sediments  
*Slope range:* 0 to 2 percent

**Typical Pedon**

Melfa mucky peat, in an area of Melfa-Hobucken complex, 0 to 1 percent slopes, frequently flooded; about 0.7 mile northwest of the junction of Virginia Highways 682 and 675 and about 1.2 miles north of the junction of Virginia Highways 676 and 675 at Clam, along Guilford Creek:

Oe—0 to 6 inches; mucky peat, black (10YR 2/1) broken face and rubbed; massive; estimated 30 percent fiber, 20 percent rubbed; mostly herbaceous fiber; about 60 percent mineral matter; *n* value more than 0.7 (flows easily through fingers when squeezed); EC of 25 dS/m; soluble cations 277 cmol(+)/liter; SAR of 45; many fine and medium roots; moderately acid; abrupt smooth boundary.

A—6 to 13 inches; very dark gray (10YR 3/1) sandy loam; weak fine granular structure; slightly sticky and slightly plastic; *n* value more than 0.7 (flows with difficulty through fingers when squeezed); EC of 25 dS/m; soluble cations 277 cmol(+)/liter; SAR of 45; many fine and medium roots; moderately acid; clear smooth boundary.

Cg1—13 to 26 inches; dark gray (5Y 4/1) sandy loam; massive; slightly sticky and slightly plastic; *n* value less than 0.7 (does not flow through fingers when squeezed); EC of 23 dS/m; soluble cations 252 cmol(+)/liter; SAR of 48; few fine and medium roots; slightly acid; diffuse smooth boundary.

Cg2—26 to 40 inches; gray (5Y 5/1) sandy loam; massive; slightly sticky and slightly plastic; *n* value less than 0.7 (does not flow through fingers when squeezed); EC of 19 dS/m; soluble cations 209 cmol(+)/liter; SAR of 42; few fine and medium roots; strongly acid; gradual smooth boundary.

Cg3—40 to 50 inches; dark gray (5Y 4/1) sandy loam; massive; slightly sticky and slightly plastic; *n* value less than 0.7 (does not flow through fingers when squeezed); few fine and medium roots; 5 percent gravel; strongly acid; diffuse smooth boundary.

Cg4—50 to 85 inches; light gray (5Y 6/1) coarse sand; common medium prominent light yellowish brown (2.5Y 6/4) mottles; massive; nonsticky and nonplastic; *n* value less than 0.7 (does not flow through fingers when squeezed); few fine and medium roots; 10 percent gravel; strongly acid.

**Range in Characteristics**

*Combined thickness of the O, Ag, and Cg horizons:*  
 More than 60 inches

*Electrical conductivity:* More than 7 dS/m  
*Soluble cations:* More than 80 cmol(+)/liter  
*Sodium adsorption ratio:* More than 13  
*Soil reaction:* Strongly acid to slightly alkaline  
*Content of coarse fragments:* 0 to 15 percent

**Oe horizon:**

Hue—10YR to 5Y or neutral  
 Value—2 or 3  
 Chroma—0 to 2  
 Organic material—hemic or sapric

**A horizon:**

Hue—10YR to 5Y or neutral  
 Value—2 to 5  
 Chroma—0 to 2  
 Texture—sandy loam, fine sandy loam, or loam

**Cg horizon:**

Hue—10YR to 5Y or neutral  
 Value—2 to 7  
 Chroma—0 to 2  
 Texture—sandy loam, fine sandy loam, or loam to a

depth of about 40 inches; coarse sand, sand, fine sand, loamy coarse sand, loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam below a depth of 40 inches

### **Molena Series**

*Depth class:* Very deep

*Drainage class:* Somewhat excessively drained

*Permeability:* Rapid

*Parent material:* Unconsolidated sediments

*Slope range:* 0 to 35 percent

#### **Typical Pedon**

Molena loamy sand, 6 to 35 percent slopes, about 0.5 mile south-southeast of the junction of Virginia Highways 679 and 704 and 1.5 miles north-northeast of the junction of Virginia Highways 679 and 702, near Atlantic:

A—0 to 8 inches; brown (10YR 4/3) loamy sand; weak coarse granular structure; very friable, slightly sticky; common fine and medium roots; very strongly acid; clear smooth boundary.

Bt1—8 to 18 inches; strong brown (7.5YR 5/6) loamy sand; weak coarse subangular blocky structure; very friable, slightly sticky; few fine roots; many distinct clay bridges between sand grains; few faint clay films in pores; very strongly acid; clear smooth boundary.

Bt2—18 to 30 inches; strong brown (7.5YR 5/8) loamy sand; weak coarse subangular blocky structure; very friable, slightly sticky; few fine roots; many distinct clay bridges between sand grains; few faint clay films in pores; very strongly acid; clear smooth boundary.

Bt3—30 to 45 inches; yellowish brown (10YR 5/6) loamy sand; weak coarse subangular blocky structure; very friable; few fine roots; many distinct clay bridges between sand grains; few faint clay films in pores; strongly acid; clear smooth boundary.

C—45 to 85 inches; light yellowish brown (10YR 6/4) sand; single grain; loose; very strongly acid.

#### **Range in Characteristics**

*Thickness of the solum:* 40 to 72 inches

*Soil reaction:* Very strongly acid to moderately acid

*A horizon:*

Hue—7.5YR to 10YR

Value—3 or 4

Chroma—2 to 4

Texture—sand, loamy sand, or loamy fine sand

*Bt horizon:*

Hue—7.5YR to 10YR

Value—4 or 5

Chroma—4 to 8

Texture—loamy sand, loamy fine sand, sandy loam, or fine sandy loam

*C horizon:*

Hue—7.5YR to 10YR

Value—5 or 6

Chroma—4 to 8

Texture—coarse sand, sand, or fine sand

### **Munden Series**

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*Permeability:* Moderately rapid in the subsoil, moderately rapid or rapid in the substratum

*Parent material:* Unconsolidated sediments

*Slope range:* 0 to 2 percent

#### **Typical Pedon**

Munden sandy loam, 0 to 2 percent slopes, 0.8 mile south-southeast of the junction of Virginia Highways 658 and 682 and 1.2 miles west-southwest of the junction of Virginia Highways 681 and 316, near Bloxom:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) sandy loam; weak medium granular structure; friable, slightly sticky and slightly plastic; common fine and medium roots; very strongly acid; clear smooth boundary.

Bt1—8 to 20 inches; yellowish brown (10YR 5/6) loam; common medium distinct reddish yellow (7.5YR 6/8) mottles; weak medium subangular blocky structure; friable, sticky and slightly plastic; common fine and medium roots; many distinct clay bridges between sand grains; few faint clay films in pores; very strongly acid; gradual smooth boundary.

Bt2—20 to 25 inches; yellowish brown (10YR 5/6) sandy loam; common medium distinct reddish yellow (7.5YR 6/8) and pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable, sticky and slightly plastic; few fine roots; many distinct clay bridges between sand grains; few faint clay films in pores; very strongly acid; gradual smooth boundary.

Bt3—25 to 40 inches; yellowish brown (10YR 5/6) sandy loam; many medium distinct reddish yellow (7.5YR 6/8) and light gray (10YR 7/2) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; many distinct clay bridges between sand grains; few faint clay films in pores; very strongly acid; gradual smooth boundary.

C—40 to 55 inches; mottled pale brown (10YR 6/3) and

grayish brown (10YR 5/2) loamy sand; single grain; loose; strongly acid; gradual smooth boundary.

Cg—55 to 85 inches; grayish brown (10YR 5/2) fine sand; single grain; loose; strongly acid.

#### Range in Characteristics

*Thickness of the solum:* 25 to 45 inches

*Soil reaction:* Very strongly acid to moderately acid

*Content of coarse fragments:* 0 to 5 percent

*Ap horizon:*

Hue—10YR or 2.5Y

Value—3 to 5

Chroma—1 to 4

Texture—loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam

*Upper part of the Bt horizon:*

Hue—7.5YR to 2.5Y

Value—3 to 6

Chroma—4 to 8

Texture—sandy loam, fine sandy loam, or loam

*Lower part of the Bt horizon:*

Hue—7.5YR to 2.5Y

Value—3 to 6

Chroma—3 to 8

Texture—sandy loam, fine sandy loam, or loam

*Btg horizon (not in all pedons):*

Hue—7.5YR to 2.5Y or neutral

Value—3 to 6

Chroma—0 to 2

Texture—sandy loam, fine sandy loam, or loam; subhorizons of sandy clay loam

*C horizon:*

Hue—7.5YR to 5Y

Value—5 to 7

Chroma—3 to 8

Other features—mottles that have chroma of 0 to 8

Texture—sand, fine sand, loamy sand, loamy fine sand, sandy loam, or fine sandy loam

*Cg horizon:*

Hue—7.5YR to 5Y or neutral

Value—5 to 7

Chroma—0 to 2

Texture—sand, fine sand, loamy sand, loamy fine sand, sandy loam, or fine sandy loam

### Nimmo Series

*Depth class:* Very deep

*Drainage class:* Poorly drained

*Permeability:* Moderate in the subsoil, moderately rapid or rapid in the substratum

*Parent material:* Unconsolidated sediments

*Slope range:* 0 to 2 percent

#### Typical Pedon

Nimmo sandy loam, 0 to 2 percent slopes, 600 yards north-northeast of the junction of U.S. Highway 13 and Virginia Highway 187 and 500 yards south-southwest of the junction of U.S. Highway 13 and Virginia Highway 775, near Nelsonia:

A—0 to 6 inches; dark gray (10YR 4/1) sandy loam; weak medium granular structure; friable, slightly sticky and nonplastic; many fine roots; extremely acid; clear smooth boundary.

