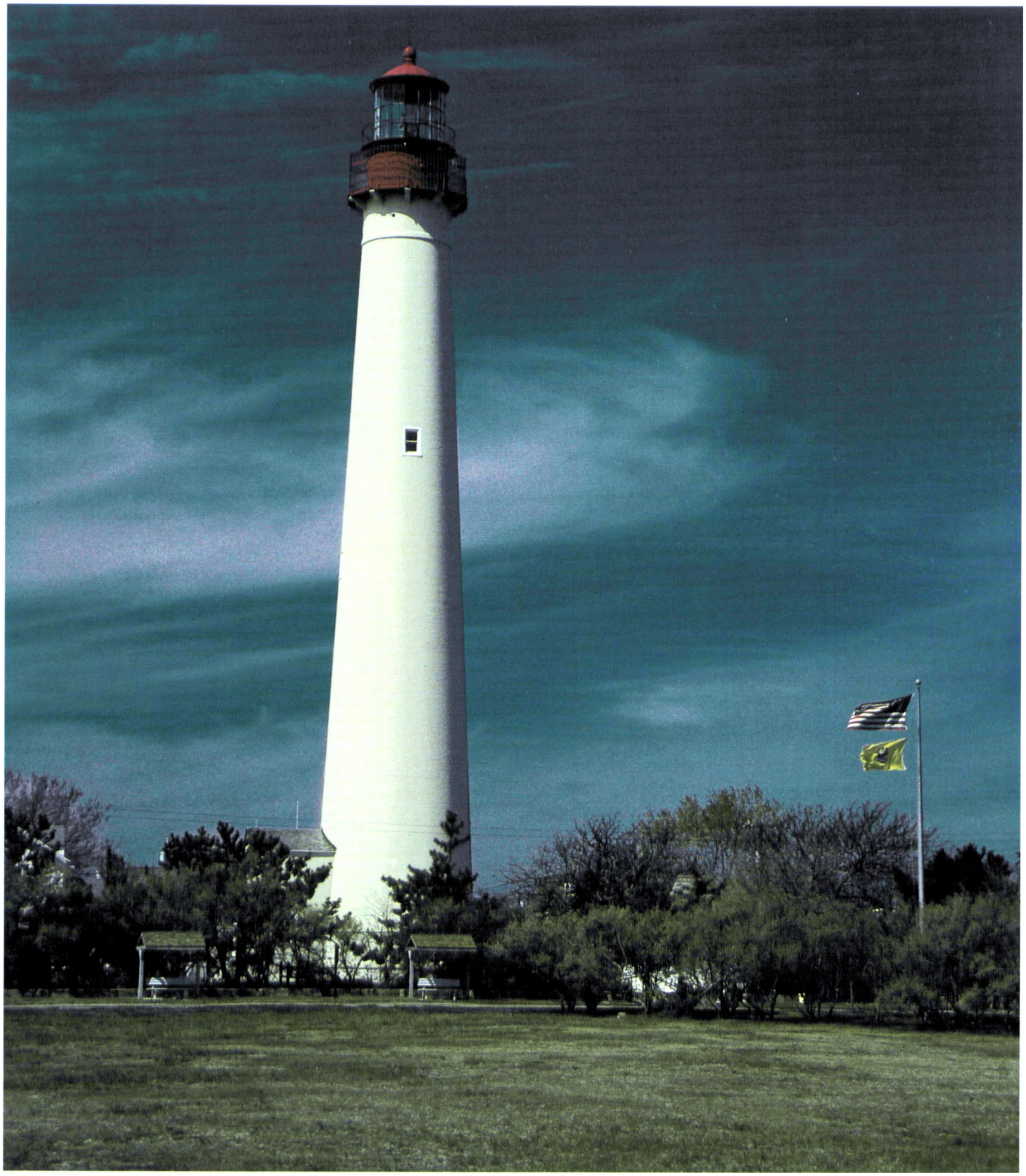
United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with
New Jersey Agricultural
Experiment Station;
Rutgers, the State
University; New Jersey
Department of Agriculture,
the State Soil Conservation
Committee; and the Cape-
Atlantic Soil Conservation
District

Soil Survey of Cape May County, New Jersey



How to Use This Soil Survey

General Soil Map

The general soil map, which is a color map, 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.

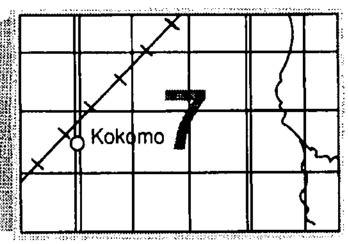
Detailed Soil Maps

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

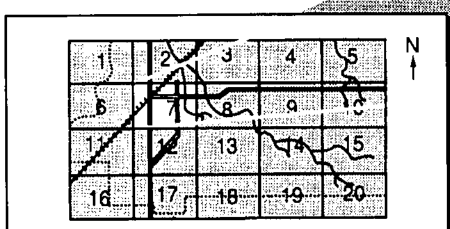
To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

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

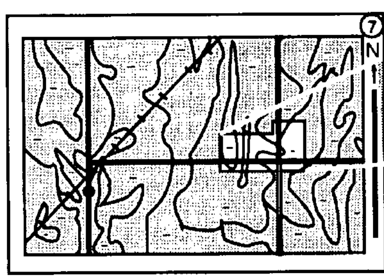
The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



MAP SHEET



INDEX TO MAP SHEETS



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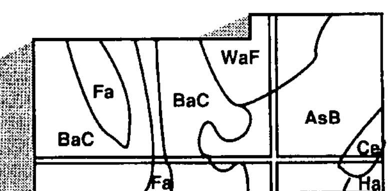

AREA OF INTEREST

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.

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 Natural Resources Conservation Service (formerly 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 1995. Soil names and descriptions were approved in 1997. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1995. This soil survey was made cooperatively by the Natural Resources Conservation Service; the New Jersey Agricultural Experiment Station; Rutgers, the State University; New Jersey Department of Agriculture, the State Soil Conservation Committee; and the Cape-Atlantic Soil Conservation District. The survey is part of the technical assistance furnished to the Cape-Atlantic Soil Conservation District.

Cover: The Cape May Lighthouse in an area of Urban land-Psamments, wet substratum complex, rarely flooded. The lighthouse is a popular tourist attraction in the county.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov (click on "Technical Resources").

Contents

Issued 2002

Foreword

This soil survey contains information that affects land use planning in Cape May County. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

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

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

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

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

Wayne M. Maresch
State Conservationist
Natural Resources Conservation Service

Soil Survey of
Cape May County, New Jersey

Soils handbook and project supervision by Lenore Matula Vasilas and
Thornton J.F. Hole, Natural Resources Conservation Service

Final manuscript by Scott C. Keenan, Natural Resources Conservation Service

Soils surveyed by Thornton J.F. Hole, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
New Jersey Agricultural Experiment Station; Rutgers, the State University; New Jersey
Department of Agriculture, the State Soil Conservation Committee; and the
Cape-Atlantic Soil Conservation District

CAPE MAY COUNTY is in the Outer Coastal Plain Physiographic Region. It forms the southern tip of New Jersey (fig. 1). It has an area of 183,000 acres and has 58 miles of shoreline. The peninsula is about 9 miles wide.

The topography of the county is characterized by two contrasting areas. The larger area, about 100,000 acres in size, is the upland part of the cape. This area has gentle slopes. The smaller area consists of barrier islands adjacent to the beaches. The highest elevation in the county is about 55 feet.

In 1990, the population of the county was 95,089, an increase of 15.6 percent since 1980. Cape May Court House is the county seat.

About 42 percent of the county is woodland. The upland forests are mostly mixed oaks and pine. Atlantic white-cedar and red maples are common in the lower, wet areas. Tidal flats supporting native grass make up 27 percent of the county. Urban land, including residential, commercial, and industrial land, makes up about 8 percent of the county, and municipal parks and golf courses make up about 5 percent.

In Cape May County there is a wide diversity of economic interests. The tourism industry is the main commercial activity. Other commercial industries in the county include vegetable farming, nurseries, fisheries, sand and gravel mining, food processing, and fabric processing. The United States Coast Guard Training Center, located in the southernmost point of the county, also contributes to the local economy.

This soil survey updates the survey of Cape May County published in 1977 *(17)*. It provides a digital soil survey on orthophotography and contains additional interpretive information.

General Nature of the Survey Area

This section gives general information about Cape May County. It describes the physiography and climate of the survey area.

Physiography

Cape May County lies within the Coastal Plain Physiographic Province. The surficial geology consists of unconsolidated deposition from the Quaternary and Tertiary Periods. The Quaternary deposits are from both the Holocene and Pleistocene Epochs, and the Tertiary deposits are from the Miocene Epoch.

The lithology of the deposits can be broken down into three groups—Holocene, Pleistocene, and Tertiary. The Holocene facies are comprised of swamp (organic muck and peat, sand, and silt), salt marshes (organic muck and peat, silt, clay, and sand), beach deposits (sand), and artificial fill (widely variable manmade deposits).

The Pleistocene deposition is the Cape May Formation. This formation is composed of three separate regressive-transgressive sequences in addition to barrier-lagoonal and beach-barrier facies.

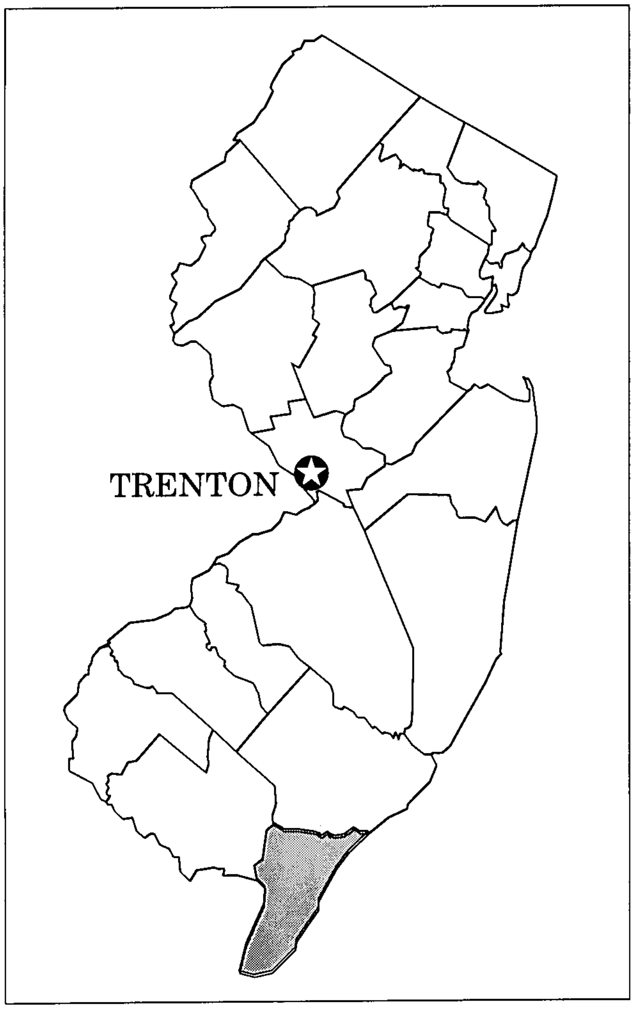

Figure 1.—Location of Cape May County in New Jersey.

The lithology consists of sand, gravel, clayey-silt, and peat.

The Tertiary deposition is made up of the Bridgeton and Cohansey Formations of the Miocene Epoch. Located in the northeastern part of the county, the lithologies of these formations consist primarily of sand and include gravel, silt, clay, and peat *(11)*.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Belleplain State Forest, New Jersey, in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 34.6 degrees F and the average daily minimum temperature is 24.2 degrees. The lowest temperature on record, which occurred on January 11, 1942, is -22 degrees. In summer, the average temperature is 72.9 degrees and the average daily maximum temperature is 84.4 degrees. The highest recorded temperature, which occurred on July 10, 1993, is 103 degrees.

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

The total average annual precipitation is 42.03 inches. Of this, 21.87 inches, or about 52 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 7 inches on August 19, 1939. Thunderstorms occur on about 27 days each year.

The average seasonal snowfall is about 14.2 inches. The greatest snow depth at any one time during the period of record was 20 inches. On the average, 10 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.

How This Survey Was Made

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

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

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

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

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. The data from these analyses and tests and from field-observed characteristics and soil properties are used to predict behavior of the soils under different uses. Interpretations 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 relatively 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 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 accurately locating boundaries.

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

Survey Procedures

The general procedures followed in making this survey are described in the "National Soil Survey Handbook" of the Natural Resources Conservation Service and in the "Soil Survey Manual" *(14, 18)*.

Before fieldwork began, preliminary boundaries of slopes and landforms were plotted stereoscopically on aerial photographs taken in 1991 at a scale of 1:24,000. United States Geological Survey geologic and topographic maps at a scale of 1:24,000 were also used. Map units were then designed according to the pattern of soils interpreted from photographs, maps, and field observations.

Two levels of mapping intensity were used in this survey. More closely spaced observations were made on uplands where the soils are used for agriculture or urban development. Less closely spaced observations were made in forested wetlands and tidal marshes where access is difficult. For either level of mapping intensity, the information about the soils can be used to determine soil management and to predict the suitability of the soils for various uses.

Traverses were made on foot. The soils were examined at intervals ranging from a few hundred feet to about 1/4 mile, depending on the landscape and soil pattern. Observations of special features, such as landforms, vegetation, and evidence of flooding, were made continuously without regard to spacing. Soil boundaries were determined on the basis of soil examinations, observations, and photo interpretations. In many areas, such as those where tidal marshes intersect with uplands, these boundaries are precise because of an abrupt change in the landform. The soils were examined with the aid of a hand probe, a bucket auger, or a spade to a depth of about 3 to 5 feet. The typical pedons were observed in pits dug by hand.

Soil boundaries were plotted stereoscopically on the basis of parent material, landform, and relief. Many of these boundaries cannot be exact because they fall within a zone of gradual change between landforms, such as an area where an upland side slope becomes a foot slope. Much intermingling of the soils occurs in these zones.

Samples for chemical and physical analyses were taken from the site of the typical pedon of the major soils in the survey area. Most of the analyses were made by the Soil Survey Laboratory, Lincoln, Nebraska. Commonly used laboratory procedures were followed *(15)*.

After completion of the soil mapping on aerial photographs, map unit delineations were transferred by hand to orthophotographs at a scale of 1:24,000 or 1:12,000.

General Soil Map Units

The general soil map 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 or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

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

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

1. Downer-Ingleside-Swainton

Nearly level and gently sloping, well drained soils that are very deep and have a loamy subsoil and a dominantly loamy or sandy substratum; formed in mineral coastal plain sediments

Setting

Location in the survey area: Mainly the central and northeastern parts of the county
Landform position: Summits and side slopes (fig. 2)
Slope range: 0 to 5 percent

Composition

Percent of the survey area: 20
Downer soils: 41 percent
Ingleside soils: 29 percent
Swainton soils: 10 percent
Minor soils (including Evesboro, Fort Mott, Aura, and Dennisville soils): 20 percent

Typical Profile

Downer

Surface layer:
0 to 10 inches—dark grayish brown loamy sand

Subsoil:
10 to 16 inches—yellowish brown loamy sand
16 to 36 inches—yellowish brown sandy loam

Substratum:
36 to 48 inches—yellowish brown loamy sand
48 to 72 inches—light yellowish brown sand

Ingleside

Surface layer:
0 to 12 inches—dark grayish brown sandy loam

Subsoil:
12 to 17 inches—yellowish brown sandy loam
17 to 27 inches—strong brown sandy loam
27 to 38 inches—yellowish brown sandy loam
38 to 48 inches—yellowish brown sandy loam that has yellowish red iron accumulations

Substratum:
48 to 66 inches—yellow sand that has light brownish gray iron depletions
66 to 72 inches—brownish yellow fine sandy loam that has light brownish gray iron depletions

Swainton

Surface layer:
0 to 1 inch—dark reddish brown sandy loam
1 to 2 inches—dark grayish brown sandy loam

Subsurface layer:
2 to 3 inches—light grayish brown sandy loam

Subsoil:
3 to 4 inches—yellowish red sandy loam
4 to 12 inches—strong brown sandy loam
12 to 23 inches—yellowish brown sandy loam
23 to 35 inches—yellowish red gravelly loamy sand

Substratum:
35 to 47 inches—yellowish red gravelly sand

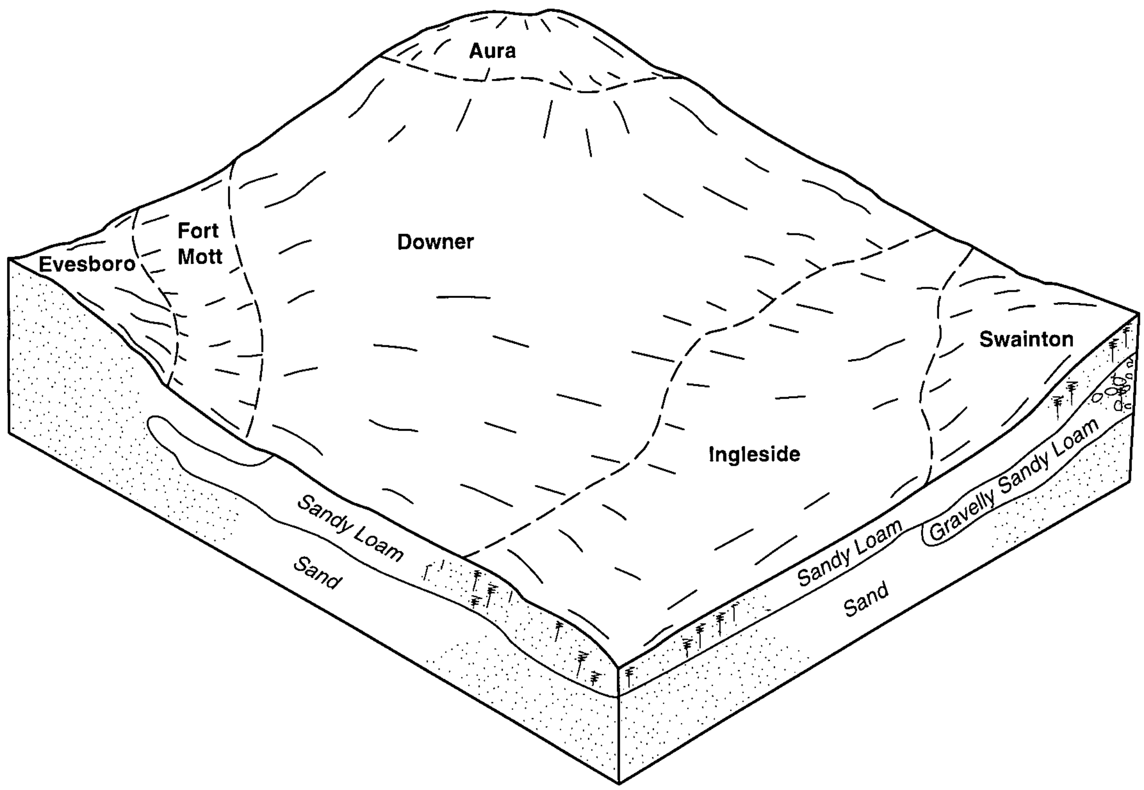

Figure 2.—The relationship of soils, landform position, and underlying material in the Downer-Ingleside-Swainton general soil map unit. Evesboro, Fort Mott, and Aura soils are minor components in the map unit.