Btg1—6 to 28 inches; gray (10YR 6/1) loam; many medium distinct brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; many fine roots; many distinct clay bridges between sand grains; few faint clay films in pores; extremely acid; clear smooth boundary.

Btg2—28 to 32 inches; light gray (10YR 7/1) sandy loam; common medium and coarse distinct yellow (10YR 7/8) mottles; weak coarse subangular blocky structure; very friable, slightly sticky and nonplastic; common fine roots; many distinct clay bridges between sand grains; few faint clay films in pores; extremely acid; clear smooth boundary.

Cg1—32 to 50 inches; light gray (10YR 7/1) sand; many medium and coarse distinct yellow (10YR 7/8) mottles; single grain; loose; few fine roots; very strongly acid; clear smooth boundary.

Cg2—50 to 85 inches; white (10YR 8/2) sand; single grain; loose; very strongly acid.

#### Range in Characteristics

*Thickness of the solum:* 25 to 45 inches

*Soil reaction:* Extremely acid to strongly acid

*Content of coarse fragments:* 0 to 3 percent in the solum, 0 to 15 percent in the C horizon

*A horizon:*

Hue—10YR to 5Y

Value—2 to 5

Chroma—1 or 2

Texture—sandy loam, fine sandy loam, or loam

*Btg horizon:*

Hue—7.5YR to 5Y

Value—4 to 7

Chroma—0 to 2

Other features—high-chroma mottles in most pedons

Texture—sandy loam, fine sandy loam, or loam

*Cg horizon:*

Hue—7.5YR to 2.5Y or neutral

Value—3 to 8

Chroma—0 to 2

Texture—coarse sand, sand, fine sand, loamy sand, loamy fine sand

### **Polawana Series**

*Depth class:* Very deep

*Drainage class:* Very poorly drained

*Permeability:* Rapid

*Parent material:* Unconsolidated sediments

*Slope range:* 0 to 2 percent

#### **Typical Pedon**

Polawana mucky sandy loam, 0 to 2 percent slopes, frequently flooded, about 800 yards south-southeast of the junction of Virginia Highways 605 and 648 and 1.2 miles north-northeast of the junction of Virginia Highways 605 and 647, near Daugherty:

A1—0 to 22 inches; very dark brown (10YR 2/2) mucky sandy loam; weak coarse granular structure; very friable; many fine, medium, and coarse roots; very strongly acid; clear smooth boundary.

A2—22 to 32 inches; very dark gray (10YR 3/1) loamy fine sand; many medium distinct gray (10YR 5/1) mottles; single grain; loose; few fine roots; strongly acid; clear smooth boundary.

Cg—32 to 85 inches; dark gray (10YR 4/1) sand; many medium distinct very pale brown (10YR 7/4) mottles; single grain; loose; moderately acid.

#### **Range in Characteristics**

*Thickness of the sandy material:* More than 80 inches

*Soil reaction:* Very strongly acid to neutral

*A horizon:*

Hue—10YR to 5Y or neutral

Value—2 or 3

Chroma—0 to 2

Texture—sand, fine sand, loamy sand, loamy fine sand, or mucky sandy loam

*Cg horizon:*

Hue—10YR to 5Y or neutral

Value—2 to 7

Chroma—0 to 4

Texture—sand, fine sand, loamy sand, or loamy fine sand

### **Seabrook Series**

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*Permeability:* Rapid

*Parent material:* Unconsolidated sediments

*Slope range:* 0 to 2 percent

#### **Typical Pedon**

Seabrook loamy fine sand, 0 to 2 percent slopes, about 30 yards south-southeast of the junction of U.S. Highway 13 and Virginia Highway 662 and about 0.7 mile north-northeast of the junction of U.S. Highway 13 (business route) and Virginia Highway 652, near Accomac:

A—0 to 10 inches; dark grayish brown (10YR 4/2) loamy sand; weak coarse granular structure; very friable; common fine roots; extremely acid; clear smooth boundary.

C1—10 to 20 inches; brown (10YR 5/3) loamy sand; single grain; loose; few fine roots; very strongly acid; clear smooth boundary.

C2—20 to 35 inches; light yellowish brown (10YR 6/4) loamy sand; single grain; loose; few fine roots; very strongly acid; clear smooth boundary.

C3—35 to 45 inches; light yellowish brown (10YR 6/4) loamy sand; common medium distinct brownish yellow (10YR 6/6) and light gray (10YR 7/2) mottles; single grain; loose; few fine roots; strongly acid; clear smooth boundary.

C4—45 to 85 inches; mottled light gray (10YR 7/2) sand; common coarse distinct brownish yellow (10YR 6/6) mottles; single grain; loose; strongly acid.

#### **Range in Characteristics**

*Thickness of the sandy material:* More than 72 inches

*Soil reaction:* Extremely acid to slightly acid

*Content of coarse fragments:* 0 to 15 percent to a depth of 40 inches; 0 to 35 percent below a depth of 40 inches

*A horizon:*

Hue—10YR

Value—3 to 5

Chroma—2 or 3

Texture—sand, fine sand, loamy sand, or loamy fine sand

*Upper part of the C horizon:*

Hue—10YR or 2.5Y

Value—4 to 7

Chroma—3 to 8

Texture—sand, fine sand, loamy coarse sand, loamy sand, or loamy fine sand

*Lower part of the C horizon:*

Hue—10YR to 5Y

Value—5 to 7

Chroma—1 to 4

Other features—mottles in shades of red, brown, yellow, and gray

Texture—sand, fine sand, loamy coarse sand,

loamy sand, or loamy fine sand in the fine-earth fraction

### **Udipsamments**

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained to excessively drained

*Permeability:* Rapid

*Parent material:* Unconsolidated sediments

*Slope range:* 0 to 30 percent

#### **Range in Characteristics**

*Thickness of the sandy material:* More than 80 inches

*Soil reaction:* Extremely acid to slightly alkaline

*A horizon:*

Hue—7.5YR to 5Y

Value—4 to 8

Chroma—3 to 8

Texture—coarse sand to loamy fine sand in the fine-earth fraction

*Upper part of the C horizon:*

Hue—7.5YR to 5Y

Value—3 to 8

Chroma—3 to 8

Texture—coarse sand to loamy fine sand in the fine-earth fraction

*Lower part of the C horizon:*

Hue—7.5YR to 5BG or neutral

Value—1 to 8

Chroma—0 to 8

Texture—coarse sand to loamy fine sand in the fine-earth fraction

### **Udorthents**

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained to well drained

*Permeability:* Moderately slow to moderately rapid

*Parent material:* Unconsolidated sediments

*Slope range:* 0 to 30 percent

#### **Range in Characteristics**

*Thickness of the soil material;* Variable

*Soil reaction:* Ultra acid to moderately alkaline

*Content of coarse fragments:* 0 to 35 percent

*A horizon:*

Hue—7.5YR to 5Y

Value—4 to 8

Chroma—3 to 8

Texture—sandy loam to silty clay loam in the fine-earth fraction

*Upper part of the C horizon:*

Hue—7.5YR to 5Y

Value—3 to 8

Chroma—3 to 8

Texture—sandy loam to silty clay loam in the fine-earth fraction

*Lower part of the C horizon:*

Hue—7.5YR to 5BG or neutral

Value—1 to 8

Chroma—0 to 8

Texture—stratified coarse sand to silty clay loam in the fine-earth fraction



# Formation of the Soils

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This section describes the factors of soil formation as they relate to the soils of Accomack County. It also describes the major processes in the development of soil horizons.

## Factors of Soil Formation

Soils form through the interaction of five major factors: climate, parent material, plant and animal life, relief, and time. All five factors contribute to the formation of every soil; however, the relative importance of each factor differs from place to place. In some places, one factor may be dominant in the formation of a soil and may determine many of its properties and characteristics.

### Climate

Climatic factors, such as temperature and precipitation, exert a strong influence on soil formation. Temperature determines the physical, chemical, and biological activities that take place in the soil and the speed at which they take place. Water dissolves minerals, supports biological activity, and transports minerals and organic leachates through the soil.

The level of rainfall and the air temperature in Accomack County are sufficient to cause leaching of plant nutrients from the soil, oxidation of organic matter in the surface layer, and strong weathering of minerals in the soils. These processes generally result in soils that have a high level of acidity, low natural fertility, and a low content of organic matter. Precipitation has been sufficient for the gradual translocation of clay from the surface layer into the subsoil; consequently, most soils in the county have more clay in the subsoil than in the surface layer. Local variations in climate generally are caused by relief, the aspect of the slope, and the proximity to large bodies of water. The climate of Accomack County is relatively uniform. Therefore, other factors account for significant differences among the soils. A more detailed description of the climate of the county is given under the heading "General Nature of the County."

### Parent Material

Parent material is the unconsolidated material in which soils form. It influences the physical, chemical, and mineralogical composition of the soil. The parent material of all of the soils in Accomack County consists of transported sediments that have been moved and deposited by marine and stream action. These sediments are mainly 3,000 to 5,000 feet thick over bedrock.

The soils in the county formed in parent material on three main landforms: terraces, tidal marshes, and barrier islands. Bojac, Dragston, Munden, and Nimmo soils formed in moderately coarse textured sediments on the mainland terraces. Chincoteague soils formed in silty sediments in the low-energy tidal marshes. The relatively young barrier islands are the landforms for the Fisherman, Camocca, and Assateague soils, all of which formed in sandy sediments. All of the soils in Accomack County are underlain by sand.

### Plant and Animal Life

All living organisms influence soil formation. Vegetation, for instance, influences the content of organic matter in the soil, which is about 1 or 2 percent on the mainland and as much as 20 percent in the tidal marshes. Burrowing animals, earthworms, and insects keep the soil open and porous. Micro-organisms decompose vegetation into organic matter that is incorporated into the soil. Soil formation has also been influenced by human activity, including clearing woodland, cultivating, introducing new plants, altering natural drainage, and adding farm chemicals, lime, and fertilizer to the soil. Human activity has also had a profound negative influence on soil formation because of practices that accelerate soil erosion.

### Relief

Relief, or lay of the land, influences soil formation through its effects on soil moisture, erosion, soil depth, and plant cover. It can alter the effects of parent material to the extent that several different kinds of soil may form in the same kind of parent material.

On the mainland in Accomack County, the topography is generally characterized by broad, nearly level terraces that are broken by narrow elliptical ridges, gentle escarpments, tidal creeks, and drainageways. Gently sloping to steep areas are adjacent to creeks, bays, and major drainageways, especially in the western part of the county. The tidal-marsh topography consists of broad flats dissected by meandering drains. The barrier islands are nearly level to steep and are bordered by tidal marsh and saltwater.

In steep areas, erosion is caused by rapid surface runoff. This erosion removes soil material and reduces the rate of water infiltration and percolation and inhibits the movement of clay and bases. Soils that formed in this kind of environment are generally thin and have weakly expressed horizons.

Nearly level and gently sloping areas are well drained or moderately well drained. The hazard of erosion is generally slight. The soils in these areas are mature and have well defined horizons. The large plane areas and depressions are wet and are frequently ponded. Soils that formed in this environment, such as those in tidal marshes and on flood plains, are mainly gray or mottled.

### Time

The length of time a soil has been subjected to the other soil-forming factors strongly influences the degree of its development. If the factors of soil formation have been active long enough for well defined, genetically related horizons to form, and if a soil is in equilibrium with its environment, the soil is considered mature. Bojac and Munden soils are examples. If, however, the soil shows little or no horizonation and the soil-forming processes are still active, the soil is considered immature. Fisherman, Chincoteague, and Assateague soils are examples of immature soils. Several soils in the county range in maturity between these extremes.

Soils that formed in the same kind of parent material but in areas of different topography do not necessarily mature in the same length of time. Some soils on steep slopes have no distinct horizons or have weakly expressed horizons because soil material has been removed by erosion almost as rapidly as it has formed. In the less sloping areas, there is sufficient time for the development of mature soils.

Soils that formed in material resistant to weathering require more time to reach maturity than soils that formed in easily weathered material. In some soils on flood plains, such as Chincoteague soils, the development of genetically related horizons is slowed or prevented if alluvium is being deposited frequently.

## Processes of Soil Formation

Soils form as a result of physical and chemical weathering of parent rock. Soil formation begins with physical weathering. Large pieces of rock are broken into small pieces by frost action and other forces. These rocks and rock fragments are further reduced to sand, silt, and clay particles.

The soils in Accomack County formed in unconsolidated sediments deposited by ancient seas and streams. These sediments formed a layer in which plants could grow. Soil horizons resulted from the transfer of materials, such as organic matter and clay, from one horizon to another by downward movement of water. Organic matter was added to the mineral material as the plants and animals died.

The rock fragments and the organic matter are chemically weathered by solution, carbonation, oxidation, reduction, and the action of weak acids. These processes release potassium, calcium, magnesium, iron, and other elements from the parent material in a form that plants can use.

The transfer of materials from one part of the profile to another takes place in most soils. Clayey material and organic matter are suspended in solution and moved. Calcium and other elements are leached from the surface layer. To some extent these elements are held by the clay in the subsoil or the lower part of the profile, but some are leached out of the soil with the ground water.

Bases are absorbed by plant roots and stored in the stems, leaves, and twigs of plants. When the plants die and decay, they return to the soil the elements they took from it. In most of the soils of the county, the translocation and development in place of clay minerals have had a strong influence on the development of soil horizons. As the soil develops, horizons gradually develop characteristics that are recognizable and that distinguish one layer from another.

### Major Soil Horizons

The results of the soil-forming factors can be distinguished by the different layers, or soil horizons, in the soil profile. The soil profile extends from the surface downward to materials that are little altered by the soil-forming processes.

Most mature soils contain three major horizons, called A, B, and C horizons. These major horizons may be further subdivided to indicate changes within one horizon. For example, a Bt<sub>2</sub> horizon is a second layer within the Bt horizon that is characterized by translocated clay eluviated from the A horizon above.

The A horizon is the surface layer. It is the layer with the largest accumulation of organic matter. It is also the

layer of maximum leaching, or eluviation, of clay and iron. When considerable leaching has taken place, an E horizon is formed. The E horizon of some of the soils in Accomack County shows light colors resulting from the loss of iron, aluminum, and clay minerals. Some soils have a BE horizon, which is transitional horizon between the E and B horizons.

The B horizon is below the A or E horizon and is commonly called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the A or E horizon. In some soils the B horizon is formed in place by the alteration of feldspars and other primary minerals to clays rather than by illuviation from overlying horizons. The alteration may result from oxidation and reduction of iron or the weathering of clay minerals. The B horizon is generally firmer and has a finer texture, stronger structure, and darker or redder colors than the E horizon. Most young soils do not have a B horizon.

The C horizon is below the A or B horizon. It consists of materials that are little altered by the soil-forming processes, but it may be modified by weathering.

#### **Soil Horizon Differentiation**

Several processes are involved in the formation of soil horizons, especially the formation of mineral soil horizons. Among these are the accumulation of organic matter, the leaching of soluble salts, the reduction and transfer of iron, the formation of soil structure, and the formation and translocation of clay minerals. These processes are continually taking place and have been active for thousands of years.

The accumulation and incorporation of organic matter occur with the decomposition of plant residue. These additions of organic matter darken the surface layer and help to form the A horizon in mineral soils. Organic matter, once lost, normally takes a long time to replace. In Accomack County the organic matter content of the surface layer of mineral soils is about 1 or 2 percent.

In order for mineral soils to have a distinct subsoil, it is believed that some of the lime and soluble salts must be leached before the translocation of clay minerals. Among the factors that affect this leaching are the kinds of salts originally present, the depth to which the soil solution percolates, and the texture of the soil profile.

Well drained and moderately well drained soils in Accomack County have a yellowish brown to strong brown subsoil. These colors are caused mainly by thin coatings of iron oxides associated primarily with the clay fraction. In some soils, however, the colors are inherited from the materials in which the soil formed. Well drained and moderately well drained soils have weak or moderate subangular blocky structure, and the subsoil contains more clay than the overlying surface layer.

The reduction and transfer of iron, called gleying, is associated mainly with the wetter, more poorly drained soils. Moderately well drained soils have yellowish brown and strong brown mottles, which indicate the segregation of iron. In poorly drained soils, such as Magotha and Nimmo soils, grayish colors in the subsoil and substratum indicate reduction and transfer of iron by removal in solution.



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# Glossary

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**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.

**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

**Base saturation.** The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

**Bedding planes.** Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

**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.

**Bench terrace.** A raised, level or nearly level strip of earth constructed on or nearly on the contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

**Bisequum.** Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

**Bottom land.** The normal flood plain of a stream, subject to flooding.

**California bearing ratio (CBR).** The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

**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.

**Carolina bay.** A shallow, oval depression that does not have a natural drainage outlet. These bays are oriented in a northwest-southwest direction and range from 5 to more than 500 acres in size. Most contain standing water unless they are drained.

**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. The 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.

**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.

**Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

**Clay film.** A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

**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.

**Climax vegetation.** 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.

**Coarse fragments.** If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

**Coarse textured soil.** Sand or loamy sand.

**Cobblestone (or cobble).** A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

**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 in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

**Concretions.** Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

**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.** The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

*Loose.*—Noncoherent when dry or moist; does not hold together in a mass.

*Friable.*—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

*Firm.*—When moist, crushes under moderate

pressure between thumb and forefinger, but resistance is distinctly noticeable.

*Plastic.*—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

*Sticky.*—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

*Hard.*—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

*Soft.*—When dry, breaks into powder or individual grains under very slight pressure.

*Cemented.*—Hard; little affected by moistening.

**Contour stripcropping.** Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

**Control section.** The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

**Cover crop.** A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

**Cutbanks cave** (in tables). The walls of excavations tend to cave in or slough.

**Deferred grazing.** Postponing grazing or resting grazing land for a prescribed period.

**Diversion (or diversion terrace).** A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

**Drainage class** (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

*Excessively drained.*—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

*Somewhat excessively drained.*—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

*Well drained.*—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

*Moderately well drained.*—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

*Somewhat poorly drained.*—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

*Poorly drained.*—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

*Very poorly drained.*—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

**Drainage, surface.** Runoff, or surface flow of water, from an area.

**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.

**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.

**Erosion.** The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

*Erosion (geologic).* Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

*Erosion (accelerated).* Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

**Erosion pavement.** A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

**Excess fines** (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

**Excess salt** (in tables). Excess water-soluble salts in the soil that restrict the growth of most 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 oven-dry 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*.

**Fine textured soil.** Sandy clay, silty clay, or clay.

**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.

**Foot slope.** The inclined surface at the base of a hill.

**Forb.** Any herbaceous plant not a grass or a sedge.

**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 and mottles.

**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 up to 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, up to 3 inches (7.6 centimeters) in diameter.

**Green manure crop** (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

**Ground water** (geology). 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.

**Hemic soil material (mucky peat).** Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

**Horizon, soil.** A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons 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, any plowed or disturbed surface layer.

*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 O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon 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) granular, 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 horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

*Cr horizon.*—Soft, consolidated bedrock beneath the soil.