47 to 58 inches—yellow sand that has strata of sandy loam
58 to 74 inches—very pale brown fine sand

Soil Properties and Qualities

Downer

Drainage class: Well drained
Permeability: Moderately rapid
Slope class: Nearly level or gently sloping
Available water capacity: Moderate
Organic matter content of the surface layer: Low
Hazard of water erosion: None to moderate
Hazard of wind erosion: Moderate
Rock fragments on the surface: 0 to 15 percent, by volume, quartzose gravel
Depth to high water table: More than 6 feet
Soil reaction: Extremely acid to strongly acid throughout the profile, except in limed areas

Ingleside

Drainage class: Well drained
Permeability: Moderately rapid
Slope class: Nearly level or gently sloping
Available water capacity: Moderate
Organic matter content of the surface layer: Low
Hazard of water erosion: None to moderate
Hazard of wind erosion: Severe
Rock fragments on the surface: 0 to 15 percent, by volume, quartzose gravel
Depth to high water table: 3.5 to 6 feet
Soil reaction: Extremely acid or very strongly acid throughout the profile, except in limed areas

Swainton

Drainage class: Well drained
Permeability: Moderate rapid
Slope class: Nearly level
Available water capacity: Low
Organic matter content of the surface layer: Low
Hazard of water erosion: None to moderate
Hazard of wind erosion: Moderate
Rock fragments on the surface: 0 to 15 percent, by volume, quartzose gravel
Depth to high water table: More than 6 feet

Soil reaction: Extremely acid or very strongly acid throughout the profile, except in limed areas

Minor Soils

• The sandy Evesboro soils in randomly scattered areas
• Fort Mott soils, which have thick sandy surface layers; in randomly scattered areas
• Aura soils, which have a fragipan; in the higher areas
• Dennisville soils, which are deep to a high water table; in the lower areas

Agricultural Development

Crops and pasture

Management concerns: Soil blowing, erodibility, and droughtiness of the surface layer for soils having a surface layer of loamy sand; erodibility on slopes of more than 2 percent

Woodland

Management concerns: Seedling mortality for soils having a surface layer of loamy sand

Urban Development

Dwellings

Management concerns: No significant limitations

Local roads and streets

Management concerns: No significant limitations

Septic tank absorption fields

Management concerns: Downer and Swainton—poor filtering capacity; Ingleside—wetness

2. Hammonton

Nearly level and gently sloping, moderately well drained soils that are very deep and have a loamy and sandy subsoil and a dominantly sandy substratum; formed in mineral coastal plain sediments

Setting

Location in the survey area: Mainly the central and northeastern parts of the county
Landform position: Side slopes, depressions, and foot slopes (fig. 3)
Slope range: 0 to 5 percent

Composition

Percent of the survey area: 15
Hammonton soils: 88 percent
Minor soils (including Galloway, Downer, Berryland, Mullica, and Manahawkin soils): 12 percent

Typical Profile

Organic layer:
0 to 2 inches—dark reddish brown moderately decomposed forest litter
2 to 3 inches—highly decomposed forest litter

Surface layer:
3 to 4 inches—dark grayish brown sandy loam

Subsurface layer:
4 to 5 inches—light yellowish brown sandy loam

Subsoil:
5 to 6 inches—strong brown sandy loam
6 to 27 inches—yellowish brown sandy loam
27 to 30 inches—yellowish brown loamy sand

Substratum:
30 to 39 inches—yellowish brown loamy sand that has light brownish gray iron depletions
39 to 43 inches—gray sand that has yellowish brown iron accumulations
43 to 72 inches—gray gravelly sand that has yellowish brown iron accumulations

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate
Slope class: Nearly level or gently sloping
Available water capacity: Moderate
Organic matter content of the surface layer: Low
Hazard of water erosion: None to moderate
Hazard of wind erosion: Moderate
Rock fragments on the surface: 0 to 10 percent, by volume, quartzose gravel
Depth to high water table: 1.5 to 3.5 feet
Soil reaction: Extremely acid to strongly acid, except in limed areas

Minor Soils

• The sandy Galloway soils in randomly scattered areas
• The well drained Downer soils in the higher areas
• The very poorly drained Berryland, Mullica, and Manahawkin soils in the lower areas

Agricultural Development

Crops and pasture

Management concerns: Soil blowing, erodibility, and droughtiness of the surface layer for soils having a

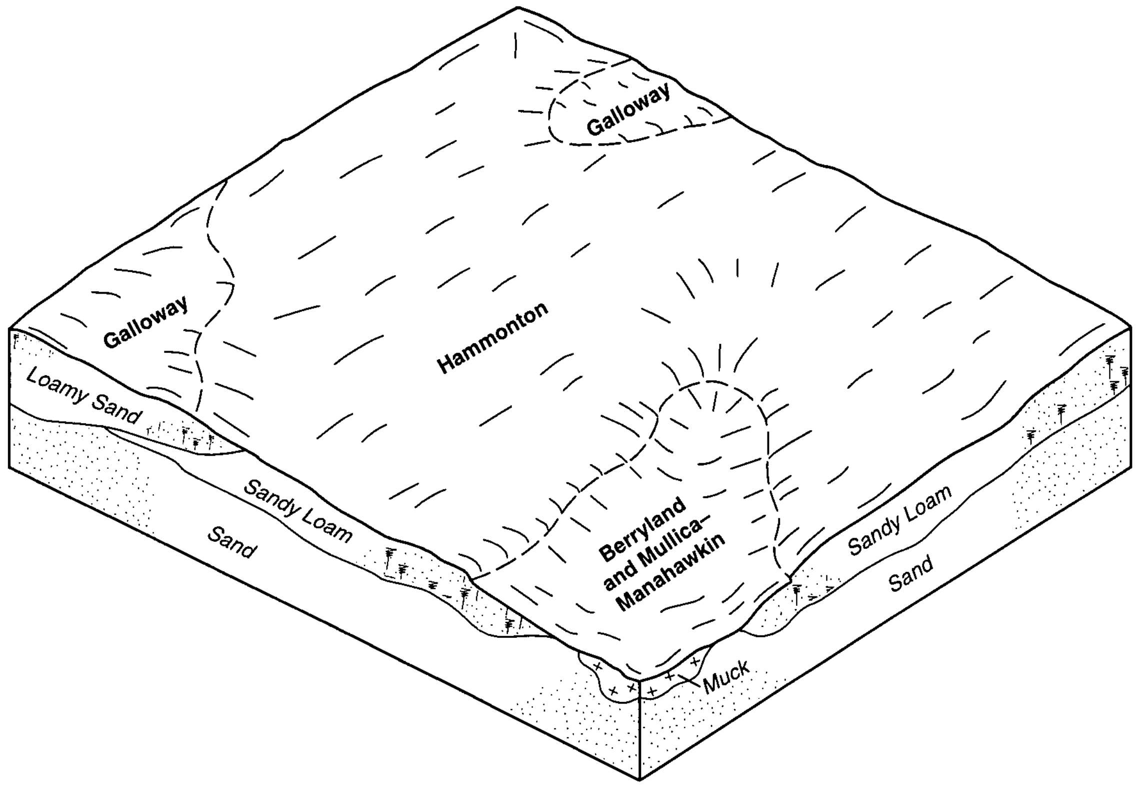

Figure 3.—The relationship of soils, landform position, and underlying material in the Hammonton general soil map unit. Galloway soils are a minor component in sandy areas. The Berryland and Mullica-Manahawkin general soil map unit occurs in the adjacent lower areas.

surface layer of loamy sand; crop selection restrictions for soils having a surface layer of sandy loam

Woodland

Management concerns: Seedling mortality for soils having a surface layer of loamy sand

Urban Development

Dwellings

Management concerns: Wetness

Local roads and streets

Management concerns: Wetness

Septic tank absorption fields

Management concerns: Wetness in areas of the Hammonton soils

3. Berryland and Mullica-Manahawkin

Level, very poorly drained soils that are very deep and range from sandy mineral material to mucky organic material over a sandy substratum; formed in mineral and organic coastal plain sediments

Setting

Location in the survey area: Mainly the central and northeastern parts of the county
Landform position: Freshwater flats, drainageways, and depressions (fig. 4); the soils are associated with landscapes subject to flooding
Slope range: 0 to 1 percent

Composition

Percent of the survey area: 18
Berryland and Mullica soils: 65 percent
Manahawkin soils: 25 percent
Minor soils (including Hammonton soils): 10 percent

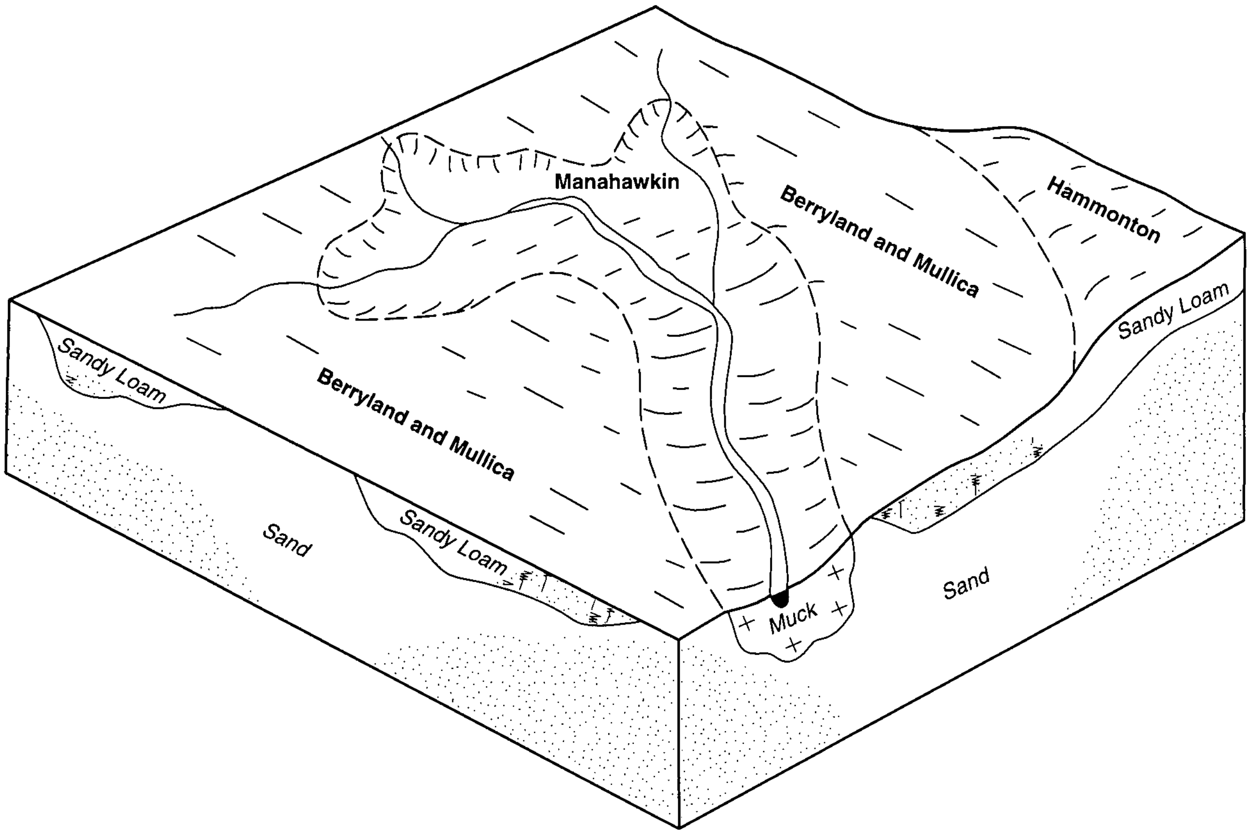

Figure 4.—The relationship of soils, landform position, and underlying material in the Berryland and Mullica-Manahawkin general soil map unit. The Hammonton general soil map unit occurs in the adjacent higher areas.

Typical Profile

Berryland

Surface layer:
0 to 11 inches—black sand

Subsoil:
11 to 19 inches—dark reddish brown sand
19 to 32 inches—gray sand that has pale yellow iron accumulations
32 to 40 inches—dark reddish brown sand

Substratum:
40 to 44 inches—gray sand
44 to 72 inches—stratified gray sand and sandy loam

Mullica

Surface layer:
0 to 12 inches—black sandy loam

Subsoil:
12 to 31 inches—grayish brown sandy loam that has yellow iron accumulations
31 to 36 inches—light brownish gray loamy sand

Substratum:
36 to 72 inches—light brownish gray sand

Manahawkin

Surface layer:
0 to 35 inches—black muck

Substratum:
35 to 72 inches—gray sand

Soil Properties and Qualities

Berryland

Drainage class: Very poorly drained
Permeability: Moderately rapid
Slope class: Level
Available water capacity: Low
Organic matter content of the surface layer: Moderate
Hazard of water erosion: None or slight
Hazard of wind erosion: None or slight
Flooding: Occasional for brief to long periods
Rock fragments on the surface: 0 to 15 percent, by volume, quartzose gravel

High water table: 0.5 foot above the soil surface to 0.5 foot below
Soil reaction: Very strongly acid or extremely acid throughout the profile

Mullica

Drainage class: Very poorly drained
Permeability: Moderate
Slope class: Level
Available water capacity: Moderate
Organic matter content of the surface layer: Moderate
Hazard of water erosion: None or slight
Hazard of wind erosion: None or slight
Flooding: Occasional for brief to long periods
Rock fragments on the surface: 0 to 15 percent, by volume, quartzose gravel
Depth to high water table: 0 to 0.5 foot
Soil reaction: Very strongly acid or extremely acid throughout the profile

Manahawkin

Drainage class: Very poorly drained
Permeability: Rapid in the organic layers and moderately rapid in the mineral horizons
Slope class: Level
Available water capacity: Very high
Organic matter content of the surface layer: Very high
Hazard of water erosion: None or slight
Hazard of wind erosion: None or slight
Flooding: Frequent for long periods
High water table: 0 to 0.5 foot above the soil surface
Soil reaction: Extremely acid or very strongly acid throughout the profile

Minor Soils

• The moderately well drained Hammonton soils in the higher areas

Agricultural Development

Management concerns: Wetness and flooding

Urban Development

Management concerns: Wetness and flooding

4. Transquaking-Appoquinimink-Mispillion-Pawcatuck

Level, very poorly drained soils that are very deep and range from silty mineral material to mucky organic material over a sandy or silty substratum; formed in mineral and organic coastal plain sediments

Setting

Location in the survey area: Mainly in the eastern third of the county and in some smaller areas in the northeastern and western parts; the soils are associated with rivers and bays subject to daily tides
Landform position: Tidal flats and drainageways
Slope range: 0 to 1 percent

Composition

Percent of the survey area: 23
Transquaking soils: 39 percent
Appoquinimink soils: 23 percent
Mispillion soils: 21 percent
Pawcatuck soils: 17 percent

Typical Profile

Transquaking

Surface layer:
0 to 60 inches—dark reddish brown mucky peat

Substratum:
60 to 90 inches—dark gray silt loam

Appoquinimink

Surface layer:
0 to 12 inches—very dark gray mucky silt loam

Substratum:
12 to 30 inches—dark gray silt loam
30 to 72 inches—dark reddish brown mucky peat

Mispillion

Surface layer:
0 to 10 inches—very dark grayish brown mucky peat
10 to 26 inches—very dark grayish brown muck

Substratum:
26 to 90 inches—dark gray silt loam

Pawcatuck

Surface layer:
0 to 12 inches—black mucky peat
12 to 45 inches—dark reddish brown mucky peat

Substratum:
45 to 50 inches—dark gray loamy sand
50 to 72 inches—gray sand

Soil Properties and Qualities

Transquaking

Drainage class: Very poorly drained
Permeability: Moderately rapid or rapid in the organic deposits and moderately slow in the mineral material
Slope class: Level
Available water capacity: Very high

Organic matter content of the surface layer: Very high
Hazard of water erosion: None or slight; however, the hazard of streambank caving from wave action is severe
Hazard of wind erosion: None or slight
Flooding: Very frequent for very brief periods
High water table: 0 to about 1 foot above the soil surface
Soil reaction: Moist soil—slightly acid to mildly alkaline; dry soil—strongly acid to ultra acid

Appoquinimink

Drainage class: Very poorly drained
Permeability: Moderately rapid or rapid in the organic deposits and moderately slow in the mineral material
Slope class: Level
Available water capacity: High
Organic matter content of the surface layer: Moderate or high
Hazard of water erosion: None or slight; however, the hazard of streambank caving from wave action is severe
Hazard of wind erosion: None or slight
Flooding: Very frequent for very brief periods
High water table: 0 to about 1 foot above the soil surface
Soil reaction: Moist soil—slightly acid to mildly alkaline; dry soil—strongly acid to ultra acid

Mispillion

Drainage class: Very poorly drained
Permeability: Moderately rapid or rapid in the organic deposits and moderately slow in the mineral material
Slope class: Level
Available water capacity: Very high
Organic matter content of the surface layer: Very high
Hazard of water erosion: None or slight; however, the hazard of streambank caving from wave action is severe
Hazard of wind erosion: None or slight
Flooding: Very frequent for very brief periods
High water table: 0 to about 1 foot above the soil surface
Soil reaction: Moist soil—slightly acid to mildly alkaline; dry soil—strongly acid to ultra acid

Pawcatuck

Drainage class: Very poorly drained
Permeability: Moderately rapid or rapid in the organic deposits and moderately slow in the mineral material
Slope class: Level
Available water capacity: Very high
Organic matter content of the surface layer: Very high
Hazard of water erosion: None or slight; however, the hazard of streambank caving from wave action is severe
Hazard of wind erosion: None or slight
Flooding: Very frequent for very brief periods
High water table: 0 to about 1 foot above the soil surface
Soil reaction: Moist soil—slightly acid to mildly alkaline; dry soil—strongly acid to ultra acid

Agricultural Development

Management concerns: Excessive wetness and flooding

Urban Development

Management concerns: Excessive wetness and flooding

5. Urban land-Psamments-Beaches

Miscellaneous land, such as beaches; areas of impervious surfaces, such as asphalt and buildings; and areas where the natural soils have been filled

Setting

Location in the survey area: Mainly along a narrow strip on the eastern side of the county adjacent to the Atlantic Ocean
Slope range: 0 to 5 percent

Composition

Percent of the survey area: 11
Urban land: 55 percent
Psamments: 20 percent
Beaches: 19 percent
Minor soils (including Downer and Hammonton soils): 6 percent

Typical Profile

Urban land

Urban land consists of areas where much of the soil surface is covered with asphalt, concrete, buildings, or other impervious material.

Psamments

Psamments consist of fill material that commonly ranges from 2 to 4 feet in thickness and is commonly over soils such as Appoquinimink, Transquaking, Mispillion, Pawcatuck, Berryland, Mullica, and Manahawkin soils. The upper part of the soil profile is commonly sand, fine sand, or loamy sand fill material.

Figure 5.—Beach dune restoration in an area of the Urban land-Psamments-Beaches general soil map unit. Planting American beachgrass helps to minimize flood damage caused by storm surges.

The lower part is mainly silty materials that have a high content of organic material; is sand, sandy loam, or loamy sand; or is mucky organic materials.

Beaches

Beaches are areas consisting of sandy materials that are constantly being reworked by ocean waves and tides. The soil material is very fine sand to coarse sand and commonly contains many shell fragments.

Minor Soils

- Natural areas of the sandy Hooksan soils; on adjacent sand dunes
- Randomly scattered areas of Pits or open excavations from which sand or gravel has been removed
- Randomly scattered areas of Udorthents that have been used for sanitary landfills

Use and Management

Areas of Beaches and Psamments

Management concerns: Flooding, variable soil properties that require onsite investigation to determine specific management concerns (fig. 5)

Areas of Urban land and Psamments

Management concerns: Excessive runoff from urban areas which can increase the hazard of flooding, subsidence and flooding, variable soil properties that require onsite investigation to determine specific management concerns

6. Water

Bays, estuaries, lakes, ponds, and streams

Setting

Location in the survey area: Mainly in the eastern part of the county; smaller bodies of water are scattered throughout the county

Composition

Percent of the survey area: 13

Detailed Soil Map Units

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

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

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

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

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

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

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

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

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Pawcatuck-Transquaking complex, very frequently flooded, is an example.

Figure 6.—Low tide in a drainageway in an area of Appoquinimink-Transquaking-Mispillion complex, very frequently flooded.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Berryland and Mullica soils, occasionally flooded, is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, sand and gravel, is an example.

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

Aptv—Appoquinimink-Transquaking-Mispillion complex, very frequently flooded

Setting

Landscape: Coastal plain
Landform: Tidal marshes
Landform position: Tidal flats and drainageways (fig. 6)

Composition

Appoquinimink soil and similar inclusions: 40 percent
Transquaking soil and similar inclusions: 30 percent
Mispillion soil and similar inclusions: 25 percent
Contrasting inclusions: 5 percent

Typical Profile

Appoquinimink

Surface layer:
0 to 12 inches—very dark gray mucky silt loam

Substratum:
12 to 30 inches—dark gray silt loam
30 to 72 inches—dark reddish brown mucky peat

Transquaking

Surface layer:
0 to 60 inches—dark reddish brown mucky peat

Substratum:
60 to 90 inches—dark gray silt loam

Mispillion

Surface layer:
0 to 10 inches—very dark grayish brown mucky peat
10 to 24 inches—reddish brown mucky peat

Substratum:
24 to 80 inches—dark gray silt loam

Soil Properties and Qualities

Drainage class: Very poorly drained
Permeability: Moderately slow in the mineral layers and moderately rapid or rapid in the organic layers
Slope class: Level
Available water capacity: Appoquinimink—high; Transquaking and Mispillion—very high
Organic matter content of the surface layer: Appoquinimink—moderate or high; Transquaking and Mispillion—very high
Hazard of water erosion: None or slight; however, the hazard of streambank caving from wave action is severe
Hazard of wind erosion: None or slight
Flooding: Very frequent for very brief periods
High water table: 0 to about 1 foot above the soil surface
Soil reaction: Moist soil—slightly acid to mildly alkaline; dry soil—strongly acid to ultra acid

Inclusions

Contrasting inclusions:
• Hammonton soils, which are moderately well drained and in the higher, less flooded areas

Agricultural Development

Management concerns: Excessive wetness and flooding

Urban Development

Management concerns: Excessive wetness and flooding

Interpretive Groups

Land capability classification: VIIIw

AugA—Aura sandy loam, 0 to 2 percent slopes

Setting

Landscape: Coastal plain
Landform: Broad ridges
Landform position: Summits and side slopes

Composition

Aura soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Typical Profile

Surface layer:
0 to 12 inches—dark yellowish brown sandy loam

Subsoil:
12 to 24 inches—brown gravelly sandy loam
24 to 32 inches—light brown gravelly sandy loam
32 to 45 inches—yellowish red gravelly sandy loam
45 to 68 inches—strong brown sandy loam

Substratum:
68 to 72 inches—yellowish brown loamy sand

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately slow
Slope class: Nearly level
Available water capacity: Moderate
Organic matter content of the surface layer: Low
Hazard of water erosion: None or slight
Hazard of wind erosion: Moderate
Rock fragments on the surface: 0 to 15 percent, by volume, quartzose gravel
Depth to high water table: More than 6 feet
Depth to restrictive feature: 15 to 40 inches to a fragipan
Soil reaction: Extremely acid or very strongly acid throughout the profile, except in limed areas

Inclusions

Contrasting inclusions:
• The moderately well drained Hammonton soils in depressions
• Downer soils that do not have a fragipan; in the lower areas

Agricultural Development

Crops and pasture

Management concerns: No significant limitations

Woodland

Management concerns: Windthrow hazard

Urban Development

Dwellings

Management concerns: No significant limitations

Local roads and streets

Management concerns: Potential frost heaving

Septic tank absorption fields

Management concerns: Restricted permeability

Interpretive Groups

Land capability classification: I

AugB—Aura sandy loam, 2 to 5 percent slopes

Setting

Landscape: Coastal plain
Landform: Broad ridges
Landform position: Summits and side slopes

Composition

Aura soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Typical Profile

Surface layer:
0 to 12 inches—dark yellowish brown sandy loam

Subsoil:
12 to 24 inches—brown gravelly sandy loam
24 to 32 inches—light brown gravelly sandy loam
32 to 45 inches—yellowish red gravelly sandy loam
45 to 68 inches—strong brown sandy loam

Substratum:
68 to 72 inches—yellowish brown loamy sand

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately slow
Slope class: Gently sloping
Available water capacity: Moderate
Organic matter content of the surface layer: Low
Hazard of water erosion: Moderate
Hazard of wind erosion: Moderate
Rock fragments on the surface: 0 to 15 percent, by volume, quartzose gravel
Depth to high water table: More than 6 feet
Depth to restrictive feature: 15 to 40 inches to a fragipan
Soil reaction: Extremely acid or very strongly acid throughout the profile, except in limed areas

Inclusions

Contrasting inclusions:
- The moderately well drained Hammonton soils in depressions
- Downer soils that do not have a fragipan; in the lower areas

Agricultural Development

Crops and pasture

Management concerns: Restricted rooting depth, erodibility

Woodland

Management concerns: Windthrow hazard

Urban Development

Dwellings

Management concerns: No significant limitations

Local roads and streets

Management concerns: Potential frost heaving

Septic tank absorption fields

Management concerns: Restricted permeability

Interpretive Groups

Land capability classification: IIe

BEAV—Beaches, very frequently flooded

Setting

Landscape: Coastal beaches

Composition

Beaches: 95 percent
Contrasting inclusions: 5 percent
Note: The number of observations in this map unit was minimal; however, the detail of mapping is adequate for the expected use of the map unit.

Typical Profile

Beaches are areas of sandy materials that are constantly being reworked by ocean waves and tides. The materials range from very fine sand to coarse sand and commonly contain many shell fragments. A typical profile is not given for this map unit.

Inclusions

Contrasting inclusions:
- Hooksan soils, which are rarely flooded and on adjacent sand dunes

• Small areas of Urban land that have impervious surfaces

Agricultural Development

Management concerns:
• This map unit is not used for agriculture because of the wetness and flooding.

Urban Development

Management concerns: Wetness and flooding

Interpretive Groups

Land capability classification: VIIIs

BEXS—Berryland and Mullica soils, occasionally flooded

Setting

Landscape: Coastal plain
Landform: Freshwater flats, flood plains, and depressions
Landform position: Freshwater flats, drainageways, and depressions

Composition

Berryland and Mullica soils and similar inclusions: 95 percent
Contrasting inclusions: 5 percent

Typical Profile

Berryland

Surface layer:
0 to 11 inches—black sand

Subsoil:
11 to 19 inches—dark reddish brown sand
19 to 32 inches—gray sand that has pale yellow iron accumulations
32 to 40 inches—dark reddish brown sand

Substratum:
40 to 44 inches—gray sand
44 to 72 inches—stratified gray sand and sandy loam

Mullica

Surface layer:
0 to 12 inches—black sandy loam

Subsoil:
12 to 31 inches—grayish brown sandy loam that has yellow iron accumulations
31 to 36 inches—light brownish gray loamy sand

Substratum:
36 to 72 inches—light brownish gray sand

Soil Properties and Qualities

Drainage class: Very poorly drained
Permeability: Berryland—moderately rapid; Mullica—moderate
Slope class: Level
Available water capacity: Berryland—low; Mullica—moderate
Organic matter content of the surface layer: Moderate
Hazard of water erosion: None or slight
Hazard of wind erosion: None or slight
Flooding: Occasional for brief to long periods
Rock fragments on the surface: 0 to 15 percent, by volume, quartzose gravel
High water table: Berryland—0.5 foot above the soil surface to 0.5 foot below; Mullica—0 to 0.5 foot below the soil surface
Soil reaction: Very strongly acid or extremely acid throughout the profile

Inclusions

Contrasting inclusions:
• The moderately well drained Hammonton and Galloway soils in the higher areas
• The organic Manahawkin soils in very narrow drainageways

Agricultural Development

Management concerns: Wetness and flooding

Urban Development

Management concerns: Wetness and flooding

Interpretive Groups

Land capability classification: Berryland—Vw; Mullica—IVw

DenA—Dennisville sandy loam, 0 to 2 percent slopes

Setting

Landscape: Coastal plain
Landform: Broad ridges
Landform position: Summits and side slopes

Composition

Dennisville soil and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Typical Profile

Organic layer:
0 to 1 inch—dark reddish brown moderately decomposed forest litter

Surface layer:
1 to 2 inches—very dark grayish brown sandy loam

Subsurface layer:
2 to 4 inches—light brownish gray sandy loam

Subsoil:
4 to 5 inches—yellowish red sandy loam
5 to 17 inches—yellowish brown sandy loam
17 to 27 inches—yellowish brown gravelly sandy loam
27 to 32 inches—yellowish brown gravelly loamy sand

Substratum:
32 to 46 inches—yellowish brown gravelly sand
46 to 50 inches—yellowish brown sand
50 to 67 inches—yellowish brown sand that has light brownish gray iron depletions
67 to 74 inches—yellowish brown gravelly sand that has light brownish gray iron depletions

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately rapid
Slope class: Nearly level
Available water capacity: Low
Organic matter content of the surface layer: Low
Hazard of water erosion: None or slight
Hazard of wind erosion: Moderate
Rock fragments on the surface: 0 to 15 percent, by volume, quartzose gravel
Depth to high water table: 3.5 to 6 feet
Soil reaction: Extremely acid to strongly acid throughout the profile, except in limed areas

Inclusions

Contrasting inclusions:
- The moderately well drained Hammonton and Galloway soils in the lower areas
- Aura soils, which have a fragipan; in the higher areas
- Swainton soils, which are very deep to a high water table; in the higher areas

Similar inclusions:
- Ingleside soils, which have less gravel in the lower part than the Dennisville soil

Agricultural Development

Management concerns: No significant limitations

Urban Development

Dwellings

Management concerns: Wetness

Local roads and streets

Management concerns: No significant limitations

Septic tank absorption fields

Management concerns: Wetness

Interpretive Groups

Land capability classification: I

DocB—Downer loamy sand, 0 to 5 percent slopes

Setting

Landscape: Coastal plain
Landform: Broad ridges
Landform position: Summits and side slopes

Composition

Downer soil and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown loamy sand

Subsoil:
10 to 16 inches—yellowish brown loamy sand
16 to 36 inches—yellowish brown sandy loam

Substratum:
36 to 48 inches—yellowish brown loamy sand
48 to 72 inches—light yellowish brown sand

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Slope class: Nearly level or gently sloping
Available water capacity: Moderate
Organic matter content of the surface layer: Low
Hazard of water erosion: Moderate
Hazard of wind erosion: Moderate
Rock fragments on the surface: 0 to 15 percent, by volume, quartzose gravel
Depth to high water table: More than 6 feet
Soil reaction: Extremely acid to strongly acid throughout the profile, except in limed areas

Inclusions

Contrasting inclusions:
- The moderately well drained Hammonton and Galloway soils in small depressions
- The sandy Evesboro soils in randomly scattered areas
- Fort Mott soils, which have a thick sandy surface layer; in randomly scattered areas

Similar inclusions:
- Swainton soils, which have more gravel in the lower part than the Downer soil

Agricultural Development

Crops and pasture

Management concerns: Soil blowing, erodibility, droughtiness of the surface layer

Woodland

Management concerns: Seedling mortality

Urban Development

Dwellings

Management concerns: No significant limitations

Local roads and streets

Management concerns: No significant limitations

Septic tank absorption fields

Management concerns: Poor filtering capacity

Interpretive Groups

Land capability classification: IIs

DoeA—Downer sandy loam, 0 to 2 percent slopes

Setting

Landscape: Coastal plain
Landform: Broad ridges
Landform position: Summits and side slopes

Composition

Downer soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Typical Profile

Surface layer:
0 to 10 inches—grayish brown sandy loam

Subsoil:
10 to 14 inches—yellowish brown sandy loam
14 to 30 inches—strong brown sandy loam
30 to 34 inches—yellow sand that has thin layers of yellowish brown sandy loam

Substratum:
34 to 72 inches—yellow sand

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Slope class: Nearly level
Available water capacity: Moderate
Organic matter content of the surface layer: Low
Hazard of water erosion: None or slight
Hazard of wind erosion: Moderate
Rock fragments on the surface: 0 to 15 percent, by volume, quartzose gravel
Depth to high water table: More than 6 feet
Soil reaction: Extremely acid to strongly acid throughout the profile, except in limed areas

Inclusions

Contrasting inclusions:
- The moderately well drained Hammonton and Galloway soils in small depressions
- Aura soils, which have a fragipan; in the higher areas

Similar inclusions:
- Swainton soils, which have more gravel in the lower part than the Downer soil

Agricultural Development

Management concerns: No significant limitations (fig. 7)

Urban Development

Dwellings

Management concerns: No significant limitations

Local roads and streets

Management concerns: No significant limitations

Septic tank absorption fields

Management concerns: Poor filtering capacity

Interpretive Groups

Land capability classification: I

Figure 7.—Vegetables grown for roadside markets, in an area of Downer sandy loam, 0 to 2 percent slopes.

DoeB—Downer sandy loam, 2 to 5 percent slopes

Setting

Landscape: Coastal plain
Landform: Broad ridges
Landform position: Summits and side slopes

Composition

Downer soil and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Typical Profile

Surface layer:
0 to 1 inch—dark grayish brown sandy loam
1 to 2 inches—strong brown sandy loam

Subsoil:
2 to 14 inches—yellowish brown sandy loam
14 to 38 inches—strong brown sandy loam

Substratum:
38 to 52 inches—strong brown loamy sand
52 to 72 inches—reddish yellow sand that has thin layers of strong brown loamy sand

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Slope class: Gently sloping
Available water capacity: Moderate
Organic matter content of the surface layer: Low
Hazard of water erosion: Moderate
Hazard of wind erosion: Moderate

Rock fragments on the surface: 0 to 15 percent, by volume, quartzose gravel
Depth to high water table: More than 6 feet
Soil reaction: Extremely acid to strongly acid throughout the profile, except in limed areas

Inclusions

Contrasting inclusions:
- The moderately well drained Hammonton and Galloway soils in small depressions
- Aura soils, which have a fragipan; in the higher areas

Similar inclusions:
- Swainton soils, which have more gravel in the lower part than the Downer soil

Agricultural Development

Crops and pasture

Management concerns: Erodibility

Woodland

Management concerns: No significant limitations

Urban Development

Dwellings

Management concerns: No significant limitations

Local roads and streets

Management concerns: No significant limitations

Septic tank absorption fields

Management concerns: Poor filtering capacity

Interpretive Groups

Land capability classification: IIe

EveB—Evesboro sand, 0 to 5 percent slopes

Setting

Landscape: Coastal plain
Landform: Old dunes and broad ridges
Landform position: Summits and side slopes

Composition

Evesboro soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Typical Profile

Organic layer:
0 to 2 inches—dark reddish brown slightly decomposed forest litter

Surface layer:
2 to 3 inches—very dark grayish brown sand

Subsurface layer:
3 to 4 inches—light brown sand

Subsoil:
4 to 5 inches—strong brown loamy sand
5 to 10 inches—light yellowish brown sand
10 to 38 inches—yellowish brown sand

Substratum:
38 to 72 inches—brownish yellow sand

Soil Properties and Qualities

Drainage class: Excessively drained
Permeability: Moderately rapid or rapid in the substratum
Slope class: Nearly level or gently sloping
Available water capacity: Low
Organic matter content of the surface layer: Low
Hazard of water erosion: Moderate
Hazard of wind erosion: Severe
Rock fragments on the surface: 0 to 15 percent, by volume, quartzose gravel
Depth to high water table: More than 6 feet
Soil reaction: Extremely acid or very strongly acid throughout the profile, except in limed areas

Inclusions

Contrasting inclusions:
- The moderately well drained Galloway soils in depressions
- The loamy Downer and Fort Mott soils in randomly scattered areas

Agricultural Development

Crops and pasture

Management concerns: Erodibility, severe hazard of soil blowing, severe droughtiness

Woodland

Management concerns: Equipment use restrictions, seedling mortality

Urban Development

Dwellings

Management concerns: No significant limitations

Local roads and streets

Management concerns: No significant limitations

Septic tank absorption fields

Management concerns: Poor filtering capacity

Interpretive Groups

Land capability classification: VIIs

FobB—Fort Mott sand, 0 to 5 percent slopes

Setting

Landscape: Coastal plain
Landform: Ridges and terraces
Landform position: Summits and side slopes

Composition

Fort Mott soil and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Typical Profile

Organic layer:
0 to 2 inches—dark reddish brown slightly decomposed forest litter

Surface layer:
2 to 3 inches—very dark grayish brown sand

Subsurface layer:
3 to 4 inches—light brownish gray sand
4 to 5 inches—yellowish red loamy sand
5 to 22 inches—yellowish brown sand

Subsoil:
22 to 35 inches—strong brown sandy loam

Substratum:
35 to 49 inches—reddish yellow loamy sand
49 to 70 inches—brownish yellow sand that has lenses of strong brown sandy loam
70 to 72 inches—yellow sand

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Slope class: Nearly level or gently sloping
Available water capacity: Low or moderately low
Organic matter content of the surface layer: Low
Hazard of water erosion: Moderate
Hazard of wind erosion: Severe
Rock fragments on the surface: 0 to 10 percent, by volume, quartzose gravel
Depth to high water table: More than 6 feet
Soil reaction: Extremely acid to strongly acid throughout the profile, except in limed areas

Inclusions

Contrasting inclusions:
• The moderately well drained Galloway soils in depressions
• Aura soils, which have fragipans; in the higher areas
• Downer soils, which are less sandy than the Fort Mott soil; in randomly scattered areas
• Evesboro soils, which are sandy throughout; in randomly scattered areas

Agricultural Development

Crops and pasture

Management concerns: Severe hazard of soil blowing, erodibility, severe droughtiness of the surface layer

Woodland

Management concerns: Equipment use restrictions, seedling mortality

Urban Development

Dwellings

Management concerns: No significant limitations

Local roads and streets

Management concerns: Potential frost heaving

Septic tank absorption fields

Management concerns: Poor filtering capacity

Interpretive Groups

Land capability classification: IIIs

GamB—Galloway loamy sand, 0 to 5 percent slopes

Setting

Landscape: Coastal plain
Landform: Terraces, flats, and shallow depressions
Landform position: Side slopes and depressions

Composition

Galloway soil and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Typical Profile

Surface layer:
0 to 9 inches—dark grayish brown loamy sand

Subsoil:
9 to 28 inches—light yellowish brown loamy sand that has brownish yellow iron accumulations

Substratum:
28 to 58 inches—white gravelly sand that has light yellowish brown iron accumulations
58 to 72 inches—white sand

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Rapid
Slope class: Nearly level or gently sloping
Available water capacity: Low
Organic matter content of the surface layer: Low
Hazard of water erosion: Moderate
Hazard of wind erosion: Moderate
Rock fragments on the surface: 0 to 5 percent, by volume, quartzose gravel
Depth to high water table: 2 to 4 feet
Soil reaction: Extremely acid to strongly acid, except in limed areas

Inclusions

Contrasting inclusions:
- The very poorly drained Berryland and Mullica soils in depressions
- The well drained Ingleside and Downer soils in the higher areas
- The excessively drained Evesboro soils in the higher areas
- Hammonton soils, which have slightly more clay in the subsoil than the Galloway soil