*R layer.*—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

**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-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

**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.

**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

**Irrigation.** Application of water to soils to assist in production of crops. Methods of irrigation are:  
*Basin.*—Water is applied rapidly to nearly level plains surrounded by levees or dikes.  
*Border.*—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.  
*Controlled flooding.*—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.  
*Corrugation.*—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.  
*Drip (or trickle).*—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.  
*Furrow.*—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.  
*Sprinkler.*—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.  
*Subirrigation.*—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.  
*Wild flooding.*—Water, released at high points, is allowed to flow onto an area without controlled distribution.

**Leaching.** The removal of soluble material from soil or other material by percolating water.

**Liquid limit.** The moisture content at which the soil passes from a plastic to a liquid state.

**Loam.** Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

**Loess.** Fine grained material, dominantly of silt-sized particles, deposited by wind.

**Low strength.** The soil is not strong enough to support loads.

**Medium textured soil.** Very fine sandy loam, loam, silt loam, or silt.

**Mineral soil.** Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

**Minimum tillage.** Only the tillage essential to crop production and prevention of soil damage.

**Miscellaneous area.** An area that has little or no natural soil and supports little or no vegetation.

**Moderately coarse textured soil.** Coarse sandy loam, sandy loam, or fine sandy loam.

**Moderately fine textured soil.** Clay loam, sandy clay loam, or silty clay loam.

**Morphology, soil.** The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

**Mottling, soil.** Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

**Muck.** Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

**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.

**Neutral soil.** A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

**Nutrient, plant.** Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

**Organic matter.** Plant and animal residue in the soil in various stages of decomposition.

**Parent material.** The unconsolidated organic and mineral material in which soil forms.

**Peat.** Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

**Ped.** An individual natural soil aggregate, such as a granule, a prism, or a block.

**Pedon.** The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

**Percolation.** The downward movement of water through the soil.

**Percs slowly** (in tables). The slow movement of water through the soil, adversely affecting the specified use.

**Permeability.** The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow .....	less than 0.06 inch
Slow .....	0.06 to 0.2 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. For example, slope, stoniness, and thickness.

**pH value.** A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

**Piping** (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

**Plasticity index.** The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

**Plastic limit.** The moisture content at which a soil changes from semisolid to plastic.

**Plinthite.** The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

**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 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.

**Poor outlets** (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

**Productivity, soil.** The capability of a soil for producing a specified plant or sequence of plants under specific management.

**Profile, soil.** A vertical section of the soil extending through all its horizons and into the parent material.

**Reaction, soil.** A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The 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

**Regolith.** The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

**Relief.** The elevations or inequalities of a land surface, considered collectively.

**Rill.** A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

**Rock fragments.** Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

**Root zone.** The part of the soil that can be penetrated by plant roots.

**Runoff.** The precipitation discharged into stream

channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

**Saline soil.** A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

**Salty water** (in tables.) Water that is too salty for consumption by livestock.

**Sand.** As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

**Sapric soil material (muck).** The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

**Seepage** (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

**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 or of the substratum. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

**Sheet erosion.** The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

**Shrink-swell.** The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

**Silt.** As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

**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 feet.

**Slick spot.** A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

**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.

**Sodicity.** The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of  $\text{Na}^+$  to  $\text{Ca}^{++} + \text{Mg}^{++}$ . The degrees of sodicity and their respective ratios are:

Slight .....	less than 13:1
Moderate .....	13-30:1
Strong .....	more than 30:1

**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 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 substratum. The living roots and plant and animal activities are largely confined to the solum.

**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.

**Stony.** Refers to a soil containing stones in numbers that interfere with or prevent tillage.

**Stripcropping.** Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind erosion 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 wind erosion 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.** Breaking up a compact subsoil by pulling a special chisel through the soil.

**Substratum.** The part of the soil below the solum.

**Subsurface layer.** Any surface soil horizon (A, E, AB, or EB) below the surface layer.

**Surface layer.** The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

**Surface soil.** The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

**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.

**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 that is 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.

**Upland** (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

**Variegation.** Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

**Varve.** A sedimentary layer of a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

**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 oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

## Tables

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TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1967-79 at Wallops Island, Virginia, and 1956-81 at Painter, Virginia)

Month	Temperature						Precipitation			
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have--		Average number of growing degree days*	Average	2 years in 10 will have--		Average number of days with 0.10 inch or more
				Maximum temperature higher than--	Minimum temperature lower than--			Less than--	More than--	
° F	° F	° F	° F	° F	Units	In	In	In		
<b>WALLOPS ISLAND:</b>										
January----	42.3	28.0	35.2	69	9	53	3.42	2.27	5.29	8
February---	43.6	28.7	36.2	71	13	55	3.35	1.59	4.87	6
March-----	51.4	36.9	44.2	78	23	169	3.69	2.79	4.77	7
April-----	61.4	44.9	53.2	89	30	395	2.57	1.57	3.35	5
May-----	68.0	54.5	61.3	90	40	658	3.91	2.01	6.88	7
June-----	76.8	63.6	70.2	92	48	906	3.32	1.81	4.68	5
July-----	81.5	68.9	75.2	95	55	1,092	3.60	2.13	4.83	7
August-----	82.4	69.1	75.8	95	56	1,108	3.99	1.31	7.25	5
September--	77.0	63.6	70.3	90	48	909	3.19	1.44	5.41	5
October----	66.8	51.6	59.2	85	31	596	2.87	1.40	4.81	5
November---	56.8	41.4	49.1	79	22	292	2.89	1.71	5.06	6
December---	47.6	32.1	39.9	69	17	109	3.98	2.71	5.24	7
Yearly:										
Average----	63.0	48.6	55.8	---	---	---	---	---	---	---
Extreme----	---	---	---	101	5	---	---	---	---	---
Total-----	---	---	---	---	---	6,342	40.78	---	---	73
<b>PAINTER:</b>										
January----	45.5	27.6	36.6	70	5	78	3.44	2.58	4.27	7
February---	48.3	29.6	39.0	70	8	90	3.43	2.08	4.44	7
March-----	55.8	36.3	46.1	79	20	224	4.14	2.72	5.04	8
April-----	66.7	45.0	55.9	86	26	473	3.00	1.85	4.05	6
May-----	74.6	54.2	64.4	91	34	756	3.55	1.99	5.15	6
June-----	82.3	62.8	72.6	94	45	973	3.40	1.90	4.72	5
July-----	85.9	67.5	76.7	95	51	1,137	4.29	2.00	5.73	6
August-----	85.1	66.6	75.9	95	50	1,109	3.87	1.77	5.15	6
September--	79.7	60.5	70.1	91	42	899	3.41	1.84	4.45	5
October----	69.0	49.2	59.1	83	28	591	3.72	1.61	5.70	5
November---	60.0	40.6	50.3	78	20	318	2.79	1.41	5.51	5
December---	50.7	32.7	41.7	71	12	131	3.69	2.49	5.40	7
Yearly:										
Average----	67.0	47.7	57.4	---	---	---	---	---	---	---
Extreme----	---	---	---	98	-5	---	---	---	---	---
Total-----	---	---	---	---	---	6,779	42.73	---	---	73

\* 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 2.--FREEZE DATES IN SPRING AND FALL

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
<b>WALLOPS ISLAND:</b>			
Last freezing temperature in spring:			
1 year in 10 later than--	Mar. 17	Mar. 26	Apr. 13
2 years in 10 later than--	Mar. 16	Mar. 25	Apr. 12
5 years in 10 later than--	Mar. 5	Mar. 17	Apr. 7
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 16	Nov. 9	Oct. 24
2 years in 10 earlier than--	Nov. 21	Nov. 11	Oct. 28
5 years in 10 earlier than--	Dec. 8	Nov. 21	Nov. 8
<b>PAINTER:</b>			
Last freezing temperature in spring:			
1 year in 10 later than--	Mar. 31	Apr. 16	May 9
2 years in 10 later than--	Mar. 22	Apr. 12	Apr. 22
5 years in 10 later than--	Mar. 12	Apr. 4	Apr. 13
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 7	Oct. 22	Oct. 15
2 years in 10 earlier than--	Nov. 12	Oct. 30	Oct. 19
5 years in 10 earlier than--	Nov. 24	Nov. 9	Oct. 29

TABLE 3.--GROWING SEASON

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	<u>Days</u>	<u>Days</u>	<u>Days</u>
<b>WALLOPS ISLAND:</b>			
9 years in 10	251	234	199
8 years in 10	253	235	206
5 years in 10	276	251	216
2 years in 10	283	264	232
1 year in 10	286	268	247
<b>PAINTER:</b>			
9 years in 10	234	200	173
8 years in 10	240	203	185
5 years in 10	256	216	191
2 years in 10	278	241	206
1 year in 10	283	254	217

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AhA	Arapahoe mucky loam, 0 to 2 percent slopes, rarely flooded-----	8,600	2.2
AmA	Arapahoe-Melfa complex, 0 to 2 percent slopes, frequently flooded-----	4,715	1.2
AtD	Assateague fine sand, 2 to 35 percent slopes, rarely flooded-----	1,510	0.4
BeB	Beaches, 1 to 5 percent slopes-----	2,550	0.7
BhB	Bojac loamy sand, 2 to 6 percent slopes-----	15,330	4.0
BkA	Bojac sandy loam, 0 to 2 percent slopes-----	44,040	11.4
BoA	Bojac fine sandy loam, 0 to 2 percent slopes-----	6,470	1.7
CaA	Camocca fine sand, 0 to 2 percent slopes, frequently flooded-----	4,500	1.2
ChA	Chincoteague silt loam, 0 to 1 percent slopes, frequently flooded-----	47,515	12.3
DrA	Dragston fine sandy loam, 0 to 2 percent slopes-----	15,225	3.9
FhB	Fisherman fine sand, 0 to 6 percent slopes, occasionally flooded-----	1,220	0.3
FmD	Fisherman-Assateague complex, 0 to 35 percent slopes, rarely flooded-----	970	0.3
FrB	Fisherman-Camocca complex, 0 to 6 percent slopes, frequently flooded-----	4,885	1.3
MaA	Magotha fine sandy loam, 0 to 2 percent slopes, frequently flooded-----	2,475	0.6
McA	Melfa-Hobucken complex, 0 to 1 percent slopes, frequently flooded-----	24,725	6.4
MoB	Molena loamy sand, 0 to 6 percent slopes-----	3,385	0.9
MoD	Molena loamy sand, 6 to 35 percent slopes-----	7,100	1.8
MuA	Munden sandy loam, 0 to 2 percent slopes-----	31,580	8.2
NmA	Nimmo sandy loam, 0 to 2 percent slopes-----	67,230	17.3
PoA	Polawana mucky sandy loam, 0 to 2 percent slopes, frequently flooded-----	8,350	2.2
SeA	Seabrook loamy fine sand, 0 to 2 percent slopes-----	265	0.1
UpD	Udorthents and Udipsamments soils, 0 to 30 percent slopes-----	1,860	0.5
	Water-----	81,900	21.1
	Total-----	386,400	100.0

TABLE 5.--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
BhB	Bojac loamy sand, 2 to 6 percent slopes
BkA	Bojac sandy loam, 0 to 2 percent slopes
BoA	Bojac fine sandy loam, 0 to 2 percent slopes
DrA	Dragston fine sandy loam, 0 to 2 percent slopes (where drained)
MuA	Munden sandy loam, 0 to 2 percent slopes
NmA	Nimmo sandy loam, 0 to 2 percent slopes (where drained)

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Wheat	Irish potatoes	Snap beans	Cucumbers	Tomatoes	Tall fescue
		Bu	Bu	Cwt	Bu	Tons	Tons	AUM*
AhA----- Arapahoe	VIw	---	---	---	---	---	---	---
AmA----- Arapahoe----- Melfa-----	VIw VIIw	---	---	---	---	---	---	---
AtD----- Assateague	VIe	---	---	---	---	---	---	---
BeB. Beaches								
BhB----- Bojac	IIe	80	50	250	120	11	12	6.0
BkA, BoA----- Bojac	IIs	110	45	300	160	15	15	8.0
CaA----- Camocca	VIIIw	---	---	---	---	---	---	---
ChA----- Chincoteague	VIIIw	---	---	---	---	---	---	---
DrA----- Dragston	IVw	120	40	290	110	13	10	7.0
FhB----- Fisherman	IVs	---	---	---	---	---	---	---
FmD----- Fisherman----- Assateague-----	VIe VIe	---	---	---	---	---	---	---
FrB----- Fisherman----- Camocca-----	IVs VIw	---	---	---	---	---	---	---
MaA----- Magotha	VIIIw	---	---	---	---	---	---	---
McA----- Melfa----- Hobucken-----	VIIIw VIIIw	---	---	---	---	---	---	---
MoB----- Molena	IIIs	70	35	200	100	10	10	6.0
MoD----- Molena	VIe	---	---	---	---	---	---	---
MuA----- Munden	IIw	115	50	300	150	13	15	8.0
NmA----- Nimmo	IVw	120	35	290	100	12	8	7.0

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Wheat	Irish potatoes	Snap beans	Cucumbers	Tomatoes	Tall fescue
		Bu	Bu	Cwt	Bu	Tons	Tons	AUM*
PoA----- Polawana	VIIw	---	---	---	---	---	---	---
SeA----- Seabrook	IVs	65	45	250	120	12	8.5	7.0
UpD. Udorthents and Udipsamments								

\* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordi- nation symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Common trees	Site index	Produc- tivity class*	
AhA----- Arapahoe	10W	Slight	Severe	Severe	Severe	Loblolly pine----- Pond pine----- Sweetgum----- Red maple----- Yellow-poplar----- Blackgum----- Willow oak----- Swamp chestnut oak-- Water oak----- Water tupelo----- Baldcypress-----	93 65 --- --- --- --- --- --- --- --- ---	10 3 --- --- --- --- --- --- --- --- ---	Loblolly pine, sweetgum, American sycamore.
AmA: Arapahoe-----	10W	Slight	Severe	Severe	Severe	Loblolly pine----- Pond pine----- Sweetgum----- Red maple----- Yellow-poplar----- Blackgum----- Willow oak----- Swamp chestnut oak-- Water oak----- Water tupelo----- Baldcypress-----	93 65 --- --- --- --- --- --- --- --- ---	10 3 --- --- --- --- --- --- --- --- ---	Loblolly pine, sweetgum, American sycamore.
Melfa.									
AtD----- Assateague	5S	Severe	Moderate	Severe	Slight	Loblolly pine----- Live oak----- American holly-----	60 --- ---	5 --- ---	Loblolly pine, longleaf pine.
BhB----- Bojac	8S	Slight	Slight	Moderate	Slight	Loblolly pine----- Southern red oak---- Virginia pine----- Sweetgum----- White oak-----	80 70 75 80 ---	8 4 8 6 ---	Loblolly pine, sweetgum.
BkA, BoA----- Bojac	8A	Slight	Slight	Slight	Slight	Loblolly pine----- Southern red oak---- Virginia pine----- Sweetgum-----	80 70 75 80	8 4 8 6	Loblolly pine, sweetgum.
DrA----- Dragston	9W	Slight	Moderate	Slight	Slight	Loblolly pine----- Southern red oak---- Sweetgum----- Yellow-poplar----- White oak-----	86 80 90 90 ---	9 4 7 6 ---	Loblolly pine, sweetgum, yellow-poplar.
FhB----- Fisherman	5S	Severe	Moderate	Moderate	Slight	Loblolly pine----- Live oak----- American holly----- Black cherry----- Longleaf pine-----	60 --- --- --- 60	5 --- --- --- 4	Loblolly pine, longleaf pine.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Common trees	Site index	Productivity class*	
FmD: Fisherman-----	5S	Severe	Moderate	Moderate	Slight	Loblolly pine----- Live oak----- American holly----- Black cherry----- Longleaf pine-----	60 --- --- --- 60	5 --- --- --- 4	Loblolly pine, longleaf pine.
Assateague-----	5S	Severe	Moderate	Severe	Slight	Loblolly pine----- Live oak----- American holly-----	60 --- ---	5 --- ---	Loblolly pine, longleaf pine.
FrB: Fisherman-----	5S	Severe	Moderate	Moderate	Slight	Loblolly pine----- Live oak----- American holly----- Black cherry----- Longleaf pine-----	60 --- --- --- 60	5 --- --- --- 4	Loblolly pine, longleaf pine.
Camocca.									
MoB, MoD----- Molena	8S	Slight	Moderate	Moderate	Slight	Loblolly pine----- Northern red oak---- White oak----- Shortleaf pine----- Water oak-----	80 86 68 --- ---	8 5 4 --- ---	Loblolly pine, slash pine.
MuA----- Munden	9W	Slight	Moderate	Slight	Slight	Loblolly pine----- Sweetgum----- White oak-----	90 90 76	9 7 4	Loblolly pine.
NmA----- Nimmo	10W	Slight	Moderate	Moderate	Moderate	Loblolly pine----- Sweetgum----- White oak----- Water oak----- Red maple----- Yellow-poplar----- Willow oak-----	95 95 80 80 --- --- ---	10 8 4 5 --- --- ---	Loblolly pine, sweetgum.
PoA----- Polawana	9W	Slight	Severe	Severe	Slight	Loblolly pine----- Sweetgum----- Baldcypress----- Water tupelo----- Blackgum----- Water oak-----	86 90 --- --- --- ---	9 7 --- --- --- ---	Sweetgum, water tupelo.
SeA----- Seabrook	8S	Slight	Moderate	Moderate	Slight	Loblolly pine----- Longleaf pine----- Slash pine----- Southern red oak---- Sweetgum----- Red maple----- Yellow-poplar----- Water oak----- Willow oak----- American beech-----	81 --- --- --- --- --- --- --- --- ---	8 --- --- --- --- --- --- --- --- ---	Loblolly pine, longleaf pine.

\* 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.

TABLE 8.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AhA----- Arapahoe	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
AmA: Arapahoe-----	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Melfa-----	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus, excess salt.	Severe: excess humus, wetness, flooding.	Severe: wetness, excess humus.	Severe: excess salt, wetness, flooding.
AtD----- Assateague	Severe: flooding, slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty, slope.
BeB----- Beaches	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy, excess salt.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: excess salt, wetness, droughty.
BhB----- Bojac	Slight-----	Slight-----	Moderate: slope.	Slight-----	Moderate: droughty.
BkA, BoA----- Bojac	Slight-----	Slight-----	Slight-----	Slight-----	Slight.
CaA----- Camocca	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, droughty, flooding.
ChA----- Chincoteague	Severe: flooding, ponding, excess salt.	Severe: ponding, excess salt.	Severe: ponding, flooding, excess salt.	Severe: ponding.	Severe: excess salt, excess sulfur, ponding.
DrA----- Dragston	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
FhB----- Fisherman	Severe: flooding, too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
FmD: Fisherman-----	Severe: flooding, too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Assateague-----	Severe: flooding, slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty, slope.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
FrB: Fisherman-----	Severe: flooding, too sandy.	Severe: too sandy.	Severe: too sandy, flooding.	Severe: too sandy.	Severe: droughty, flooding.
Camocca-----	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness, flooding.	Severe: wetness, too sandy.	Severe: wetness, droughty, flooding.
MaA----- Magotha	Severe: flooding, wetness, excess sodium.	Severe: wetness, excess sodium, excess salt.	Severe: wetness, flooding, excess sodium.	Severe: wetness.	Severe: excess salt, excess sodium, wetness.
McA: Melfa-----	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus, excess salt.	Severe: excess humus, wetness, flooding.	Severe: wetness, excess humus.	Severe: excess salt, wetness, flooding.
Hobucken-----	Severe: flooding, ponding.	Severe: ponding.	Severe: flooding, ponding.	Severe: ponding.	Severe: flooding, ponding.
MoB----- Molena	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
MoD----- Molena	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, too sandy.	Severe: slope.
MuA----- Munden	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
NmA----- Nimmo	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
PoA----- Polawana	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
SeA----- Seabrook	Moderate: wetness, too sandy.	Moderate: wetness, too sandy.	Moderate: too sandy, wetness.	Moderate: too sandy.	Severe: droughty.
UpD: Udorthents.					
Udipsamments.					