Agricultural Development

Crops and pasture

Management concerns: Erodibility, soil blowing, droughtiness

Woodland

Management concerns: Seedling mortality, equipment use restrictions

Urban Development

Dwellings

Management concerns: Wetness

Local roads and streets

Management concerns: Wetness

Septic tank absorption fields

Management concerns: Wetness and poor filtering capacity

Interpretive Groups

Land capability classification: IVs

HbmB—Hammonton loamy sand, 0 to 5 percent slopes

Setting

Landscape: Coastal plain
Landform: Terraces, flats, and depressions
Landform position: Side slopes and foot slopes

Composition

Hammonton soil and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Typical Profile

Surface layer:
0 to 1 inch—dark grayish brown loamy sand
1 to 3 inches—light gray loamy sand

Subsoil:
3 to 4 inches—strong brown sandy loam
4 to 22 inches—yellowish brown sandy loam
22 to 26 inches—brownish yellow loamy sand

Substratum:
26 to 36 inches—yellowish brown sand
36 to 55 inches—pale brown sand that has light gray mottles
55 to 72 inches—light gray loamy sand that has pale brown mottles

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate
Slope class: Nearly level or gently sloping
Available water capacity: Moderate
Organic matter content of the surface layer: Low
Hazard of water erosion: Moderate
Hazard of wind erosion: Moderate
Rock fragments on the surface: 0 to 10 percent, by volume, quartzose gravel
Depth to high water table: 1.5 to 3.5 feet
Soil reaction: Extremely acid to strongly acid, except in limed areas

Inclusions

Contrasting inclusions:
- The very poorly drained Mullica and Berryland soils in drainageways and depressions
- The well drained Downer soils in the higher areas
- The sandy Galloway soils in randomly scattered areas

Agricultural Development

Crops and pasture

Management concerns: Soil blowing, droughtiness of the surface layer, restrictions on crop selection

Woodland

Management concerns: Seedling mortality

Urban Development

Management concerns: Wetness

Interpretive Groups

Land capability classification: IIw

HboA—Hammonton sandy loam, 0 to 2 percent slopes

Setting

Landscape: Coastal plain
Landform: Terraces, flats, and depressions
Landform position: Side slopes and foot slopes

Composition

Hammonton soil and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Typical Profile

Organic layer:
0 to 2 inches—dark reddish brown moderately decomposed forest litter
2 to 3 inches—black highly decomposed forest litter

Surface layer:
3 to 4 inches—dark grayish brown sandy loam

Subsurface layer:
4 to 5 inches—light yellowish brown sandy loam

Subsoil:
5 to 6 inches—strong brown sandy loam
6 to 27 inches—yellowish brown sandy loam
27 to 30 inches—yellowish brown loamy sand

Substratum:
30 to 39 inches—yellowish brown loamy sand that has light brownish gray iron depletions
39 to 43 inches—gray sand that has yellowish brown iron accumulations
43 to 72 inches—gray gravelly sand that has yellowish brown iron accumulations

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate
Slope class: Nearly level
Available water capacity: Moderate
Organic matter content of the surface layer: Low
Hazard of water erosion: None or slight
Hazard of wind erosion: Moderate
Rock fragments on the surface: 0 to 10 percent, by volume, quartzose gravel
Depth to high water table: 1.5 to 3.5 feet
Soil reaction: Extremely acid to strongly acid, except in limed areas

Inclusions

Contrasting inclusions:
- The very poorly drained Mullica and Berryland soils in drainageways and depressions
- The sandy Galloway soils in randomly scattered areas
- The well drained Downer soils in the higher areas

Agricultural Development

Crops and pasture (fig. 8)

Management concerns: Restrictions on crop selection

Woodland

Management concerns: No significant limitations

Urban Development

Management concerns: Wetness

Interpretive Groups

Land capability classification: IIw

HorD—Hooksan sand, 2 to 15 percent slopes, rarely flooded

Setting

Landscape: Coastal plain
Landform: Sand dunes
Landform position: Summits and side slopes

Composition

Hooksan soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Typical Profile

Surface layer:
0 to 2 inches—very dark brown fine sand
2 to 4 inches—grayish brown fine sand

Substratum:
4 to 11 inches—very pale brown fine sand

Figure 8.—Harvesting hay on Hammonton sandy loam, 0 to 2 percent slopes.

11 to 19 inches—light gray fine sand
19 to 72 inches—very pale brown fine sand

Soil Properties and Qualities

Drainage class: Excessively drained
Permeability: Rapid
Slope class: Gently sloping or strongly sloping
Available water capacity: Low
Organic matter content of the surface layer: Low
Hazard of wind erosion: Severe
Hazard of water erosion: Moderate or severe
Flooding: Rare for brief periods
Rock fragments on the surface: 0 to 5 percent, by volume; mostly seashells
Depth to high water table: More than 6 feet
Soil reaction: Strongly acid to slightly alkaline in the A and AC horizons and moderately acid to slightly alkaline in the C horizon

Inclusions

Contrasting inclusions:
- Pawcatuck soils, which have thick organic layers; in adjacent tidal marsh areas
- Beaches in adjacent sandy areas that are very frequently flooded by ocean tides

Agricultural Development

Crops and pasture

Management concerns:
- This soil is not used for crops and pasture because of the excessive droughtiness, the slope, soil blowing, and salt spray.

Woodland

Management concerns: Equipment use restrictions, seedling mortality, salt spray

Urban Development

Dwellings

Management concerns: Flooding and slope

Local roads and streets

Management concerns: Flooding and slope

Septic tank absorption fields

Management concerns: Flooding, slope, poor filtering capacity

Interpretive Groups

Land capability classification: VIIs

IngB—Ingleside loamy sand, 0 to 5 percent slopes

Setting

Landscape: Coastal plain
Landform: Flats and terraces
Landform position: Summits and side slopes

Composition

Ingleside soil and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Typical Profile

Surface layer:
0 to 1 inch—dark grayish brown loamy sand
1 to 3 inches—light brownish gray loamy sand
3 to 4 inches—strong brown loamy sand
4 to 12 inches—yellowish brown loamy sand

Subsoil:
12 to 37 inches—strong brown sandy loam

Substratum:
37 to 54 inches—brown sand
54 to 68 inches—brown sand that has grayish brown iron depletions
68 to 72 inches—light brownish gray sand that has brown iron accumulations

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately rapid
Slope class: Nearly level or gently sloping
Available water capacity: Moderate
Organic matter content of the surface layer: Low
Hazard of water erosion: Moderate
Hazard of wind erosion: Severe
Rock fragments on the surface: 0 to 15 percent, by volume, quartzose gravel
Depth to high water table: 3.5 to 6 feet
Soil reaction: Extremely acid or very strongly acid throughout the profile, except in limed areas

Inclusions

Contrasting inclusions:
• The moderately well drained Hammonton and Galloway soils in the lower areas
• The sandy Evesboro soils in randomly scattered areas
• Downer soils, which have a high water table below a depth of 6 feet; in randomly scattered areas

Agricultural Development

Crops and pasture

Management concerns: Soil blowing, erodibility, droughtiness of the surface layer

Woodland

Management concerns: Seedling mortality

Urban Development

Dwellings

Management concerns: Wetness

Local roads and streets

Management concerns: No significant limitations

Septic tank absorption fields

Management concerns: Wetness

Interpretive Groups

Land capability classification: IIs

InnA—Ingleside sandy loam, 0 to 2 percent slopes

Setting

Landscape: Coastal plain
Landform: Flats and terraces
Landform position: Summits and side slopes

Composition

Downer soil and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Typical Profile

Surface layer:
0 to 12 inches—dark grayish brown sandy loam

Subsoil:
12 to 17 inches—yellowish brown sandy loam
17 to 27 inches—strong brown sandy loam
27 to 38 inches—yellowish brown sandy loam
38 to 48 inches—yellowish brown sandy loam that has yellowish red iron accumulations

Substratum:
48 to 66 inches—yellow sand that has light brownish gray iron depletions
66 to 72 inches—brownish yellow fine sandy loam that has light brownish gray iron depletions

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately rapid
Slope class: Nearly level
Available water capacity: Moderate
Organic matter content of the surface layer: Low
Hazard of water erosion: None or slight
Hazard of wind erosion: Moderate
Rock fragments on the surface: 0 to 15 percent, by volume, quartzose gravel
Depth to high water table: 3.5 to 6 feet
Soil reaction: Extremely acid or very strongly acid throughout the profile, except in limed areas

Inclusions

Contrasting inclusions:
- The moderately well drained Hammonton and Galloway soils in the lower areas
- The sandy Evesboro soils in randomly scattered areas
- Downer soils, which have a high water table below a depth of 6 feet; in randomly scattered areas

Agricultural Development

Management concerns: No significant limitations

Urban Development

Dwellings

Management concerns: Wetness

Local roads and streets

Management concerns: No significant limitations

Septic tank absorption fields

Management concerns: Wetness

Interpretive Groups

Land capability classification: I

Makt—Manahawkin muck, frequently flooded

Setting

Landscape: Coastal plain
Landform: Freshwater swamps, drainageways, and depressions
Landform position: Freshwater flats, drainageways, and depressions

Composition

Manahawkin soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Typical Profile

Surface layer:
0 to 35 inches—black muck

Substratum:
35 to 72 inches—gray sand

Soil Properties and Qualities

Drainage class: Very poorly drained
Permeability: Rapid in the organic layers and moderately rapid in the mineral horizons
Slope class: Level
Available water capacity: Very high
Organic matter content of the surface layer: Very high
Hazard of water erosion: None or slight
Hazard of wind erosion: None or slight
Flooding: Frequent for long periods
High water table: 0 to 0.5 foot above the soil surface
Soil reaction: Extremely acid or very strongly acid throughout the profile

Inclusions

Contrasting inclusions:
- The sandy Berryland soils in the slightly higher areas
- The loamy Mullica soils in the slightly higher areas
- Transquaking soils, which are very frequently flooded and more saline than the Manahawkin soil; in adjacent tidal marsh areas

Agricultural Development

Management concerns: Excessive wetness and flooding

Urban Development

Management concerns: Excessive wetness and flooding

Interpretive Groups

Land capability classification: VIIw

Mmtv—Mispillion-Transquaking-Appoquinimink complex, very frequently flooded

Setting

Landscape: Coastal plain
Landform: Tidal marshes
Landform position: Tidal flats and drainageways

Composition

Mispillion soil and similar inclusions: 50 percent
Transquaking soil and similar inclusions: 25 percent
Appoquinimink soil and similar inclusions: 20 percent
Contrasting inclusions: 5 percent

Typical Profile

Mispillion

Surface layer:
0 to 10 inches—very dark grayish brown mucky peat
10 to 26 inches—very dark grayish brown muck

Substratum:
26 to 90 inches—dark gray silt loam

Transquaking

Surface layer:
0 to 14 inches—dark reddish brown mucky peat
14 to 65 inches—reddish brown mucky peat

Substratum:
65 to 80 inches—dark gray silt

Appoquinimink

Surface layer:
0 to 5 inches—very dark reddish brown mucky peat

Substratum:
5 to 32 inches—very dark gray mucky silt loam
32 to 73 inches—dark reddish brown mucky peat

Soil Characteristics

Drainage class: Very poorly drained
Permeability: Moderately slow in the mineral layers and moderately rapid or rapid in the organic layers
Slope class: Level
Available water capacity: Appoquinimink—high; Mispillion and Transquaking—very high
Organic matter content of the surface layer: Appoquinimink—moderate or high; Mispillion and Transquaking—very high
Hazard of water erosion: None or slight; however, the hazard of streambank caving from wave action is severe
Hazard of wind erosion: None or slight
Flooding: Very frequent for very brief periods
High water table: 0 to about 1 foot above the soil surface
Soil reaction: Moist soil—slightly acid to mildly alkaline; dry soil—strongly acid to ultra acid

Inclusions

Contrasting inclusions:
- Hammonton soils, which are moderately well drained and in the higher, less flooded areas
- The frequently flooded Berryland and Mullica soils in the higher areas

Agricultural Development

Management concerns: Excessive wetness and flooding

Urban Development

Management concerns: Excessive wetness and flooding

Interpretive Groups

Land capability classification: VIIIw

Pdwv—Pawcatuck-Transquaking complex, very frequently flooded

Setting

Landscape: Coastal plain
Landform: Tidal marshes
Landform position: Tidal flats and drainageways

Composition

Pawcatuck soil and similar inclusions: 60 percent
Transquaking soil and similar inclusions: 35 percent
Contrasting inclusions: 5 percent

Typical Profile

Pawcatuck

Surface layer:
0 to 12 inches—black mucky peat
12 to 45 inches—dark reddish brown mucky peat

Substratum:
45 to 50 inches—dark gray loamy sand
50 to 72 inches—gray sand

Transquaking

Surface layer:
0 to 60 inches—dark reddish brown mucky peat

Substratum:
60 to 72 inches—dark gray silt loam

Soil Properties and Qualities

Drainage class: Very poorly drained
Permeability: Moderately rapid or rapid in the organic deposits and moderately slow in the mineral material
Slope class: Level
Available water capacity: Very high
Organic matter content of the surface layer: Very high
Hazard of water erosion: None or slight; however, the hazard of streambank caving from wave action is severe
Hazard of wind erosion: None or slight
Flooding: Very frequent for very brief periods
High water table: 0 to about 1 foot above the soil surface
Soil reaction: Moist soil—slightly acid to mildly alkaline; dry soil—strongly acid to ultra acid

Inclusions

Contrasting inclusions:
- Appoquinimink soils, which have less organic matter than the Pawcatuck and Transquaking soils; in areas adjacent to uplands
- Berryland and Mullica soils, which have less organic matter than the Pawcatuck and Transquaking soils; in the slightly higher areas
- Manahawkin soils, which are frequently flooded and are less saline than the Pawcatuck and Transquaking soils

Agricultural Development

Management concerns: Excessive wetness and flooding

Urban Development

Management concerns: Excessive wetness and flooding

Interpretive Groups

Land capability classification: VIIIw

PHG—Pits, sand and gravel

Composition

The number of observations in this map unit was minimal; however, the detail of mapping is adequate for the expected use of the map unit.

Typical Profile

Pits are open excavations from which soil material has been removed for use as construction material or road aggregate. They commonly have steep, unstable slope faces. Some pits are filled with water. A typical profile is not given for this map unit.

Use and Management

Management concerns: Variable soil properties that require onsite investigation to determine specific management concerns

Interpretive Groups

Land capability classification: VIIIs

Ptt—Psamments, sulfidic substratum, frequently flooded

Setting

Landscape: Filled tidal marshes

Composition

The number of observations in this map unit was fewer than in others; however, the detail of mapping is adequate for the expected use of the soils.

Typical Profile

Psamments have fill material that commonly ranges from 2 to 4 feet in thickness and is commonly over such soils as Appoquinimink, Transquaking, Mispillion, and Pawcatuck soils. The upper part of Psamments is commonly fill material of sand, fine sand, or loamy sand. The lower part is mainly silty materials that have a high content of organic material. Because of the variability of these soils, a typical profile is not given.

Use and Management

Management concerns: Subsidence and flooding, variable soil properties that require onsite investigation to determine specific management concerns

Interpretive Groups

Land capability classification: VIIs

Pvr—Psamments, wet substratum, rarely flooded

Setting

Landscape: Filled flood plains, flats, and swamps

Composition

The number of observations in this map unit was fewer than in others; however, the detail of mapping is adequate for the expected use of the soils.

Typical Profile

Psamments have fill material that ranges from 2 to 4 feet in thickness and is over such soils as Berryland, Mullica, and Manahawkin soils. The upper part of Psamments is commonly fill material of sand, fine sand, or loamy sand. The lower part is mainly sand, sandy loam, or loamy sand, or it is mucky organic materials. Because of the variability of these soils, a typical profile is not given.

Use and Management

Management concerns: Wetness and flooding, variable soil properties that require onsite investigation to determine specific management concerns

Interpretive Groups

Land capability classification: VIIs

SwaA—Swainton sandy loam, 0 to 2 percent slopes

Setting

Landscape: Coastal plain
Landform: Flats and terraces
Landform position: Summits and side slopes

Composition

Swainton soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Typical Profile

Surface layer:
0 to 4 inches—grayish brown sandy loam

Subsoil:
4 to 23 inches—yellowish brown sandy loam
23 to 35 inches—yellowish red gravelly loamy sand

Substratum:
35 to 47 inches—yellowish red very gravelly loamy sand
47 to 72 inches—yellow sand

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately rapid
Slope class: Nearly level
Available water capacity: Low
Organic matter content of the surface layer: Low
Hazard of water erosion: None or slight
Hazard of wind erosion: Moderate
Rock fragments on the surface: 0 to 15 percent, by volume, quartzose gravel
Depth to high water table: More than 6 feet
Soil reaction: Extremely acid or very strongly acid throughout the profile, except in limed areas

Inclusions

Contrasting inclusions:
- The moderately well drained Hammonton and Galloway soils in small depressions
- Aura soils, which have a fragipan; in the higher areas

Similar inclusions:
- Downer soils that are less gravelly in the lower part

Agricultural Development

Crops and pasture (fig. 9)

Management concerns: Droughtiness

Woodland

Management concerns: No significant limitations

Urban Development

Dwellings

Management concerns: No significant limitations

Local roads and streets

Management concerns: No significant limitations

Septic tank absorption fields

Management concerns: Poor filtering capacity

Interpretive Groups

Land capability classification: IIs

Figure 9.—Horses grazing in a pasture of cool-season forage in an area of Swainton sandy loam, 0 to 2 percent slopes.

SwaB—Swainton sandy loam, 2 to 5 percent slopes

Setting

Landscape: Coastal plain
Landform: Flats and terraces
Landform position: Summits and side slopes

Composition

Swainton soil and similar inclusions: 90 percent
Contrasting inclusions: 10 percent

Typical Profile

Surface layer:
0 to 1 inch—dark reddish brown sandy loam
1 to 2 inches—dark grayish brown sandy loam

Subsurface layer:
2 to 3 inches—light grayish brown sandy loam

Subsoil:
3 to 4 inches—yellowish red sandy loam
4 to 12 inches—strong brown sandy loam
12 to 23 inches—yellowish brown sandy loam
23 to 35 inches—yellowish red gravelly loamy sand

Substratum:
35 to 47 inches—yellowish red very gravelly sand
47 to 58 inches—yellow sand that has strata of sandy loam
58 to 74 inches—very pale brown fine sand

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately rapid
Slope class: Gently sloping
Available water capacity: Low
Organic matter content of the surface layer: Low
Hazard of water erosion: Moderate
Hazard of wind erosion: Moderate

Rock fragments on the surface: 0 to 15 percent, by volume, quartzose gravel
Depth to high water table: More than 6 feet
Soil reaction: Extremely acid or very strongly acid throughout the profile, except in limed areas

Inclusions

Contrasting inclusions:
- The moderately well drained Hammonton and Galloway soils in small depressions
- Aura soils, which have a fragipan; in the higher areas

Similar inclusions:
- Downer soils that are less gravelly in the lower part

Agricultural Development

Crops and pasture

Management concerns: Erodibility, droughtiness

Woodland

Management concerns: No significant limitations

Urban Development

Dwellings

Management concerns: No significant limitations

Local roads and streets

Management concerns: No significant limitations

Septic tank absorption fields

Management concerns: Poor filtering capacity

Interpretive Groups

Land capability classification: IIe

Trkv—Transquaking mucky peat, very frequently flooded

Setting

Landscape: Coastal plain
Landform: Tidal marshes
Landform position: Tidal flats and drainageways

Composition

Transquaking soil and similar inclusions: 95 percent
Contrasting inclusions: 5 percent

Typical Profile

Surface layer:
0 to 60 inches—dark reddish brown mucky peat

Substratum:
60 to 90 inches—dark gray silt loam

Soil Properties and Qualities

Drainage class: Very poorly drained
Permeability: Moderately slow in the mineral layers and moderately rapid or rapid in the organic layers
Slope class: Level
Available water capacity: Very high
Organic matter content of the surface layer: Very high
Hazard of water erosion: None or slight; however, the hazard of streambank caving from wave action is severe
Hazard of wind erosion: None or slight
Flooding: Very frequent for very brief periods
High water table: 0 to about 1 foot above the soil surface
Soil reaction: Moist soil—slightly acid to mildly alkaline; dry soil—strongly acid to ultra acid

Inclusions

Contrasting inclusions:
- Appoquinimink soils, which have less organic matter than the Transquaking soil; in areas adjacent to uplands

Agricultural Development

Management concerns: Excessive wetness and flooding

Urban Development

Management concerns: Excessive wetness and flooding

Interpretive Groups

Land capability classification: VIIIw

Udz—Udorthents, refuse substratum

Setting

Landscape: Sanitary landfills on convex summits, side slopes, and broad flats

Composition

The number of observations in this map unit was minimal; however, the detail of mapping is adequate for the expected use of the soils.

Typical Profile

Udorthents generally consist of clay loam, sandy clay loam, silty clay loam, or clay in the upper part. In the lower part they consist of sandy or loamy material mixed with household and industrial refuse. In most areas vegetation has been established to control erosion. Some sites are in areas that had been previously used as sand or gravel pits. Other sites are in areas of filled tidal marshes. Because of the variability of these soils, a typical profile is not given.

Use and Management

Management concerns: Variable soil properties that require onsite investigation to determine specific management concerns

Interpretive Groups

Land capability classification: VIIs

UR—Urban land

Composition

The number of observations in this map unit was fewer than in others because of urbanization; however, the detail of mapping is adequate for the expected use of the map unit.

Typical Profile

Urban land consists of areas where much of the soil surface is covered with asphalt, concrete, buildings, or other impervious material. A typical profile is not given.

Use and Management

Management concerns: Excessive runoff from streets, roofs, and parking lots which may increase the flooding hazard in low-lying areas; variable soil properties that require onsite investigation to determine specific management concerns

Interpretive Groups

Land capability classification: VIIIs

URPTS—Urban land-Psamments, sulfidic substratum complex, occasionally flooded

Setting

Landscape: Filled tidal marshes

Composition

The number of observations in this map unit was fewer than in others because of urbanization; however, the detail of mapping is adequate for the expected use of the map unit.

Typical Profile

Urban land

Urban land consists of areas where much of the soil surface is covered with asphalt, concrete, buildings, or other impervious material. A typical profile is not given.

Psamments

Psamments have fill material that commonly ranges from 2 to 4 feet in thickness and is commonly over such soils as Appoquinimink, Transquaking, Mispillion, and Pawcatuck soils. The upper part of Psamments is commonly fill material of sand, fine sand, or loamy sand. The lower part is mainly silty materials that have a high content of organic matter. Because of the variability of these soils, a typical profile is not given.

Use and Management

Management concerns: Excessive runoff from urban areas which can increase the flooding hazard, subsidence and flooding, variable soil properties that require onsite investigation to determine specific management concerns

Interpretive Groups

Land capability classification: Urban land—VIIIs; Psamments—VIIs

URPVR—Urban land-Psamments, wet substratum complex, rarely flooded

Setting

Landscape: Flood plains, flats, swamps, or barrier islands that have been altered and filled

Composition

The number of observations in this map unit was fewer than in others because of urbanization; however, the detail of mapping is adequate for the expected use of the map unit.

Typical Profile

Urban land

Urban land consists of areas where much of the soil surface is covered with asphalt, concrete, buildings, or other impervious material. A typical profile is not given.

Psamments

Psamments have fill material that ranges from 2 to 4 feet in thickness and is over such soils as Berryland, Mullica, Manahawkin, and Hooksan soils. Hooksan soils are commonly leveled prior to filling. The upper part of Psamments is commonly fill material of sand, fine sand, or loamy sand. The lower part is mainly sand, sandy loam, or loamy sand, or it is mucky organic materials. Because of the variability of these soils, a typical profile is not given.

Use and Management

Management concerns: Excessive runoff from urban areas which can increase the hazard of flooding, wetness and flooding, variable soil properties that require onsite investigation to determine specific management concerns

Interpretive Groups

Land capability classification: Urban land—VIIIs; Psamments—VIIs

Use and Management of the Soils

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

Generally, the soils in Cape May County that are well suited to crops are also well suited to urban uses. The data concerning specific soils in the county can be used in planning future land use patterns. The potential for farming should be considered relative to any soil limitations and the potential for nonfarm development.

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

Mary Beth Sorrentino and Garry Lee, District Conservationists, Natural Resources Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils are identified, the system of land capability classification used by the Natural Resources Conservation Service is explained, the estimated yields of the main crops and hay and pasture plants are listed for each soil, and prime farmland is described.

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

Federal and State regulations require that any area designated as wetlands cannot be altered without prior approval. Contact the local office of the Natural Resources Conservation Service for identification of hydric soils and potential wetlands.

Conditions are favorable for crops and pasture in Cape May County. Because of soil suitability and a favorable climate, many types of field crops are produced.

Corn and soybeans are the dominant row crops. Grain sorghum and similar crops can also be grown profitably if economic conditions are favorable.

Wheat is the most common close-growing crop. Rye, barley, and oats are also suitable. Grass seed can be produced from fescue and orchardgrass.

Specialty crops include vegetables, small fruits, tree fruits, flowers, and many nursery plants. Some areas are used for melons, strawberries, snap beans, sweet corn, tomatoes, peppers, or other vegetables or small fruits. Apples and peaches are the most common tree fruits.

Deep and very deep soils that are characterized by good natural drainage and that warm up early in spring are especially well suited to many vegetables and small fruits. These soils include the Downer and

Dennisville soils that have slopes of less than 8 percent. Crops generally can be planted and harvested earlier on these soils than on other soils in the survey area.

Most of the well drained soils in the survey area are suitable for orchard crops and nursery plants. Soils in low areas where frost is frequent and air drainage is poor generally are less suited to early vegetables, small fruits, and orchard crops.

The latest information about specialty crops can be obtained at the local office of the Cooperative Extension Service or the Natural Resources Conservation Service.

The nearly level and gently sloping upland soils in the survey area generally are well suited to most crops. Most of the crops are grown on uplands because areas on the lower landscapes generally have soils with wetness problems. Deep, well drained soils, such as Downer and Ingleside soils, are suited to both row crops and vegetables. Most areas used for vegetables, however, are irrigated.

Some areas that are idle, wooded, or pastured have good potential for use as cropland. Food production could be increased considerably by applying the latest technology to all of the cropland in the survey area. The information in this soil survey can facilitate the application of such technology.

Cropland

Management considerations on cropland in the county include controlling erosion, installing a drainage system, improving soil fertility, applying a system of chemical weed control, and improving tilth.

Erosion control.—Water erosion is a major concern on many of the soils used for cropland in Cape May County. It is a hazard on soils that have slopes of more than 2 percent. Aura and Swainton soils are examples. As the slope increases, the hazard of erosion and the difficulty in controlling erosion also increase.

Loss of the surface layer through erosion is damaging. It is especially damaging on soils that have a gravelly subsoil, such as Swainton and Dennisville soils, and on soils that have a layer in or below the subsoil that limits the depth of the root zone, such as Aura soils. Erosion on farmland results in the sedimentation of streams and bays. Controlling erosion minimizes the pollution of water by runoff carrying plant nutrients, soil particles, and plant residue. It improves the quality of water for municipal use, for recreation, and for fish and wildlife.

Erosion-control practices provide a protective surface cover, reduce runoff, and increase the rate of water infiltration. A cropping system that keeps a vegetative cover on the soil for extended periods helps to minimize soil loss and maintain the productive capacity of the soil. Rye is a common cover crop grown during winter to control erosion. In sloping areas, including forage crops of grasses and legumes in the cropping system helps to control erosion. The forage crops also add nitrogen to the soil and improve tilth.

Minimizing tillage and leaving crop residue on the surface increase the rate of water infiltration, reduce runoff, and help to control erosion. These practices can be effective on most of the soils in the survey area. In the more sloping areas that are used for corn or are double cropped with soybeans, no-till farming is effective in controlling erosion.

Contour farming and contour stripcropping help to control erosion on many of the soils in the survey area. They are best suited to soils that have smooth, uniform slopes, including most areas of upland soils.

Information about erosion-control measures for each kind of soil is available at the local office of the Natural Resources Conservation Service.

Drainage.—Excessive wetness is a management concern on cropland in Cape May County. Some soils are so wet that production of the crops commonly grown in the survey area is difficult unless a drainage system is installed. Berryland and Mullica soils and other poorly drained soils are so wet that crops are damaged during most years unless a drainage system is installed. These soils are generally not used for cropland in the county.

Small areas of wetter soils along drainageways are commonly included in mapping with the moderately well drained Hammonton and Galloway soils. A drainage system generally is not installed in these included soils.

Managing drainage in conformance with regulations concerning wetlands may require special permits and extra planning. The local office of the Natural Resources Conservation Service should be contacted for identification of hydric soils and potential wetlands.

Soils along the tidal areas in Cape May County are very frequently flooded for very brief periods year-round. Flash flooding as a result of intensive storm surges can occur at any time of the year.

Soil fertility.—The soils in Cape May County generally are low in natural fertility and are naturally acid. Additions of lime and fertilizer are needed for the production of most kinds of crops.

Liming requirements are a major concern on cropland. The acidity level in the soil affects the availability of many nutrients to plants and the activity of beneficial bacteria. Lime neutralizes exchangeable aluminum in the soil and thus counteracts the adverse effects of high levels of aluminum on many crops.

Liming adds calcium (from calcitic lime) or calcium and magnesium (from dolomitic lime) to the soil.

A soil test is a guide to what amount and kind of lime should be used. The desired pH levels may differ, depending on the soil properties and the crop to be grown.

Nitrogen fertilizer is required for most crops. It is generally not required, however, for clover, in some rotations of soybeans, and for alfalfa that is established. A reliable soil test is not available for predicting nitrogen requirements. Appropriate rates of nitrogen application are described in the section "Yields per Acre."

Soil tests can indicate the need for phosphorus and potassium fertilizer. Phosphorus and potassium tend to build up in the soil.

Chemical weed control.—The use of herbicides for weed control is a common practice on the cropland in Cape May County. It decreases the need for tillage and is an integral part of modern farming. Selected soil properties, such as organic matter content and texture of the surface layer, affect the rate of herbicide application. Estimates of both of these properties were determined for the soils in this survey area. Table 15 shows a general range of organic matter content in the surface layer of the soils. The texture of the surface layer is shown in the USDA texture column in table 14.

In some areas the organic matter content projected for the different soils is outside the range shown in the table. The content can be higher in soils that have received large amounts of animal or manmade waste. Soils that have recently been brought into cultivation may have a higher content of organic matter in the surface layer than similar soils that have been cultivated for a long time. Conservation tillage can increase the content of organic matter in the surface layer. A lower content of organic matter is common where the surface layer has been partly or completely removed by erosion or land smoothing. Current soil tests should be used for specific organic matter determinations.

Tilth.—Soil tilth is an important factor in the germination of seeds and the infiltration of water into the soil. Soils that have good tilth are granular and porous.

Some of the soils in the survey area that are used for crops have a light-colored surface layer of loamy sand and a low content of organic matter. Generally, the structure of these soils is weak. Regular additions of crop residue, manure, and other organic material can improve soil structure, increase the amount of available moisture, and help reduce the potential for compaction.

Pasture and Hayland

Most of the pasture and hayland in Cape May County supports a mixture of grasses and legumes. Most of the hay is grown in rotation with pasture. The hay commonly is harvested intro large square bales and sold for horse feed.

Selection of forage species.—A successful livestock enterprise depends on a forage program that provides large quantities of good-quality feed. In most areas of hayland and pasture in Cape May County, renovation, brush control, and measures that prevent overgrazing are needed.

The soils in the survey area vary widely in their ability to produce grasses and legumes because of differences in such properties as depth to bedrock or to other limiting layers, internal drainage, and available water capacity. The forage species selected for planting should be appropriate for the soil.

The nearly level and gently sloping, deep and very deep, well drained soils should be planted to the highest producing crops, such as corn silage, alfalfa, or a mixture of alfalfa and orchardgrass or alfalfa and timothy. Sod-forming grasses, such as tall fescue and orchardgrass, can also be used. Alfalfa should be seeded with cool-season grasses in areas where the soil is at least 2 feet deep and is well drained. The more poorly drained soils are suited to clover-grass mixtures or to pure stands of clover or grasses. Legumes can be established through renovation in areas that support sod-forming grasses.

The intended use should be considered when forage species are selected. Selected species should provide maximum quality and versatility in the forage program. Legumes generally produce higher quality feed than grasses. They should be grown to the maximum extent possible. The taller legumes, such as alfalfa and red clover, are more versatile than legumes that are used primarily for grazing, such as white clover. Orchardgrass, timothy, and tall fescue are best suited to use as hay and silage.

Tall fescue is an important cool-season grass. It is suited to a wide range of soil conditions and is grown for both pasture and hay. The growth that occurs from August through November commonly accumulates in the field and is used for grazing in late fall and in winter. For maximum production, nitrogen fertilizer should be applied during the period when the grass is accumulating. The rate of application should be based on the desired level of production.

Warm-season grasses that are planted during the period from early April through late May help to supplement cool-season grasses, such as tall fescue. They grow well during warm periods, especially from mid-June through September, when the growth of cool-season grasses is slow. Examples of warm-season grasses are switchgrass, big bluestem, indiangrass, and Caucasian bluestem.

Maintenance of pasture and hayland.—Renovation can increase forage yields in areas that have a good stand of grass. It includes partially destroying the sod, applying lime and fertilizer, and seeding desirable forage species. Adding legumes to the stand of grass provides high-quality feed. Legumes increase summer production and transfer nitrogen from the air into the soil. Under growing conditions, alfalfa can fix 200 to 300 pounds of nitrogen per acre per year, red clover can fix 100 to 200 pounds, and ladino clover can fix 100 to 150 pounds. An acre of annual forage legumes, such as vetch, can fix 75 to 100 pounds of nitrogen per year.

Additional information about managing pasture and hayland can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Ornamental Crops

The ornamental crops grown in Cape May County include Christmas trees, mountain laurel, rhododendron, hemlock, boxwood, and other species of native trees and non-native trees, shrubs, and herbaceous plants used in landscaping. Also grown are hybrid trees and shrubs, including holly, juniper, and yew. Important species of Christmas trees are Scotch pine, white pine, blue spruce, and Norway spruce.

Soil-plant-landscape relationships.—Native and hybrid ornamental crops grow well on well drained, loamy soils. They should be protected from northwest winds in winter. The low content of clay in the soil can sometimes make ball and burlap harvesting difficult. In Cape May County most of the upland soils are suited to ornamental crops (fig. 10).

Site selection.—Soils that have a clay content of less than 15 percent are difficult to use for ornamental species that are ball and burlap harvested. These soils do not cling together and thus ball poorly. Soils that are wet or are in natural drainageways also are difficult to use for ornamental species. They hold excess moisture around roots, which results in poor growth and encourages phytophthora root disease. Sites should be selected in areas that have an adequate supply of clear water that can be used for spraying or irrigation. Many operations pump water from ground-water aquifers. Disturbing as little of the planting area as possible helps to prevent excessive erosion. Areas between plants and areas between rows should remain in permanent sod. Planting in a grid arrangement allows easy access to equipment used for mowing and spraying.

Seedling line-out beds require soils that have less than 10 percent clay in the upper 12 inches. Soils that are more than 10 percent clay hold seedling roots so tightly that tearing and breaking of roots result during harvesting. Root damage reduces the vigor of the seedlings when they are transplanted to a field. Soils that have a sandy surface layer, such as Evesboro and Fort Mott soils, are suited to line-out beds if irrigation is supplied. Soils that have a dark, rich organic layer are also suited to line-out beds.

Access roads should be carefully planned and constructed. If possible, they should not be constructed in natural drainageways or in wet areas. They should be surfaced or seeded with perennial vegetation as soon as possible after construction. Lime and fertilizer should be applied regularly to maintain the sod. Cut and fill slopes should be stabilized with vegetation as soon as possible.

Lime, fertilizer, and herbicides.—Because of insufficient natural fertility, the soils in Cape May County cannot quickly produce ornamentals. They are typically low in nitrogen and phosphorus and high in potassium. Some soils are too acid for ornamental crops, especially for hybrid ornamentals and some tree species. Application rates for lime and fertilizer should be determined by soil tests and by tissue analysis of the crop.

Herbicides should only be applied by banding or spot treatment. The content of organic matter, the texture of the surface layer, and the depth to a water table affect the amount of herbicide used and the frequency of application. Water in the soils and in areas with seeps and springs can reduce the effectiveness of herbicides. These soil limitations are described under the heading "Detailed Soil Map Units."

Yields per Acre

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

Figure 10.—Ornamentals in an area of Hammonton and Downer soils.

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.

A high level of management includes maintaining proper soil reaction and fertility levels as indicated by standard soil tests. The application rate of nitrogen for corn on soils that have a yield potential of 125 to 150 bushels per acre should be 140 to 160 pounds per acre. If the yield potential for corn is 100 bushels per acre or less, a rate of 100 to 120 pounds of nitrogen per acre should be used. The application of nitrogen in excess of that required for potential yields generally is not recommended. The excess nitrogen fertilizer that is not utilized by the crop is an unnecessary expense and causes a hazard of water pollution. If corn or cotton is grown after the harvest of soybeans or peanuts, nitrogen rates can be reduced by about 20 to 30 pounds per acre. Because nitrogen can be readily leached from sandy soils, applications may be needed on these soils more than once during the growing season.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum. Tomatoes and sweet corn are the irrigated crops shown in table 5.

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

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

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. 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 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.

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 land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 56,000 acres in the survey area, or nearly 30 percent of the total acreage, meets the soil

Figure 11.—Dense hydrophytic vegetation grows well in this area of Berryland and Mullica soils, occasionally flooded.

requirements for prime farmland. Scattered areas of this land are throughout the county.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial, recreational, and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 6. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures used to overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Hydric Soils

In this section, hydric soils are defined and described and the hydric soils in the survey area are listed.

The three essential characteristics of wetlands are hydrophytic vegetation (fig. 11), hydric soils, and hydrology *(4, 5, 10, 13)*. Areas identified as wetlands must meet criteria for each of the characteristics. Undrained hydric soils that have natural vegetation support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses are capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part of the profile *(6)*. These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. To determine whether a specific soil is a hydric or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Criteria which identify the estimated soil properties that are unique to hydric soils have been established *(7)*. These criteria are used to identify a phase of a soil series that normally is associated with wetlands. The criteria are selected estimated soil properties, which are described in "Soil Taxonomy" *(16, 19)* and in the "Soil Survey Manual" *(18)*.

If soils are wet enough for a long enough period to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators that can be used to make onsite determinations of hydric soils in Cape May County are specified in "Field Indicators of Hydric Soils in the United States" *(8)*.

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. The determination of an appropriate indicator may require a greater depth. Soil scientists excavate and describe the soils deep enough to understand the redoximorphic processes. After completing the soil description, soil scientists can compare the soil features required by each indicator and the conditions observed in the soil and determine which indicators occur. The soil can be identified as a hydric soil if one or more of the approved indicators occur.

This survey can be used to locate probable areas of hydric soils. Map units consisting of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions of the landform, and map units consisting of nonhydric soils may have inclusions of hydric soils in the lower positions of the landform.