TABLE 9.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AhA----- Arapahoe	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
AmA: Arapahoe-----	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Melfa-----	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
AtD----- Assateague	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
BeB. Beaches										
BhB----- Bojac	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
BkA, BoA----- Bojac	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CaA----- Camocca	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor.
ChA----- Chincoteague	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
DrA----- Dragston	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Fair.
FhB----- Fisherman	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.
FmD: Fisherman-----	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.
Assateague-----	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
FrB: Fisherman-----	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.
Camocca-----	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor.
MaA----- Magotha	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
McA: Melfa-----	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.



TABLE 10.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. 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
AhA----- Arapahoe	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.
AmA: Arapahoe-----	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Melfa-----	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: excess salt, wetness, flooding.
AtD----- Assateague	Severe: cutbanks cave, slope.	Severe: flooding, slope.	Severe: flooding, slope.	Severe: flooding, slope.	Severe: slope.	Severe: droughty, slope.
BeB. Beaches						
BhB----- Bojac	Severe: cutbanks cave.	Slight-----	Moderate: wetness.	Moderate: slope.	Slight-----	Moderate: droughty.
BkA, BoA----- Bojac	Severe: cutbanks cave.	Slight-----	Moderate: wetness.	Slight-----	Slight-----	Slight.
CaA----- Camocca	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, droughty, flooding.
ChA----- Chincoteague	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: excess salt, excess sulfur ponding.
DrA----- Dragston	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
FhB----- Fisherman	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: droughty.
FmD: Fisherman-----	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Severe: droughty.
Assateague-----	Severe: cutbanks cave, slope.	Severe: flooding, slope.	Severe: flooding, slope.	Severe: flooding, slope.	Severe: slope.	Severe: droughty, slope.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
FrB: Fisherman-----	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: droughty, flooding.
Camocca-----	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, droughty, flooding.
MaA----- Magotha	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: excess salt, excess sodium wetness.
McA: Melfa-----	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: excess salt, wetness, flooding.
Hobucken-----	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.
MoB----- Molena	Severe: cutbanks cave.	Slight-----	Slight-----	Slight-----	Slight-----	Moderate: droughty.
MoD----- Molena	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
MuA----- Munden	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
NmA----- Nimmo	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
PoA----- Polawana	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding.	Severe: ponding, flooding.
SeA----- Seabrook	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
UpD: Udorthents.						
Udipsamments.						

TABLE 11.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "severe," "good," and other terms. Absence of an entry indicates that the soil was not rated. 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
AhA----- Arapahoe	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.
AmA: Arapahoe-----	Severe: flooding, wetness.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
Melfa-----	Severe: flooding, wetness.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness, excess salt.
AtD----- Assateague	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
BeB. Beaches					
BhB, BkA, BoA----- Bojac	Moderate: wetness.	Severe: seepage.	Severe: wetness, seepage.	Severe: seepage.	Fair: thin layer.
CaA----- Camocca	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
ChA----- Chincoteague	Severe: flooding, ponding, percs slowly.	Severe: seepage, flooding, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, ponding.	Poor: ponding, excess salt.
DrA----- Dragston	Severe: wetness, poor filter.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness, thin layer.
FhB----- Fisherman	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy.
FmD: Fisherman-----	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy.
Assateague-----	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
FrB: Fisherman-----	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy.
Camocca-----	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, wetness.
MaA----- Magotha	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: wetness, excess salt, excess sodium.
McA: Melfa-----	Severe: flooding, wetness.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness, excess salt.
Hobucken-----	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.
MoB----- Molena	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
MoD----- Molena	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
MuA----- Munden	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Good.
NmA----- Nimmo	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
PoA----- Polawana	Severe: flooding, ponding, poor filter.	Severe: seepage, flooding, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: seepage, too sandy, ponding.
SeA----- Seabrook	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
UpD: Udorthents.					
Udipsamments.					

TABLE 12.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. 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
AhA----- Arapahoe	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: wetness.
AmA: Arapahoe-----	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: wetness.
Melfa-----	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, wetness.
AtD----- Assateague	Fair: slope.	Probable-----	Improbable: too sandy.	Poor: too sandy, slope.
BeB. Beaches				
BhB----- Bojac	Good-----	Probable-----	Improbable: too sandy.	Fair: too sandy.
BkA, BoA----- Bojac	Good-----	Probable-----	Improbable: too sandy.	Good.
CaA----- Camocca	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy, wetness.
ChA----- Chincoteague	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, wetness.
DrA----- Dragston	Fair: wetness.	Probable-----	Improbable: too sandy.	Fair: thin layer.
FhB----- Fisherman	Fair: wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy.
FmD: Fisherman-----	Fair: wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy.
Assateague-----	Fair: slope.	Probable-----	Improbable: too sandy.	Poor: too sandy, slope.
FrB: Fisherman-----	Fair: wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy.
Camocca-----	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: too sandy, wetness.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
MaA----- Magotha	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: excess salt, wetness, excess sodium.
McA: Melfa-----	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, wetness.
Hobucken-----	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
MoB----- Molena	Good-----	Probable-----	Improbable: too sandy.	Fair: too sandy.
MoD----- Molena	Fair: slope.	Probable-----	Improbable: too sandy.	Poor: slope.
MuA----- Munden	Fair: wetness.	Probable-----	Improbable: too sandy.	Fair: small stones, thin layer.
NmA----- Nimmo	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: wetness.
PoA----- Polawana	Poor: wetness.	Probable-----	Improbable: too sandy.	Poor: wetness.
SeA----- Seabrook	Fair: wetness.	Probable-----	Improbable: too sandy.	Fair: too sandy.
UpD: Udorthents.				
Udipsamments.				

TABLE 13.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. 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--			
	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
AhA----- Arapahoe	Severe: piping, wetness.	Severe: cutbanks cave.	Favorable-----	Wetness, soil blowing.	Wetness, soil blowing.	Wetness.
AmA: Arapahoe-----	Severe: piping, wetness.	Severe: cutbanks cave.	Flooding-----	Wetness, soil blowing, flooding.	Wetness, soil blowing.	Wetness.
Melfa-----	Severe: piping, wetness, excess salt.	Severe: salty water.	Flooding, subsides, excess salt.	Wetness, flooding, excess salt.	Wetness-----	Wetness, excess salt.
AtD----- Assateague	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
BeB. Beaches						
BhB----- Bojac	Severe: piping.	Severe: cutbanks cave.	Deep to water	Slope, droughty, fast intake.	Soil blowing---	Droughty.
BkA, BoA----- Bojac	Severe: piping.	Severe: cutbanks cave.	Deep to water	Soil blowing---	Soil blowing---	Favorable.
CaA----- Camocca	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy.	Wetness, droughty.
ChA----- Chincoteague	Severe: ponding, excess salt.	Severe: slow refill, salty water.	Ponding, flooding, excess salt.	Ponding, droughty, flooding.	Erodes easily, ponding, poor outlets.	Wetness, excess salt, erodes easily.
DrA----- Dragston	Severe: piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Wetness, soil blowing.	Wetness, droughty.
FhB----- Fisherman	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, slope, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
FmD: Fisherman-----	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Slope, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
Assateague-----	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
FrB: Fisherman-----	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, slope, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
Camocca-----	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Flooding, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy.	Wetness, droughty.
MaA----- Magotha	Severe: piping, wetness, excess sodium.	Severe: salty water, cutbanks cave.	Flooding, excess salt, excess sodium.	Wetness, flooding.	Wetness, poor outlets.	Wetness, excess salt, excess sodium.
McA: Melfa-----	Severe: piping, wetness, excess salt.	Severe: salty water.	Flooding, subsides, excess salt.	Wetness, flooding, excess salt.	Wetness-----	Wetness, excess salt.
Hobucken-----	Severe: piping, ponding.	Moderate: salty water.	Ponding, flooding.	Ponding, flooding.	Ponding-----	Wetness, excess salt.
MoB----- Molena	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, slope.	Too sandy-----	Droughty.
MoD----- Molena	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, slope.	Slope, too sandy.	Slope, droughty.
MuA----- Munden	Severe: seepage, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Wetness, soil blowing.	Droughty.
NmA----- Nimmo	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty.	Wetness, too sandy.	Wetness, droughty.
PoA----- Polawana	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Flooding, cutbanks cave, ponding.	Ponding, droughty, fast intake.	Ponding, too sandy.	Wetness, droughty.
SeA----- Seabrook	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
UpD: Udorthents.						
Udipsamments.						