The following map units meet the requirements for hydric soils and also have at least one of the hydric soil indicators. This list can help to plan land uses, but onsite investigation is needed to determine the occurrence of hydric soils on a specific site *(8, 10)*.

Aptv Appoquinimink-Transquaking-Mispillion complex, very frequently flooded
BEXS Berryland and Mullica soils, occasionally flooded
Makt Manahawkin muck, frequently flooded
Mmtv Mispillion-Transquaking-Appoquinimink complex, very frequently flooded
Pdwv Pawcatuck-Transquaking complex, very frequently flooded
Trkv Transquaking mucky peat, very frequently flooded

Woodland Management and Productivity

Albert Coffey, Forester, Natural Resources Conservation Service, helped prepare this section.

Owners of woodland in Cape May County have many objectives. These objectives include producing timber; conserving wildlife, soil, and water; preserving esthetic values; and providing opportunities for recreational activities, such as commercial hunting. Public demand for clean water and recreational areas creates pressures and opportunities for owners of woodland.

The landowner interested in timber production is faced with the challenge of producing greater yields from smaller areas. Meeting this challenge requires intensive management and silvicultural practices. Many modern silvicultural techniques resemble those long practiced in agriculture. They include establishing, weeding, and thinning a desirable young stand; propagating the more productive species and genetic varieties; providing short rotations and complete fiber utilization; controlling insects, diseases, and weeds; and improving tree growth by applications of fertilizer and the installation of a drainage system. Even though timber crops require decades to grow, the goal of intensive management is similar to the goal of intensive agriculture. This goal is to produce the greatest yield of the most valuable crop as quickly as possible.

A knowledge of soils helps to provide a basic understanding of the distribution and growth of tree species on the landscape. For example, Atlantic white-cedar grows well on organic, very poorly drained soils and black oak or pitch pine is common in upland areas on soils that have better drainage.

Availability of water and landscape position largely determine which tree species grow on a particular soil. For example, sweetgum, red maple, and willow oak grow well on soils that are poorly drained and in depressions. Chestnut oak grows on soils that have a low moisture content and are on uplands. Post oak and blackjack oak grow on soils that have a very low moisture content and are on summits and side slopes.

Soil serves as a reservoir for moisture, provides an anchor for roots, and supplies most of the available nutrients. These three qualities are directly or indirectly affected by organic matter content, reaction, fertility, drainage, texture, structure, depth, and landscape position.

The ability of a soil to serve as a reservoir for moisture, as measured by the available water capacity, is primarily influenced by texture, organic matter content, rooting depth, and content of rock fragments. Because of the fairly even and abundant summer rainfall in the survey area, available water capacity is a limitation affecting tree growth only on sandy, excessively drained soils, such as Evesboro soils.

In the survey area all of the soils provide an adequate anchor for tree roots. The susceptibility to windthrow, or the uprooting of trees by the wind, is not a major management concern on most soils. Because Aura soils have a fragipan that can restrict rooting depth, the windthrow hazard is a moderate management concern on these soils.

The available supply of nutrients for tree growth is affected by several soil properties. Mineral horizons in the soil are important. Mineralization of humus releases nitrogen and other nutrients to plants. Calcium, magnesium, and potassium are held within the humus. Very small amounts of these nutrients are made available by the weathering of clay and silt particles. Most of the upland soils have been leached and contain only small amounts of nutrients below the surface layer. Soils that have a thin surface layer must be carefully managed during site preparation so that the surface layer is not removed or degraded.

The living plant community is part of the nutrient reservoir. The decomposition of leaves, stems, and other organic material recycles the nutrients that have accumulated in the forest ecosystem. Fire, excessive trampling by livestock, and erosion can result in the loss of these nutrients. Woodland management should include prevention of wildfires and protection from overgrazing.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to applications of fertilizer than others, and some are more susceptible to landslides and erosion after roads are built and timber is harvested. Some soils require special reforestation efforts. In the section "Detailed Soil Map Units," the description of each map unit in the survey area suitable for timber includes information about management concerns in producing timber. The common forest understory plants also are listed. Table 7 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate*, and *severe* are used to indicate the degree of the major soil limitations to be considered in management.

Table 7 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare per year. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation affecting use and management. The letter *R* indicates a soil that has a significant limitation because of the slope. The letter *X* indicates that a soil has restrictions because of stones or rocks on the surface. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *T* indicates a soil that has, within the root zone, excessive alkalinity or acidity, sodium salts, or other toxic substances that limit the development of desirable trees. The letter *D* indicates a soil that has a limitation because of a restricted rooting depth, such as a shallow soil that is underlain by hard bedrock, a hardpan, or other layers that restrict roots. The letter *C* indicates a soil that has a limitation because of the kind or amount of clay in the upper part of the profile. The letter *S* indicates a dry, sandy soil. The letter *F* indicates a soil that has a high content of coarse fragments. The letter *A* indicates a soil having no significant limitations that affect forest use and management. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation or harvesting activities expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion-control measures are needed for particular silvicultural activities; and *severe* if special precautions are needed to control erosion for most silvicultural activities. Ratings of moderate or severe indicate the need for construction of higher standard roads, additional maintenance of roads, additional care in planning harvesting and reforestation activities, or the use of special equipment.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, and susceptibility of the surface layer to compaction. As slope gradient and length increase, the use of wheeled equipment becomes more difficult. On the steeper slopes, tracked equipment is needed. On the steepest slopes, even tracked equipment cannot be operated and more sophisticated systems are needed. The rating is *slight* if equipment use is restricted by wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are so steep that wheeled equipment cannot be operated safely across the slope, if wetness restricts equipment use from 2 to 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. The rating is *severe* if slopes are so steep that tracked equipment cannot be operated safely across the slope, if wetness restricts equipment use for more than 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. Ratings of moderate or severe indicate a need to choose the best suited equipment and to carefully plan the timing of harvesting and other management activities.

Ratings of *seedling mortality* refer to the probability of the death of the naturally occurring or properly planted seedlings of good stock in periods of normal rainfall, as influenced by kinds of soil or topographic features. Seedling mortality is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth to a high water table and the length of the period when the water table is high, rock fragments in the surface layer, rooting depth, and the aspect of the slope. The mortality rate generally is highest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of moderate or severe indicate that it may be necessary to use containerized or larger than usual planting stock or to make special site preparations, such as bedding, furrowing, installing a surface drainage system, and providing artificial shade for seedlings. Reinforcement planting is often needed if the risk is moderate or severe.

Ratings of *windthrow hazard* indicate the likelihood that trees will be uprooted by the wind. A restricted rooting depth is the main reason for windthrow. The rooting depth can be restricted by a high water table, by a fragipan, by bedrock, or by a combination of such factors as soil wetness, texture, structure, and depth. The risk is *slight* if strong winds break trees but do not uproot them; *moderate* if strong winds blow a few trees over and break many trees; and *severe* if moderate or strong winds commonly blow trees over. Ratings of moderate or severe indicate that care is needed in thinning or that the stand should not be thinned at all. Special equipment may be needed to prevent damage to shallow root systems in partial cutting operations. A plan for the periodic removal of windthrown trees and the maintenance of a road and trail system may be needed.

The *potential productivity* of *common trees* on a soil is expressed as a *site index* and a *volume* number. The predominant common trees are listed in table 7 in the order of their observed occurrence. Additional species that commonly occur on the soils may be listed in the detailed soil map unit descriptions. Generally, only two or three tree species dominate (fig. 12). The first tree listed for each soil is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

For soils that are commonly used for timber production, the yield is predicted in cubic feet per acre per year. It is predicted at the point where mean annual increment culminates. The estimates of the productivity of the soils in this survey are based mainly on upland oaks *(12)*.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years (50 years in this survey). This index applies to fully stocked, even-aged, unmanaged stands. Productivity of a site can be improved through management practices, such as bedding, ditching, managing water, applying fertilizer, and planting genetically improved species.

The *volume* is the yield likely to be produced by the most important trees, expressed in cubic feet per acre per year.

Trees to plant are those that are used for reforestation or, under suitable conditions, natural regeneration. They are suited to the soils and can produce a commercial wood crop. The desired product, topographic position (such as a low, wet area), and personal preference are three factors among many that can influence the choice of trees for use in reforestation.

Recreation

The soils of the survey area are rated in table 8 according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of

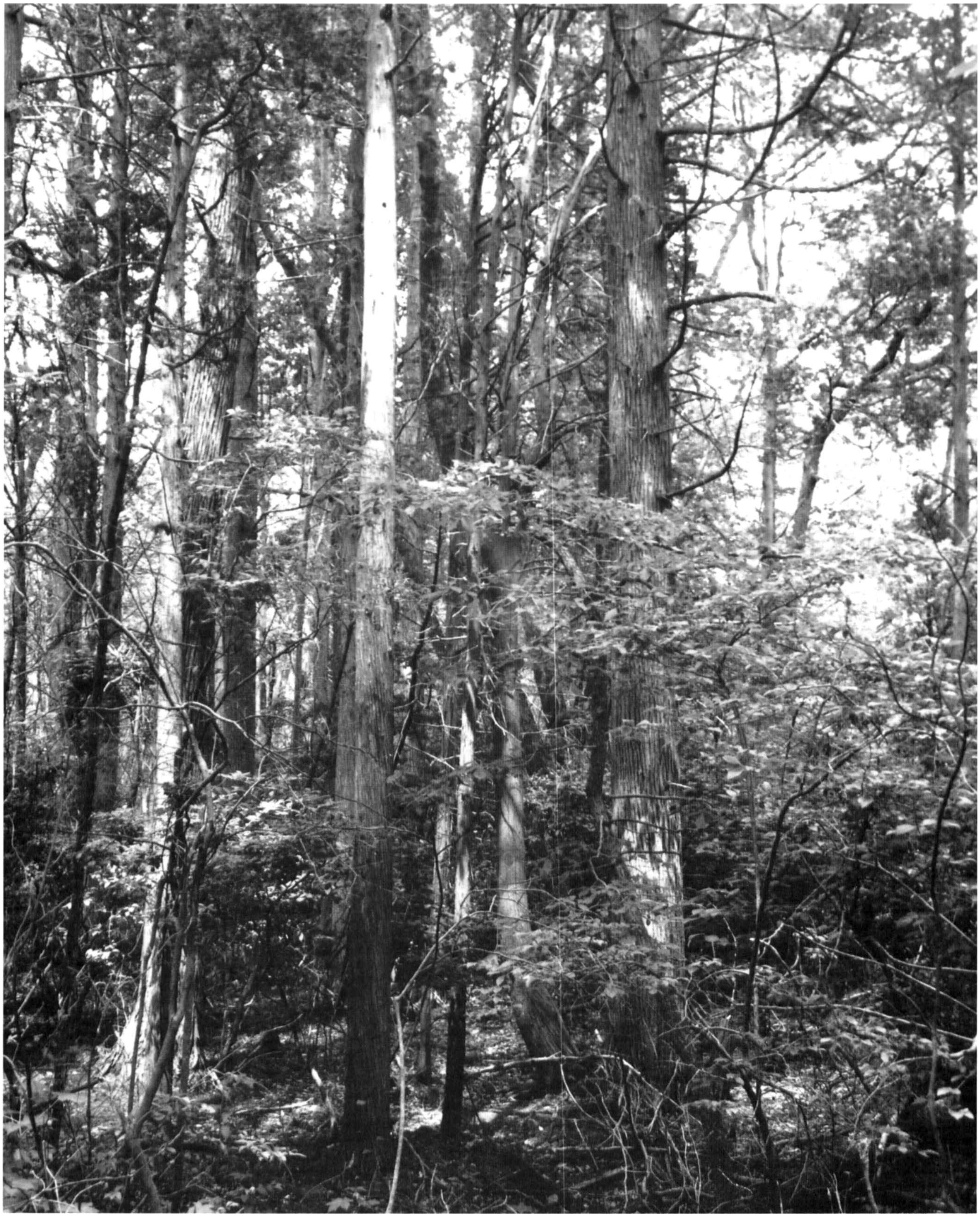

Figure 12.—Atlantic white-cedar is the main canopy species and the dominant indicator tree species on Manahawkin soils.

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 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 gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

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

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

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat. The ratings in table 9 are intended to be used as a guide and are not site specific. Onsite investigation is needed for individual management plans.

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, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, and pokeberry.

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, yellow-poplar, black cherry, red maple, sweetgum, apple, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are 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, Atlantic white-cedar, red 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, cattail, 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, 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, meadowlark, field sparrow, cottontail rabbit, 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, and white-tailed deer.

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, muskrat, osprey (fig. 13), 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 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

Figure 13.—An osprey nest built on a high platform in an area of Appoquinimink-Transquaking-Mispillion complex, very frequently flooded.

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, soil wetness, depth to a high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to 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 or a very firm, dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the high 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. Depth to a high water table, depth to bedrock, large stones, 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, depth to 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, depth to a high water table, depth to bedrock, and the available water capacity in the upper 40 inches 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. Soil tests are essential to determine liming and fertilizer needs. Help in making soil tests or in deciding what soil additive, if any, should be used can be obtained from the office of the Cape-Atlantic Soil Conservation District or the local office of the Cooperative Extension Service.

Sanitary Facilities

Table 11 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and that 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, depth to a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock 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. The animal waste lagoons commonly used in farming operations are not considered in the ratings. They are generally deeper than the lagoons referred to in the table and rely on anaerobic bacteria to decompose waste materials.

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, depth to a high water table, depth to bedrock, 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 or bedrock 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, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as the 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, depth to 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 high water table is more than 3 feet. Soils rated *fair* have 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 high 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 high 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, siltstone, and weathered granite saprolite, 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 high water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a high 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 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 or stones, 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 or stones, have slopes of more than 15 percent, or have a high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area. Ponds that are less than about 2 acres in size are not shown on the maps because of the scale of mapping.

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 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, mica, or salts or sodium. Depth to a high water table affects the amount of usable material. It also affects trafficability.

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 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, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Drainage may be a major management consideration in some areas. Management of drainage in conformance with regulations concerning wetlands may require special permits and extra planning. The local office of the Natural Resources Conservation Service should be contacted for identification of hydric soils and potential wetlands.

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 a high 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. The performance of a system is affected by the availability of suitable irrigation water, the depth of the root zone, 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 affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of soil blowing, a low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

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

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

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, by weight, 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 15 percent, by volume, 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, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest.

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

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

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 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, or component, 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 the shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water through the soil 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 in each major soil layer is stated in inches of water per inch of soil. 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. It is the difference between the amount of soil water at field moisture capacity and the amount at wilting point.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; *high*, 6 to 9 percent; and *very high*, more than 9 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.64. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

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

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. The soils assigned to group 1 are the most susceptible to soil blowing, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 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 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 or very 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 to very 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 covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

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

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as none, rare, occasional, or frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); *frequent* that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year); and *very frequent* that it occurs very often under usual weather conditions (the chance of flooding is more than 50 percent in all months of any year). *Common* is used when occasional and frequent classes are grouped for certain purposes. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding 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 is 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 (redoximorphic features) in the soil. Indicated in table 16 are the depth to the high water table; the kind of water table—that is, *perched* or *apparent*; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 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.

Two numbers in the column showing depth to the high water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. Table 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 the amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(16)*. 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 on laboratory measurements. Table 17 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, meaning humid climate, 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 Fragiudults (*Fragi*, meaning brittle pan, plus *udult*, the suborder of the Ultisols that occurs in humid climates).

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 Fragiudults.

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, siliceous, semiactive, mesic Typic Fragiudults.

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. There can be some variation in the texture of the surface layer or of the substratum within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. 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 location of the typical pedon is described, and coordinates generally are identified by the State plane grid system or by longitude and latitude. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(18)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(16)* and in "Keys to Soil Taxonomy" *(19)*. 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."

Appoquinimink Series

Drainage class: Very poorly drained
Permeability: Moderately slow in the mineral layers and moderately rapid or rapid in the organic layers

Landscape: Coastal plain
Landform: Tidal marshes
Landform position: Tidal flats and drainageways
Parent material: Loamy mineral sediments underlain by organic materials
Slope range: 0 to 1 percent
Taxonomic class: Fine-silty, mixed, active, nonacid, mesic Thapto-Histic Sulfaquents

Typical Pedon

Appoquinimink mucky silt loam in an area of Appoquinimink-Transquaking-Mispillion complex, very frequently flooded; 1.4 miles west of Dennisville on State Route 47 to Jakes Landing Road, 1.4 miles south on Jakes Landing Road to a boat ramp on Dennisville Creek, 2,300 feet southwest of the boat ramp, 300 feet west of and 400 feet north of Dennis Creek at a sharp bend in creek, in a tidal marsh; USGS Woodbine topographic quadrangle; lat. 39 degrees 10 minutes 32 seconds N. and long. 74 degrees 51 minutes 32 seconds W.

Ag—0 to 12 inches; very dark gray (5Y 3/1) mucky silt loam; massive; friable; slightly sticky, slightly plastic; *n* value greater than 1.0; many fine roots; 8 percent, by volume, organic material; neutral, ultra acid after drying; clear smooth boundary.
Cg—12 to 30 inches; dark gray (5Y 4/1) silt loam; massive; friable; slightly sticky, slightly plastic; *n* value greater than 1.0; 5 percent, by volume, organic material; neutral, ultra acid after drying; abrupt smooth boundary.
Oe—30 to 72 inches; dark reddish brown (5YR 3/2) mucky peat; 10 percent, by weight, mineral material; 40 percent, by volume, fibers after rubbing; neutral, extremely acid after drying.

Range in Characteristics

Thickness of the overlying mineral layers: 16 to 40 inches
Thickness of the buried organic layers: More than 16 inches
High water table: 0 to about 1 foot above the soil surface
Electrical conductivity: Greater than 8 millimhos per centimeter
n *value:* Greater than 1.0
Soil reaction: Moist soil—slightly acid to mildly alkaline; dry soil—strongly acid to ultra acid

Ag horizon:
Color—horizon has hue of 10YR to 5GY, value of 2 to 4, and chroma of 1 or 2, or it is neutral in hue and has value of 2 to 4
Texture—mucky silt loam

Cg horizon:
Color—horizon has hue of 10YR to 5GY, value of 2 to 6, and chroma of 1 or 2, or it is neutral in hue and has value of 3 or 4
Texture—silt loam, mucky silt loam, or silty clay loam

O horizon:
Color—horizon has hue of 5YR to 2.5Y, value of 2 to 5, and chroma of 1 to 4, or it is neutral in hue and has value of 2 to 5
Texture—muck or mucky peat

C´g horizon (if it occurs):
Color—horizon has hue of 10YR to 5GY, value of 3 or 4, and chroma of 1 or 2, or it is neutral in hue and has value of 3 or 4
Texture—silt loam, mucky silt loam, sandy loam, fine sandy loam, or very fine sandy loam

Aura Series

Drainage class: Well drained
Permeability: Moderately slow
Landscape: Coastal plain
Landform: Broad ridges
Landform position: Summits and side slopes
Parent material: Loamy and gravelly fluvial sediments
Slope range: 0 to 5 percent
Taxonomic class: Coarse-loamy, siliceous, semiactive, mesic Typic Fragiudults

Typical Pedon

Aura sandy loam, 2 to 5 percent slopes; in Salem County, about 0.85 mile northwest of Six Points on Garden Road, 1,300 feet north in a cultivated field; USGS Newfield topographic quadrangle; lat. 39 degrees 32 minutes 20 seconds N. and long. 75 degrees 07 minutes 17 seconds W.

Ap—0 to 12 inches; dark yellowish brown (10YR 4/4) sandy loam; moderate medium granular structure; friable; nonsticky, nonplastic; common medium and fine roots; 12 percent, by volume, quartzose gravel; very strongly acid; abrupt smooth boundary.
Bt1—12 to 24 inches; brown (7.5YR 5/4) gravelly sandy loam; moderate medium subangular blocky structure; friable; nonsticky, nonplastic; common fine and very fine roots; common faint clay films and clay bridges between sand grains; 25 percent, by volume, quartzose gravel; very strongly acid; clear smooth boundary.
Bt2—24 to 32 inches; light brown (7.5YR 6/4) gravelly sandy loam; moderate medium subangular blocky

structure; friable; slightly sticky, slightly plastic; few fine and very fine roots; common faint clay films and clay bridges between sand grains; 20 percent, by volume, quartzose gravel; extremely acid; abrupt smooth boundary.

2Btx1—32 to 45 inches; yellowish red (5YR 5/6) gravelly sandy loam; strong medium subangular blocky structure; friable; very dense and compact; slightly sticky, slightly plastic; common faint clay films and clay bridges between sand grains; 20 percent, by volume, quartzose gravel; few ironstone pebbles; very strongly acid; gradual smooth boundary.

2Btx2—45 to 68 inches; strong brown (7.5YR 5/6) sandy loam; massive; friable; very dense and compact; nonsticky, nonplastic; 5 percent, by volume, quartzose gravel; few ironstone pebbles; many faint clay bridges between sand grains; very strongly acid; gradual smooth boundary.

2C—68 to 72 inches; yellowish brown (10YR 5/6) loamy sand; single grain; loose; nonsticky, nonplastic; very strongly acid.

Range in Characteristics

Thickness of the solum: 40 to 80 inches or more
Depth to fragipan: 15 to 40 inches (fig. 14)
Depth to high water table: More than 6 feet
Rock fragments: 0 to 20 percent in the A, E, and Bt horizons; 10 to 50 percent in the Btx horizon; 0 to 50 percent in the C horizon
Soil reaction: Extremely acid or very strongly acid throughout the profile, except in limed areas

O horizon (if it occurs):
Color—hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 to 3
Texture—highly decomposed to slightly decomposed plant material

A or Ap horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 4
Texture (fine-earth fraction)—sandy loam

BE or E horizon (if it occurs):
Color—hue of 7.5YR to 2.5Y, value of 5 to 8, and chroma of 2 to 6
Texture (fine-earth fraction)—sandy loam, loamy sand, or coarse sandy loam

Bh horizon (if it occurs):
Color—hue of 5YR or 7.5YR and value and chroma of 4 to 6
Texture (fine-earth fraction)—sandy loam, loamy sand, coarse sandy loam, or loam

Bt horizon:
Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8
Texture (fine-earth fraction)—sandy loam, coarse sandy loam, loam, or thin strata of sandy clay loam

2Btx horizon:
Color—hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8
Texture (fine-earth fraction)—sandy loam, loam, coarse sandy loam, or thin strata of sandy clay loam

2C horizon:
Color—hue of 5YR to 10YR, value of 4 to 7, and chroma of 3 to 8
Texture (fine-earth fraction)—sandy loam, loamy sand, or sand

Berryland Series

Drainage class: Very poorly drained
Permeability: Moderately rapid
Landscape: Coastal plain
Landform: Freshwater flats and depressions
Landform position: Freshwater flats, drainageways, and depressions
Parent material: Sandy coastal plain sediments
Slope range: 0 to 1 percent
Taxonomic class: Sandy, siliceous, mesic Typic Alaquods

Typical Pedon

Berryland sand in an area of Berryland and Mullica soils, occasionally flooded; 0.6 mile east of Cedar Swamp Creek on Tuckahoe Road, 0.3 mile southeast on Butter Road to a power line, 1,200 feet south along the power line, in a wooded area; USGS Marmora topographic quadrangle; lat. 39 degrees 15 minutes 10 seconds N. and long. 74 degrees 41 minutes 31 seconds W.

Ag—0 to 11 inches; black (10YR 3/1) sand; weak fine granular structure; very friable; nonsticky, nonplastic; many fine roots; 5 percent, by volume, quartzose gravel; extremely acid; clear wavy boundary.

Bh—11 to 19 inches; dark reddish brown (5YR 3/2) sand; massive; firm; brittle; dense and compact; nonsticky, nonplastic; few fine roots; organic matter coatings on sand grains; extremely acid; clear irregular boundary.

Bg—19 to 32 inches; gray (5Y 6/1) sand; single grain; loose; nonsticky, nonplastic; common medium faint pale yellow (5Y 8/3) irregular shaped iron accumulations with diffuse boundaries throughout; few fine roots; 5 percent, by volume, quartzose gravel; very strongly acid; clear wavy boundary.

B′h—32 to 40 inches; dark reddish brown (5YR 2/2) sand; firm; brittle; slightly dense and compact; nonsticky, nonplastic; few fine and medium roots; 12 percent, by volume, quartzose gravel; extremely acid; abrupt wavy boundary.

Cg1—40 to 44 inches; gray (10YR 6/1) sand; single grain; loose; nonsticky, nonplastic; very strongly acid; abrupt wavy boundary.

Cg2—44 to 72 inches; stratified gray (10YR 6/1) sand and sandy loam; single grain; loose; nonsticky, nonplastic; very strongly acid.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Depth to the spodic horizon: 10 to 16 inches
Soil reaction: Very strongly acid or extremely acid throughout the profile
Depth to high water table: 0 to 0.5 foot
Rock fragments: 0 to 15 percent, by volume, throughout the profile

O horizon (if it occurs):
Color—hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 3
Texture—mucky peat or muck; thin peat layers occur in some pedons

Ag horizon:
Color—horizon has hue of 5YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3
Texture—sand

Bh or B′h horizon:
Color—hue of 5YR to 10YR and value and chroma of 2 to 4
Texture—sand or loamy sand

Bg horizon:
Color—horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 to 3, or it is neutral in hue and has value of 4 to 6
Texture—sand or loamy sand
Redoximorphic features—iron accumulations in shades of yellow, red, or brown and iron depletions in shades of gray or white

Cg horizon:
Color—horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 to 3, or it is neutral in hue and has value of 4 to 6
Texture—sand or loamy sand; stratified with sandy loam below a depth of 40 inches
Redoximorphic features—iron accumulations in shades of yellow, red, or brown and iron depletions in shades of gray or white

Dennisville Series

Drainage class: Well drained
Permeability: Moderately rapid
Landscape: Coastal plain
Landform: Broad ridges
Landform position: Summits and side slopes
Parent material: Loamy and sandy marine sediments
Slope range: 0 to 2 percent
Taxonomic class: Coarse-loamy, siliceous, semiactive, mesic Typic Hapludults

Typical Pedon

Dennisville sandy loam, 0 to 2 percent slopes; 1.4 mile west of Woodbine on Belleplain-Woodbine Road (County Road 550) to entrance of Belleplain State Forest, 1.3 miles south on Pine Swamp Road, 100 feet south of State Forest boundary and 100 feet east of road, in a wooded area; USGS Woodbine topographic quadrangle; lat. 39 degrees 14 minutes 01 second N. and long. 74 degrees 51 minutes 14 seconds W.

Oe—0 to 1 inch; dark reddish brown (5YR 3/2) moderately decomposed plant material (hemic); moderate fine granular structure; very friable; nonsticky, nonplastic; many very fine and fine and few medium roots; many fine vesicular pores; extremely acid; abrupt smooth boundary.

A—1 to 2 inches; very dark grayish brown (10YR 3/2) sandy loam; moderate fine granular structure; friable; nonsticky, nonplastic; many very fine and fine and few medium roots; many fine vesicular pores; extremely acid; abrupt smooth boundary.

E—2 to 4 inches; light brownish gray (10YR 6/2) sandy loam; weak fine granular structure; friable; nonsticky, nonplastic; common fine and few medium roots; many fine vesicular pores; extremely acid; abrupt smooth boundary.

Bh—4 to 5 inches; yellowish red (5YR 5/6) sandy loam; massive; friable; slightly brittle; slightly dense and compact; nonsticky, nonplastic; common fine and few medium roots; common fine vesicular pores; extremely acid; abrupt smooth boundary.

Bt1—5 to 17 inches; yellowish brown (10YR 5/6) sandy loam; moderate medium subangular blocky structure; friable; slightly sticky, slightly plastic; common fine and medium roots; common fine vesicular pores; common clay bridges between sand grains; very strongly acid; clear smooth boundary.

Bt2—17 to 27 inches; yellowish brown (10YR 5/6) gravelly sandy loam; moderate medium subangular blocky structure; friable; slightly sticky, slightly plastic; common fine and medium roots; common fine vesicular pores; common clay bridges between sand grains; 20 percent, by volume, gravel; very strongly acid; clear smooth boundary.

BC—27 to 32 inches; yellowish brown (10YR 5/6) gravelly loamy sand; single grain; loose; nonsticky, nonplastic; few fine and medium roots; 20 percent, by volume, gravel; very strongly acid; clear smooth boundary.

C1—32 to 46 inches; yellowish brown (10YR 5/8) gravelly sand; single grain; loose; nonsticky, nonplastic; few fine and medium roots; 25 percent, by volume, gravel; very strongly acid; clear smooth boundary.

C2—46 to 50 inches; yellowish brown (10YR 5/8) sand; single grain; loose; nonsticky, nonplastic; very strongly acid; clear smooth boundary.

C3—50 to 62 inches; yellowish brown (10YR 5/8) sand; single grain; loose; nonsticky, nonplastic; common coarse prominent light brownish gray (10YR 6/2) iron depletions with clear boundaries throughout; very strongly acid; clear smooth boundary.

C4—62 to 67 inches; yellowish brown (10YR 6/8) sand; single grain; loose; nonsticky, nonplastic; common medium distinct light brownish gray (10YR 6/2) irregular shaped iron depletions with clear boundaries throughout; very strongly acid; clear smooth boundary.

C5—67 to 74 inches; yellowish brown (10YR 6/8) gravelly sand; single grain; loose; nonsticky, nonplastic; common medium distinct light brownish gray (10YR 6/2) irregular shaped iron depletions with clear boundaries throughout; 30 percent, by volume, gravel; very strongly acid.

Range in Characteristics

Thickness of the solum: 20 to 50 inches
Depth to gravelly or very gravelly horizons: 20 to 40 inches
Depth to high water table: 3.5 to 6 feet
Rock fragments: 0 to 15 percent, by volume, in the A, E, and Bh horizons and the upper part of the Bt horizon; 15 to 30 percent in the lower part of the Bt horizon; 15 to 50 percent in the BC horizon and the upper part of the C horizon; 0 to 50 percent in the lower part of the C horizon
Soil reaction: Extremely acid to strongly acid throughout the profile, except in limed areas

O horizon (if it occurs):
Color—hue of 5YR or 7.5YR, value of 2 or 3, and chroma of 1 to 3
Texture—moderately decomposed or highly decomposed plant material

A or Ap horizon:
Color—hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 to 3
Texture—sandy loam

E horizon:
Color—hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 1 or 2
Texture—sandy loam or loamy sand

Bh horizon:
Color—hue of 5YR or 7.5YR and value and chroma of 4 to 6
Texture—sandy loam or loamy sand

Bt horizon:
Color—hue of 7.5YR or 10YR and value and chroma of 4 to 6
Texture (fine-earth fraction)—sandy loam

BC horizon:
Color—hue of 7.5YR or 10YR and value and chroma of 4 to 6
Texture (fine-earth fraction)—loamy sand or sandy loam

C horizon:
Color—hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 2 to 8
Texture (fine-earth fraction)—sand
Redoximorphic features—iron depletions in shades of white, olive, or gray and iron accumulations in shades of yellow, red, or brown

Downer Series

Drainage class: Well drained
Permeability: Moderate
Landscape: Coastal plain
Landform: Broad ridges
Landform position: Summits and side slopes
Parent material: Loamy coastal plain sediments
Slope range: 0 to 5 percent
Taxonomic class: Coarse-loamy, siliceous, semiactive, mesic Typic Hapludults

Typical Pedon

Downer loamy sand, 0 to 5 percent slopes; south of Bridgeton in Cumberland County, 1,650 feet west of the intersection of Trench Road (County Road 699) and Cubby Hollow Road, 660 feet north of Trench Road, in a cultivated area; USGS Port Elizabeth topographic quadrangle; lat. 39 degrees 22 minutes 30 seconds N. and long. 74 degrees 58 minutes 35 seconds W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) loamy sand; weak fine granular structure; very friable; nonsticky, nonplastic; many fine roots; slightly acid; abrupt smooth boundary.
BA—10 to 16 inches; yellowish brown (10YR 5/6) loamy sand; very weak medium subangular blocky structure; very friable; nonsticky, nonplastic; common fine roots; slightly acid; clear wavy boundary.
Bt—16 to 36 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; friable; nonsticky, nonplastic; common fine roots; clay bridging between sand grains; 5 percent, by volume, quartzose gravel; moderately acid; clear wavy boundary.
C1—36 to 48 inches; yellowish brown (10YR 5/6) loamy sand; single grain; loose; nonsticky, nonplastic; few fine roots; 10 percent, by volume, quartzose gravel; very strongly acid; clear smooth boundary.
C2—48 to 72 inches; light yellowish brown (10YR 6/4) sand that has lenses of strong brown (7.5YR 5/6) sandy loam; single grain; loose; nonsticky, nonplastic; 10 percent, by volume, quartzose gravel; very strongly acid.

Range in Characteristics

Thickness of the solum: 18 to 55 inches
Rock fragments: 0 to 15 percent, by volume, in the A and E horizons and the upper part of the B horizon; 0 to 35 percent in the lower part of the B horizon and in the C horizon; depth to layers having more than 35 percent rock fragments is more than 40 inches; below a depth of 40 inches in the C horizon, rock fragments range from 0 to 60 percent
Depth to high water table: More than 6 feet
Soil reaction: Extremely acid to strongly acid throughout the profile, except in limed areas

O horizon (if it occurs):
Color—hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 1 or 2
Texture—moderately decomposed or highly decomposed plant material

A or Ap horizon:
Color—hue of 10YR, value of 3 to 5, and chroma of 2 to 4
Texture—loamy sand or sandy loam

E horizon (if it occurs):
Color—hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 1 to 4
Texture—sand, loamy sand, or sandy loam

BA or BE horizon:
Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6
Texture—sand, loamy sand, loamy coarse sand, or sandy loam

Bh horizon (if it occurs):
Color—hue of 5YR or 10YR and value and chroma of 4 to 6
Texture—loamy sand or sandy loam

Bt horizon:
Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8
Texture—sandy loam; thin subhorizons of sandy clay loam, loam, or loamy sand occur in many pedons

BC horizon (if it occurs):
Color—hue of 7.5YR or 2.5Y, value of 4 to 6, and chroma of 4 to 8
Texture—sand, loamy sand, or sandy loam

C horizon:
Color—hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 4 to 8
Texture (fine-earth fraction)—sand or loamy sand; ranging from sand to sandy clay loam below a depth of 40 inches

Evesboro Series

Drainage class: Excessively drained
Permeability: Moderately rapid
Landscape: Coastal plain
Landform: Old dunes and broad ridges
Landform position: Summits and side slopes
Parent material: Sandy marine and eolian sediments
Slope range: 0 to 5 percent
Taxonomic class: Mesic, coated Typic Quartzipsamments

Typical Pedon

Evesboro sand, 0 to 5 percent slopes; 1.2 miles west of U.S. Highway 9 on County Road 550 to the second power line, 1,000 feet north of the road along the power line and 100 feet north of the power line, in a wooded area; USGS Sea Isle City topographic quadrangle; lat. 39 degrees 11 minutes 44 seconds N. and long. 74 degrees 44 minutes 35 seconds W.

Oi—0 to 2 inches; dark reddish brown (5YR 3/2) slightly decomposed plant material; moderate fine granular structure; very friable; many fine roots; extremely acid; abrupt smooth boundary.
A—2 to 3 inches; very dark grayish brown (10YR 3/2) sand; single grain; loose; nonsticky, nonplastic; many fine roots; extremely acid; abrupt smooth boundary.
E—3 to 4 inches; light brown (10YR 6/2) sand; single grain; loose; nonsticky, nonplastic; common fine roots; very strongly acid; abrupt smooth boundary.
Bh—4 to 5 inches; strong brown (7.5YR 5/6) loamy sand; single grain; loose; nonsticky, nonplastic; common fine roots; very strongly acid; abrupt smooth boundary.
Bw1—5 to 10 inches; light yellowish brown (10YR 6/4) sand; single grain; loose; nonsticky, nonplastic; common fine roots; very strongly acid; clear smooth boundary.
Bw2—10 to 38 inches; yellowish brown (10YR 5/6) sand; single grain; loose; nonsticky, nonplastic; few fine roots; very strongly acid; clear smooth boundary.
C1—38 to 52 inches; brownish yellow (10YR 6/6) sand; single grain; loose; nonsticky, nonplastic; very strongly acid; gradual smooth boundary.
C2—52 to 72 inches; brownish yellow (10YR 7/6) sand; single grain; loose; nonsticky, nonplastic; very strongly acid.

Range in Characteristics

Thickness of the solum: 10 to 48 inches
Rock fragments: 0 to 15 percent, by volume, in the A horizon; 0 to 25 percent throughout the rest of the profile; layers having more than 15 percent rock fragments are less than 1 foot thick
Depth to high water table: More than 6 feet
Soil reaction: Extremely acid or very strongly acid throughout the profile, except in limed areas

O horizon:
Color—hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 to 3
Texture—slightly decomposed to highly decomposed plant material

A horizon:
Color—hue of 10YR, value of 3 to 6, and chroma of 1 to 4
Texture (fine-earth fraction)—sand

E horizon:
Color—hue of 10YR, value of 5 or 6, and chroma of 2 to 6
Texture (fine-earth fraction)—sand or loamy sand

Bh horizon:
Color—hue of 5YR or 7.5YR and value and chroma of 4 to 6
Texture (fine-earth fraction)—loamy sand or sand

Bw horizon:
Color—hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8
Texture (fine-earth fraction)—loamy sand

C horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 2 to 6
Texture (fine-earth fraction)—stratified sand to loamy sand to a depth of 40 inches; ranging from sand to sandy loam below a depth of 40 inches

Fort Mott Series

Drainage class: Well drained
Permeability: Moderate
Landscape: Coastal plain
Landform: Ridges and terraces
Landform position: Summits and side slopes
Parent material: Sandy and loamy coastal plain sediments
Slope range: 0 to 5 percent
Taxonomic class: Loamy, siliceous, semiactive, mesic Arenic Hapludults

Typical Pedon

Fort Mott sand, 0 to 5 percent slopes; about 0.9 mile west of U.S. Route 9 on State Route 83 to an electric transmission line (old railroad), 1.5 miles south along the transmission line to a dirt road, 1.2 miles west on the dirt road, 100 feet south of the road to the top of a ridge; USGS Woodbine topographic quadrangle; lat. 39 degrees 08 minutes 35 seconds N. and long. 74 degrees 48 minutes 32 seconds W.

Oi—0 to 2 inches; dark reddish brown (5YR 3/2) slightly decomposed organic matter; very friable; nonsticky, nonplastic; many fine roots; extremely acid; clear smooth boundary.
A—2 to 3 inches; very dark grayish brown (10YR 3/2) sand; single grain; loose; nonsticky, nonplastic; many fine roots; extremely acid; abrupt smooth boundary.
E—3 to 4 inches; light brownish gray (10YR 6/2) sand;

single grain; loose; nonsticky, nonplastic; common fine roots; strongly acid; abrupt smooth boundary.

Bh—4 to 5 inches; yellowish red (5YR 5/6) loamy sand; massive; loose; slightly brittle; slightly dense and compact; nonsticky, nonplastic; common fine roots; extremely acid; abrupt smooth boundary.