TABLE 14.--ENGINEERING INDEX PROPERTIES

(The symbol &lt; means less than; &gt; means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments >3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AhA----- Arapahoe	0-13	Mucky loam-----	SM	A-2, A-4	0	100	100	80-100	20-49	<30	NP-4
	13-34	Fine sandy loam, loam, sandy loam.	SM	A-2, A-4	0	100	100	70-100	20-49	---	NP
	34-85	Stratified sand to loamy fine sand.	SM, SP-SM	A-2, A-3, A-4	0	100	100	65-100	5-45	<30	NP-4
AmA: Arapahoe-----	0-13	Mucky loam-----	SM	A-2, A-4	0	100	100	80-100	20-49	<30	NP-4
	13-34	Fine sandy loam, loam, sandy loam.	SM	A-2, A-4	0	100	100	70-100	20-49	---	NP
	34-85	Stratified sand to loamy fine sand.	SM, SP-SM	A-2, A-3, A-4	0	100	100	65-100	5-45	<30	NP-4
Melfa-----	0-6	Mucky peat-----	PT	A-8	0	---	---	---	---	---	---
	6-13	Sandy loam, fine sandy loam, loam.	SM, SC, ML, CL	A-2, A-4, A-6	0	100	95-100	45-95	30-65	20-35	4-10
	13-50	Sandy loam, fine sandy loam, loam.	SM, SC, ML, CL	A-2, A-4, A-6	0	100	75-100	45-95	30-65	20-35	4-10
	50-85	Coarse sand, sandy loam, loam.	SC, SM, ML, CL	A-2, A-4, A-6	0	100	75-100	35-90	10-70	10-35	NP-10
AtD----- Assateague	0-2	Fine sand-----	SP, SW, SP-SM, SW-SM	A-1, A-3	0	100	75-100	35-99	0-10	---	NP
	2-85	Coarse sand, sand, fine sand.	SP, SW, SP-SM, SW-SM	A-1, A-3	0	100	75-100	35-99	0-8	---	NP
BeB----- Beaches	0-6	Sand-----	SP	A-1, A-3	0	100	75-100	5-85	0-5	---	NP
	6-72	Coarse sand, sand, fine sand.	SP	A-1, A-3	0	100	75-100	5-85	0-5	---	NP
BhB----- Bojac	0-7	Loamy sand-----	SM	A-2	0	95-100	95-100	50-100	15-30	<20	NP
	7-40	Fine sandy loam, loam, sandy loam, loamy sand.	ML, SM	A-2, A-4	0	95-100	95-100	55-100	20-60	<35	NP-10
	40-85	Stratified loamy fine sand to coarse sand.	SM, SP, SW-SM	A-1, A-2, A-3	0	80-100	75-100	12-100	2-35	<20	NP
BkA----- Bojac	0-7	Sandy loam-----	ML, CL-ML, SM, SC-SM	A-2, A-4	0	95-100	95-100	55-100	30-60	<25	NP-7
	7-40	Fine sandy loam, loam, sandy loam, loamy sand.	ML, SM	A-2, A-4	0	95-100	95-100	55-100	20-60	<35	NP-10
	40-85	Stratified loamy fine sand to coarse sand.	SM, SP, SW-SM	A-1, A-2, A-3	0	80-100	75-100	12-100	2-35	<20	NP

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments >3 inches	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
BoA----- Bojac	0-7	Fine sandy loam	ML, CL-ML, SM, SC-SM	A-2, A-4	0	95-100	95-100	55-100	30-60	<25	NP-7
	7-40	Fine sandy loam, loam, sandy loam.	ML, SM	A-2, A-4	0	95-100	95-100	55-100	20-60	<35	NP-10
	40-85	Stratified loamy fine sand to coarse sand.	SM, SP, SW-SM	A-1, A-2, A-3	0	80-100	75-100	12-100	2-35	<20	NP
CaA----- Camocca	0-85	Fine sand-----	SP-SM, SP, SM	A-2, A-3, A-1-b	0	100	80-100	40-75	3-18	---	NP
ChA----- Chincoteague	0-13	Silt loam-----	CL, CL-ML, ML	A-4, A-6	0	100	98-100	70-100	50-95	20-40	NP-20
	13-40	Loam, silt loam, silty clay loam.	CL	A-4, A-6, A-7	0	100	98-100	85-100	60-95	25-45	7-25
	40-85	Stratified coarse sand to silty clay loam.	SM, SC, ML, CL	A-1, A-2, A-4, A-6	0	100	75-100	35-100	5-95	<40	NP-20
DrA----- Dragston	0-6	Fine sandy loam	SM, SC, SC-SM, CL-ML	A-2, A-4	0	100	95-100	60-85	30-60	<20	NP-8
	6-40	Fine sandy loam, sandy loam, loam.	SM, SC, SC-SM, CL-ML	A-2, A-4	0	100	95-100	60-85	30-60	<25	NP-10
	40-85	Sand, fine sand, fine sandy loam.	SM, SP-SM, SC-SM	A-1, A-2, A-3	0	95-100	85-100	35-70	5-30	<18	NP-7
FhB----- Fisherman	0-6	Fine sand-----	SP, SW, SP-SM, SW-SM	A-1, A-3	0	100	75-100	35-99	0-10	---	NP
	6-85	Coarse sand, sand, fine sand.	SP, SW, SP-SM, SW-SM	A-1, A-3	0	100	75-100	35-99	0-8	---	NP
FmD: Fisherman-----	0-6	Fine sand-----	SP, SW, SP-SM, SW-SM	A-1, A-3	0	100	75-100	35-99	0-10	---	NP
	6-85	Coarse sand, sand, fine sand.	SP, SW, SP-SM, SW-SM	A-1, A-3	0	100	75-100	35-99	0-8	---	NP
Assateague-----	0-2	Fine sand-----	SP, SW, SP-SM, SW-SM	A-1, A-3	0	100	75-100	35-99	0-10	---	NP
	2-85	Coarse sand, sand, fine sand.	SP, SW, SP-SM, SW-SM	A-1, A-3	0	100	75-100	35-99	0-8	---	NP
FrB: Fisherman-----	0-6	Fine sand-----	SP, SW, SP-SM, SW-SM	A-1, A-3	0	100	75-100	35-99	0-10	---	NP
	6-85	Coarse sand, sand, fine sand.	SP, SW, SP-SM, SW-SM	A-1, A-3	0	100	75-100	35-99	0-8	---	NP
Camocca-----	0-85	Fine sand-----	SP-SM, SP, SM	A-2, A-3, A-1-b	0	100	80-100	40-75	3-18	---	NP

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments >3 inches	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
MaA----- Magotha	0-5	Fine sandy loam	SM, SC, ML, CL	A-2, A-4, A-6	0	100	75-100	45-95	30-65	20-35	NP-15
	5-40	Sandy loam, fine sandy loam, loam.	SM, SC, ML, CL	A-2, A-4, A-6	0	100	75-100	45-95	30-65	20-35	NP-15
	40-85	Coarse sand, fine sand, loamy fine sand.	SC, SP-SM, SM, SC-SM	A-1, A-2	0	100	75-100	35-99	10-35	10-25	NP-10
McA: Melfa-----	0-6	Mucky peat-----	PT	A-8	0	---	---	---	---	---	---
	6-13	Sandy loam, fine sandy loam, loam.	SM, SC, ML, CL	A-2, A-4, A-6	0	100	95-100	45-95	30-65	20-35	4-10
	13-50	Sandy loam, fine sandy loam, loam.	SM, SC, ML, CL	A-2, A-4, A-6	0	100	75-100	45-95	30-65	20-35	4-10
	50-85	Coarse sand, sandy loam, loam.	SC, SM, ML, CL	A-2, A-4, A-6	0	100	75-100	35-90	10-70	10-35	NP-10
Hobucken-----	0-13	Loam-----	SM, SC-SM, ML	A-2, A-4	0	100	95-100	60-95	39-90	<30	NP-10
	13-40	Fine sandy loam, loam, silt loam.	SM, SC-SM, ML	A-2, A-4	0	100	95-100	60-95	39-90	<30	NP-10
	40-85	Stratified loamy sand to sandy clay.	SM, SM-SC, ML, CL	A-1, A-2, A-4, A-6	0	100	95-100	60-95	39-90	<30	NP-10
MoB, MoD----- Molena	0-8	Loamy sand-----	SM, SP-SM	A-2, A-3	0	100	98-100	55-95	5-15	---	NP
	8-45	Loamy fine sand, loamy sand.	SM, SP-SM	A-2, A-3	0	100	98-100	55-95	7-25	---	NP
	45-85	Sand, coarse sand, gravelly sand.	SP, SP-SM	A-2, A-3	0-5	90-100	60-100	51-80	2-12	---	NP
MuA----- Munden	0-8	Sandy loam-----	SM, SC, SC-SM	A-4	0	100	90-100	60-95	35-75	<22	NP-10
	8-40	Sandy loam, loam, fine sandy loam.	SM, SC, SC-SM	A-2, A-4, A-6	0	100	90-100	60-95	30-75	<30	NP-15
	40-85	Fine sandy loam, loamy sand, fine sand.	SM, SP-SM, SC-SM	A-2, A-3	0	100	90-100	50-90	5-35	<18	NP-7
NmA----- Nimmo	0-6	Sandy loam-----	SM, SC, SC-SM, ML	A-4	0	100	95-100	60-85	36-60	<22	NP-10
	6-32	Loam, fine sandy loam, sandy loam.	SM, SC, ML, CL	A-2, A-4, A-6	0	100	95-100	60-95	30-75	<30	NP-10
	32-85	Loamy sand, fine sand, sand.	SM, SP-SM, SC-SM	A-2, A-3	0	100	95-100	50-80	5-35	<18	NP-7
PoA----- Polawana	0-22	Mucky sandy loam	SM, SC-SM	A-2, A-3	0	100	98-100	57-85	30-50	15-25	NP-5
	22-85	Loamy fine sand, loamy sand, fine sand.	SM, SP-SM	A-2	0	100	98-100	75-98	5-20	15-25	NP-5
SeA----- Seabrook	0-10	Loamy sand-----	SM, SP-SM	A-2, A-3	0	95-100	90-100	85-99	5-25	---	NP
	10-85	Loamy sand, fine sand, sand.	SM, SP-SM	A-2, A-3	0	95-100	90-100	85-100	5-25	---	NP



TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. 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	Permea- bility	Available water		Soil reaction	Salinity	Shrink- swell potential	Erosion factors		Wind erodi- bility group	Organic matter
					In/hr	In/in				K	T		
AhA----- Arapahoe	0-13	8-18	1.30-1.45	2.0-6.0	0.13-0.18	3.6-5.5	<2	Low-----	0.15	5	3	10-20	
	13-34	8-18	1.45-1.60	2.0-6.0	0.10-0.14	3.6-5.5	<2	Low-----	0.15				
	34-85	3-18	1.40-1.65	2.0-20	0.05-0.14	5.0-7.8	<2	Low-----	0.10				
AmA:													
Arapahoe-----	0-13	8-18	1.30-1.45	2.0-6.0	0.13-0.18	3.6-5.5	<2	Low-----	0.15	5	3	10-20	
	13-34	8-18	1.45-1.60	2.0-6.0	0.10-0.14	3.6-5.5	<2	Low-----	0.15				
	34-85	3-18	1.40-1.65	2.0-20	0.05-0.14	5.0-7.8	<2	Low-----	0.10				
Melfa-----	0-6	---	0.20-0.80	2.0-6.0	0.15-0.26	5.1-7.8	>7	Low-----	---	5	8	20-90	
	6-13	5-18	1.20-1.50	2.0-6.0	0.10-0.20	5.1-7.8	>7	Low-----	0.28				
	13-50	5-18	1.20-1.60	2.0-6.0	0.10-0.20	5.1-7.8	>7	Low-----	0.28				
	50-85	2-18	1.20-1.60	2.0-6.0	0.06-0.18	5.1-7.8	>7	Low-----	0.24				
AtD----- Assateague	0-2	0-10	1.30-1.60	>20	0.02-0.08	4.5-7.3	<2	Low-----	0.10	5	1	0-.5	
	2-85	0-5	1.30-1.60	>20	0.02-0.06	5.6-7.8	<2	Low-----	0.10				
BeB----- Beaches	0-6	0-1	1.35-1.85	>6.0	0.03-0.05	5.1-7.8	>4	Low-----	0.05	5	1	<.1	
	6-72	0-1	1.35-1.85	>6.0	0.03-0.05	5.1-7.8	>4	Low-----	0.05				
BhB----- Bojac	0-7	3-8	1.20-1.50	6.0-20	0.05-0.10	3.6-6.5	<2	Low-----	0.17	3	2	.5-1	
	7-40	11-16	1.35-1.55	2.0-6.0	0.08-0.16	3.6-6.5	<2	Low-----	0.17				
	40-85	1-8	1.30-1.50	6.0-20.0	0.02-0.07	4.5-6.0	<2	Low-----	0.17				
BkA, BoA----- Bojac	0-7	3-8	1.20-1.50	2.0-6.0	0.08-0.16	3.6-6.5	<2	Low-----	0.24	3	3	.5-2	
	7-40	11-16	1.35-1.55	2.0-6.0	0.08-0.16	3.6-6.5	<2	Low-----	0.17				
	40-85	1-8	1.30-1.50	6.0-20.0	0.02-0.07	4.5-6.0	<2	Low-----	0.17				
CaA----- Camocca	0-85	0-4	1.60-1.70	>20	0.02-0.05	3.6-8.4	<2	Low-----	0.10	5	---	.5-1	
ChA----- Chincoteague	0-13	10-35	1.20-1.50	0.2-2.0	0.02-0.07	5.6-7.3	>16	Moderate	0.32	5	---	2-10	
	13-40	20-35	1.30-1.60	0.2-2.0	0.02-0.07	5.6-7.3	>16	Moderate	0.37				
	40-85	0-35	1.30-1.60	0.2-20	0.02-0.07	5.6-7.3	>16	Moderate	0.28				
DrA----- Dragston	0-6	4-12	1.20-1.50	2.0-6.0	0.08-0.15	4.5-5.5	<2	Low-----	0.20	4	3	1-2	
	6-40	10-18	1.25-1.45	2.0-6.0	0.08-0.16	4.5-5.5	<2	Low-----	0.17				
	40-85	2-12	1.35-1.55	6.0-20.0	0.04-0.10	4.5-6.5	<2	Low-----	0.17				
FhB----- Fisherman	0-6	0-10	1.30-1.60	>20	0.02-0.08	4.5-7.8	<2	Low-----	0.10	5	1	0-1	
	6-85	0-5	1.30-1.60	>20	0.02-0.06	4.5-7.8	<2	Low-----	0.10				
FmD:													
Fisherman-----	0-6	0-10	1.30-1.60	>20	0.02-0.08	4.5-7.8	<2	Low-----	0.10	5	1	0-1	
	6-85	0-5	1.30-1.60	>20	0.02-0.06	4.5-7.8	<2	Low-----	0.10				
Assateague-----	0-2	0-10	1.30-1.60	>20	0.02-0.08	4.5-7.3	<2	Low-----	0.10	5	1	0-.5	
	2-85	0-5	1.30-1.60	>20	0.02-0.06	5.6-7.8	<2	Low-----	0.10				
FrB:													
Fisherman-----	0-6	0-10	1.30-1.60	>20	0.02-0.08	4.5-7.8	<2	Low-----	0.10	5	1	0-1	
	6-85	0-5	1.30-1.60	>20	0.02-0.06	4.5-7.8	<2	Low-----	0.10				
Camocca-----	0-85	0-4	1.60-1.70	>20	0.02-0.05	3.6-8.4	<2	Low-----	0.10	5	---	.5-1	



TABLE 16.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "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	Hydro-logic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total	Uncoated steel	Concrete
					Ft			In	In		
AhA----- Arapahoe	B/D	Rare-----	---	---	0-1.0	Apparent	Nov-May	---	---	High-----	High.
AmA: Arapahoe-----	B/D	Frequent---	Very brief.	Dec-May	0-1.0	Apparent	Nov-May	---	---	High-----	High.
Melfa-----	D	Frequent---	Very brief.	Jan-Dec	0-1.0	Apparent	Jan-Dec	0-6	0-6	High-----	High.
AtD----- Assateague	A	Rare-----	---	---	>6.0	---	---	---	---	Moderate	Low.
BeB----- Beaches	D	Frequent---	Very brief to long.	Jan-Dec	0-6.0	Apparent	Jan-Dec	---	---	High-----	High.
BhB, BkA, BoA-- Bojac	B	None-----	---	---	4.0-6.0	Apparent	Nov-Apr	---	---	Low-----	High.
CaA----- Camocca	A/D	Frequent---	Brief	Jan-Dec	0-1.0	Apparent	Jan-Dec	---	---	Low-----	Low.
ChA----- Chincoteague	D	Frequent---	Very brief.	Jan-Dec	+3.-0	Apparent	Jan-Dec	---	---	High-----	High.
DrA----- Dragston	C	None-----	---	---	1.0-2.5	Apparent	Nov-Apr	---	---	Low-----	High.
FhB----- Fisherman	D	Occasional	Very brief.	Jan-Dec	1.5-3.0	Apparent	Jan-Dec	---	---	Low-----	Low.
FmD: Fisherman-----	D	Rare-----	---	---	1.5-3.0	Apparent	Jan-Dec	---	---	Low-----	Low.
Assateague-----	A	Rare-----	---	---	>6.0	---	---	---	---	Moderate	Low.
FrB: Fisherman-----	D	Frequent---	Very brief.	Jan-Dec	1.5-3.0	Apparent	Jan-Dec	---	---	Low-----	Low.
Camocca-----	A/D	Frequent---	Brief	Jan-Dec	0-1.0	Apparent	Jan-Dec	---	---	Low-----	Low.
MaA----- Magotha	D	Frequent---	Very brief.	Jan-Dec	0-1.0	Apparent	Jan-Dec	---	---	High-----	High.
McA: Melfa-----	D	Frequent---	Very brief.	Jan-Dec	0-1.0	Apparent	Jan-Dec	0-6	0-6	High-----	High.
Hobucken-----	D	Frequent---	Very brief.	Jan-Dec	+1-1.0	Apparent	Jan-Dec	---	---	High-----	High.
MoB, MoD----- Molena	A	None-----	---	---	>6.0	---	---	---	---	Low-----	High.



TABLE 17.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Arapahoe-----	Coarse-loamy, mixed, nonacid, thermic Typic Humaquepts
Assateague-----	Mixed, thermic Typic Udipsamments
Bojac-----	Coarse-loamy, mixed, thermic Typic Hapludults
Camocca-----	Mixed, thermic Typic Psammaquents
Chincoteague-----	Fine-silty, mixed, nonacid, thermic Typic Sulfaquents
Dragston-----	Coarse-loamy, mixed, thermic Aeric Ochraquults
Fisherman-----	Mixed, thermic Aquic Udipsamments
Hobucken-----	Coarse-loamy, mixed, nonacid, thermic Typic Hydraquents
Magotha-----	Coarse-loamy, mixed, thermic Typic Natraqualfs
Melfa-----	Coarse-loamy, mixed, nonacid, thermic Mollic Fluvaquents
Molena-----	Sandy, mixed, thermic Psammentic Hapludults
Munden-----	Coarse-loamy, mixed, thermic Aquic Hapludults
Nimmo-----	Coarse-loamy, mixed, thermic Typic Ochraquults
Polawana-----	Sandy, mixed, thermic Cumulic Humaquepts
Seabrook-----	Mixed, thermic Aquic Udipsamments
Udipsamments-----	Udipsamments
Udorthents-----	Udorthents



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