E′—5 to 22 inches; yellowish brown (10YR 5/6) sand; single grain; loose; nonsticky, nonplastic; very strongly acid; clear smooth boundary.

Bt—22 to 35 inches; strong brown (7.5YR 5/6) sandy loam; moderate medium and coarse subangular blocky structure; friable; slightly sticky, slightly plastic; clay bridging between sand grains; very strongly acid; clear smooth boundary.

BC—35 to 49 inches; reddish yellow (7.5YR 5/6) loamy sand; weak fine subangular blocky structure; very friable; nonsticky, nonplastic; very strongly acid; clear smooth boundary.

C1—49 to 70 inches; brownish yellow (10YR 6/8) sand that has thin lenses of strong brown (7.5YR 5/6) sandy loam; single grain; loose; nonsticky, nonplastic; very strongly acid; clear smooth boundary.

C2—70 to 72 inches; yellow (10YR 7/8) sand; single grain; loose; nonsticky, nonplastic; very strongly acid.

Range in Characteristics

Thickness of the solum: 36 to 60 inches
Rock fragments: 0 to 10 percent, by volume, in the A, E, and B horizons; 0 to 30 percent in the C horizon
Depth to high water table: More than 6 feet
Soil reaction: Extremely acid to strongly acid throughout the profile, except in limed areas

O horizon:
Color—hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 to 3
Texture—slightly decomposed to highly decomposed plant material

A or Ap horizon:
Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 1 to 4
Texture—sand

E or E′ horizon:
Color—hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 1 to 6
Texture—sand or loamy sand

Bh horizon:
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 6
Texture—loamy sand or sandy loam

Bt horizon:
Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8
Texture—sandy loam, coarse sandy loam, sandy clay loam, or loam

BC horizon:
Color—hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8
Texture—loamy sand or sandy loam

C horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 to 8, and chroma of 3 to 8
Texture (fine-earth fraction)—stratified sand, loamy sand, or loamy coarse sand that has thin layers of sandy loam or fine sandy loam

Galloway Series

Drainage class: Moderately well drained
Permeability: Rapid
Landscape: Coastal plain
Landform: Terraces, flats, and depressions
Landform position: Side slopes and depressions
Parent material: Sandy coastal plain sediments
Slope range: 0 to 5 percent
Taxonomic class: Mesic, coated Aquic Quartzipsamments

Typical Pedon

Galloway loamy sand, 0 to 5 percent slopes; in Cumberland County, 0.1 mile south of the intersection of Ackley Road and Buckshutem Road on Buckshutem Road, 50 feet east of the road, in a cultivated field in Edward G. Bevan Wildlife Management Area; USGS Dividing Creek topographic quadrangle; lat. 39 degrees 18 minutes 48 seconds N. and long. 75 degrees 00 minutes 34 seconds W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) loamy sand; single grain; loose; nonsticky, nonplastic; many fine roots; slightly acid; abrupt smooth boundary.

Bw—9 to 28 inches; light yellowish brown (10YR 6/4) loamy sand; single grain; loose; nonsticky, nonplastic; few fine faint brownish yellow (10YR 6/6) irregular shaped iron accumulations with diffuse boundaries throughout; many sand grains coated with silt; moderately acid; clear smooth boundary.

Cg1—28 to 58 inches; white (2.5Y 8/2) gravelly sand; single grain; loose; nonsticky, nonplastic; common medium prominent light yellowish brown (10YR

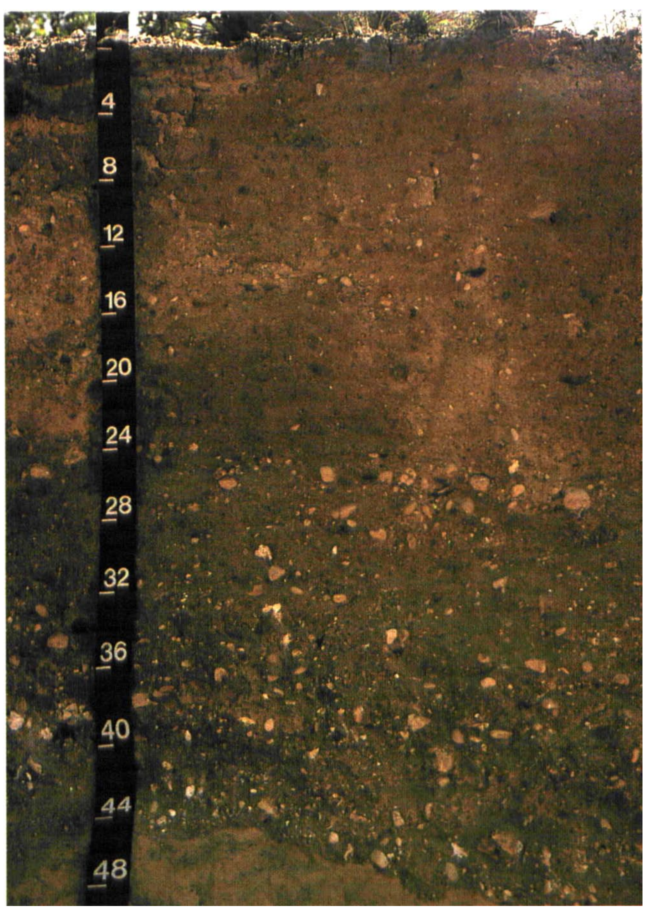

Figure 14.—A profile of Aura soils. These soils have a gravelly fragipan that occurs at a depth of about 24 inches and is underlain by sandy materials at a depth of about 46 inches.

Figure 15.—A profile of Hooksan soils. These sandy, excessively drained soils occur on sand dunes adjacent to beaches. They formed in recent, wind-deposited marine sediments. They are young soils and do not have a well developed subsoil.

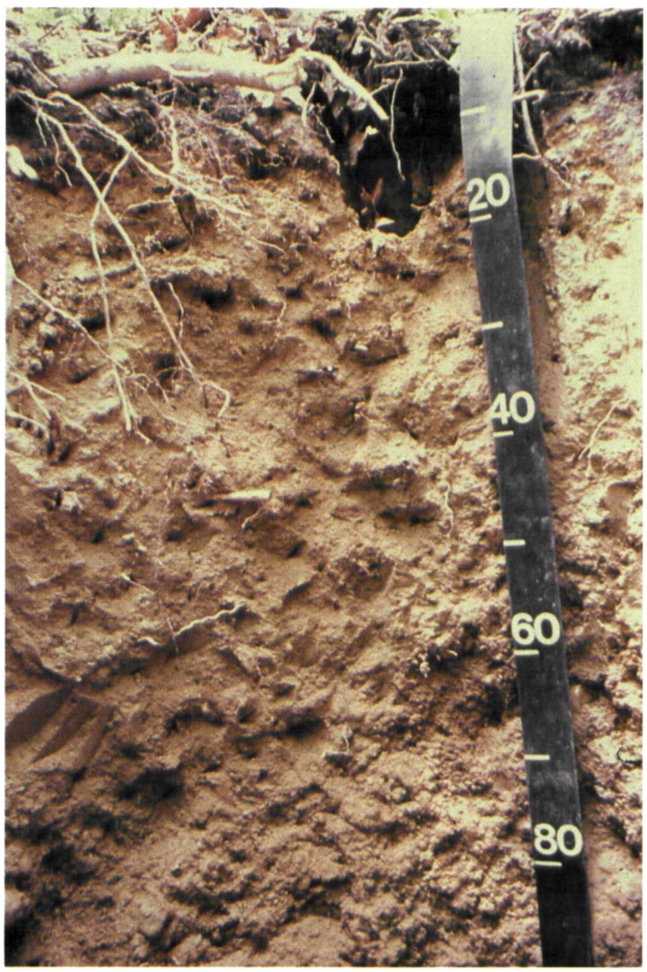

Figure 16.—A profile of Ingleside soils. These soils typically developed a brownish subsoil as they weathered from marine sediments.

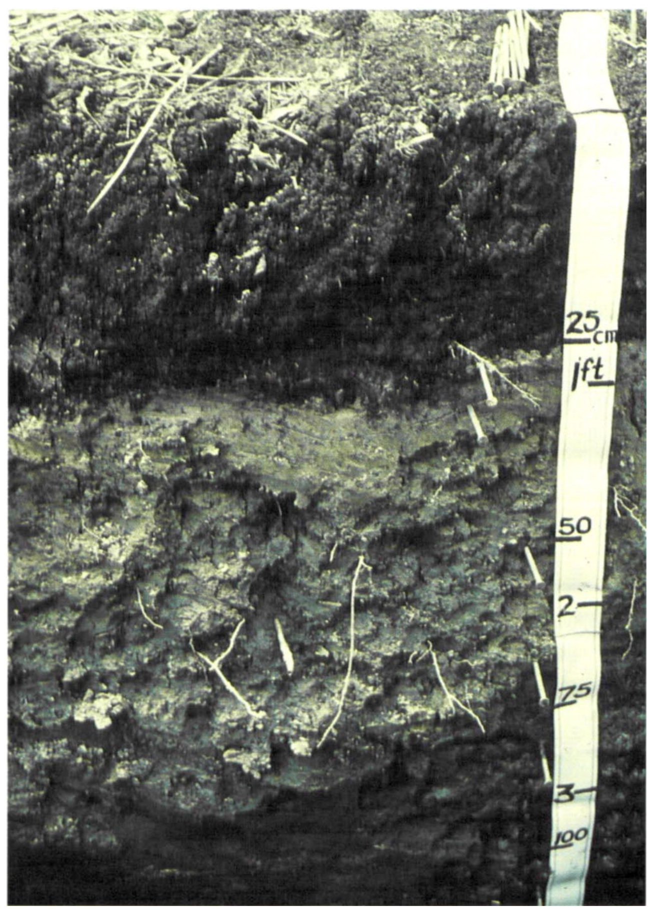

Figure 17.—A profile of Mullica soils. These soils are loamy and very poorly drained. They typically have a thick black surface horizon over a gray subsoil which developed under saturated conditions over long periods of time.

6/4) irregular shaped iron accumulations with clear boundaries throughout; 20 percent, by volume, gravel; very strongly acid; abrupt smooth boundary.

Cg2—58 to 72 inches; white (2.5Y 8/1) sand; single grain; loose; nonsticky, nonplastic; 5 percent, by volume, gravel; very strongly acid.

Range in Characteristics

Thickness of the solum: 35 to 44 inches
Depth to high water table: 2 to 4 feet
Rock fragments: 0 to 5 percent, by volume, in the O, A, E, and B horizons; 0 to 35 percent in the C horizon
Soil reaction: Extremely acid to strongly acid throughout the profile, except in limed areas

O horizon (if it occurs):
Color—hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 to 3
Texture—highly decomposed to slightly decomposed plant material

A or Ap horizon:
Color—hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 1 to 4
Texture—loamy sand

E horizon (if it occurs):
Color—hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 to 3
Texture—loamy sand or sand

Bh horizon (if it occurs):
Color—hue of 5YR or 7.5YR and value and chroma of 4 to 6
Texture—loamy sand

Bw horizon:
Color—hue of 7.5YR to 5Y, value of 5 to 7, and chroma of 3 to 6
Texture—loamy sand in the upper part and loamy sand to sand in the lower part
Redoximorphic features—iron depletions in shades gray (below a depth of 24 inches and within a depth of 40 inches) and iron accumulations in shades of red, yellow, or brown

Cg horizon:
Color—horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 5 to 7
Texture (fine-earth fraction)—sand or loamy sand
Redoximorphic features—iron depletions in shades of white or gray and iron accumulations in shades of red, yellow, or brown

Hammonton Series

Drainage class: Moderately well drained
Permeability: Moderate
Landscape: Coastal plain
Landform: Terraces, flats, and depressions
Landform position: Side slopes and foot slopes
Parent material: Sandy and loamy coastal plain sediments
Slope range: 0 to 5 percent
Taxonomic class: Coarse-loamy, siliceous, semiactive, mesic Aquic Hapludults

Typical Pedon

Hammonton sandy loam, 0 to 2 percent slopes; in Cumberland County, 1.3 miles north of State Route 47 (Delsea Drive) on Hands Mill Road, 30 feet southeast of the road, in a wooded area; USGS Newfield topographic quadrangle; lat. 39 degrees 32 minutes 08 seconds N. and long. 75 degrees 03 minutes 03 seconds W.

Oe—0 to 2 inches; dark reddish brown (5YR 3/2) moderately decomposed organic matter; moderate medium granular structure; friable; nonsticky, nonplastic; many fine roots; extremely acid; abrupt smooth boundary.

Oa—2 to 3 inches; black (5YR 2/1) highly decomposed organic matter; moderate medium granular structure; friable; nonsticky, nonplastic; many fine roots; extremely acid; abrupt smooth boundary.

A—3 to 4 inches; dark grayish brown (10YR 4/2) sandy loam; moderate medium granular structure; friable; nonsticky, nonplastic; many fine roots; extremely acid; abrupt smooth boundary.

E—4 to 5 inches; light brownish gray (10YR 6/2) sandy loam; weak medium granular structure; friable; nonsticky, nonplastic; many fine roots; extremely acid; abrupt smooth boundary.

Bh—5 to 6 inches; strong brown (7.5YR 5/6) sandy loam; massive; friable; nonsticky, nonplastic; common fine and medium roots; extremely acid; clear smooth boundary.

Bt—6 to 27 inches; yellowish brown (10YR 5/6) sandy loam; moderate medium and coarse subangular blocky structure; friable; slightly sticky, slightly plastic; common fine and medium roots; thin patchy clay films; very strongly acid; clear smooth boundary.

BC—27 to 30 inches; yellowish brown (10YR 5/6) loamy sand; weak medium subangular blocky structure; friable; nonsticky, nonplastic; few medium and coarse roots; very strongly acid; clear wavy boundary.

C—30 to 39 inches; yellowish brown (10YR 5/4) loamy sand; single grain; loose; nonsticky, nonplastic; common medium distinct light brownish gray (10YR 6/2) irregular shaped iron depletions with clear boundaries throughout; few fine roots; very strongly acid; clear smooth boundary.

Cg1—39 to 43 inches; gray (10YR 6/1) sand; single grain; loose; nonsticky, nonplastic; few medium prominent yellowish brown (10YR 5/6) irregular shaped iron accumulations with clear boundaries throughout; very strongly acid; abrupt smooth boundary.

Cg2—43 to 72 inches; gray (10YR 6/1) gravelly sand; single grain; loose; nonsticky, nonplastic; few medium prominent yellowish brown (10YR 5/6) irregular shaped iron accumulations with clear boundaries throughout; 20 percent, by volume, gravel; strongly acid.

Range in Characteristics

Thickness of the solum: 20 to 50 inches
Depth to high water table: 1.5 to 3.5 feet
Rock fragments: 0 to 10 percent, by volume, in the A, E, and B horizons; 0 to 40 percent in the C horizon
Soil reaction: Extremely acid to strongly acid, except in limed areas

O horizon:
Color—hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 to 3
Texture—highly decomposed to slightly decomposed plant material

A or Ap horizon:
Color—hue of 10YR to 5Y, value of 3 to 6, and chroma of 1 to 4
Texture—loamy sand or sandy loam

E horizon:
Color—hue of 10YR to 5Y, value of 4 to 7, and chroma of 2 to 8
Texture—loamy sand or sandy loam

Bh horizon:
Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 6
Texture—loamy sand or sandy loam

Bt horizon:
Color—hue of 7.5YR to 5Y, value of 4 to 7, and chroma of 3 to 8
Texture—sandy loam; thin subhorizons of sandy clay loam or loamy sand occur in some pedons
Redoximorphic features—iron depletions in shades of white or gray and iron accumulations in shades of red, yellow, or brown

Btg horizon (if it occurs):
Color—hue of 7.5YR to 5Y, value of 4 to 7, and chroma of 1 or 2
Texture—sandy loam; thin subhorizons of sandy clay loam or loamy sand occur in some pedons
Redoximorphic features—iron depletions in shades of white or gray and iron accumulations in shades of red, yellow, or brown

BC horizon:
Color—hue of 7.5YR to 5Y, value of 4 to 8, and chroma of 3 to 8
Texture—sandy loam; thin subhorizons of sandy clay loam occur in some pedons

BCg horizon (if it occurs):
Color—hue of 7.5YR to 5Y, value of 4 to 8, and chroma of 1 or 2
Texture—sandy loam or loamy sand; thin subhorizons of sandy clay loam occur in some pedons
Redoximorphic features—iron depletions in shades of olive, gray, or white and iron accumulations in shades of red, yellow, or brown

C horizon:
Color—hue of 7.5YR to 5Y, value of 5 to 8, and chroma of 3 to 8
Texture (fine-earth fraction)—sand or loamy sand; thin subhorizons of sandy clay loam occur in some pedons; texture ranges from sand to sandy clay loam below a depth of 40 inches
Redoximorphic features—iron depletions in shades of white or gray and iron accumulations in shades of yellow or brown

Cg horizon:
Color—hue of 7.5YR to 5Y, value of 5 to 8, and chroma of 1 or 2
Texture (fine-earth fraction)—sand or loamy sand; thin subhorizons of sandy clay loam occur in some pedons; texture ranges from sand to sandy clay loam below a depth of 40 inches
Redoximorphic features—iron depletions in shades of olive, gray, or white and iron accumulations in shades of red, yellow, or brown

Hooksan Series

Drainage class: Excessively drained
Permeability: Rapid

Landscape: Coastal plain
Landform: Sand dunes (fig. 15)
Landform position: Summits and side slopes
Parent material: Wind-deposited marine sands
Slope range: 2 to 15 percent
Taxonomic class: Mesic, uncoated Typic Quartzipsamments

Typical Pedon

Hooksan sand, 2 to 15 percent slopes, rarely flooded; in Avalon, 100 feet east of Dune Drive at 50th Street, along a foot path to the beach, 100 feet south of the foot path, in sand dunes; USGS Sea Isle City topographic quadrangle; lat. 39 degrees 04 minutes 48 seconds N. and long. 74 degrees 44 minutes 00 seconds W.

Oe—0 to 1 inch; dark reddish brown (5YR 3/2) moderately decomposed plant material; friable; many fine roots; very strongly acid; abrupt smooth boundary.
A—1 to 2 inches; very dark brown (10YR 2/2) fine sand; single grain; loose; nonsticky, nonplastic; common fine roots; 10 percent dark opaque sand grains; strongly acid; abrupt smooth boundary.
AC—2 to 4 inches; grayish brown (10YR 6/2) fine sand; single grain; loose; nonsticky, nonplastic; common fine roots; 10 percent dark opaque sand grains; very strongly acid; abrupt smooth boundary.
C1—4 to 11 inches; very pale brown (10YR 7/4) fine sand; single grain; loose; nonsticky, nonplastic; common fine roots; 10 percent dark opaque sand grains; strongly acid; clear smooth boundary.
C2—11 to 19 inches; light gray (10YR 7/1) fine sand; single grain; loose; nonsticky, nonplastic; few fine roots; 10 percent dark opaque sand grains; strongly acid; gradual smooth boundary.
C3—19 to 57 inches; very pale brown (10YR 8/3) fine sand; single grain; loose; nonsticky, nonplastic; 10 percent dark opaque sand grains; strongly acid; gradual smooth boundary.
C4—57 to 72 inches; very pale brown (10YR 8/3) fine sand; single grain; loose; nonsticky, nonplastic; 10 percent black opaque sand grains; slightly acid.

Range in Characteristics

Rock fragments: 0 to 5 percent, by volume; mostly seashells
Depth to high water table: More than 6 feet
Soil reaction: Strongly acid to slightly alkaline in the A and AC horizons; moderately acid to slightly alkaline in the C horizon

O horizon:
Color—hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 to 3
Texture—highly decomposed to slightly decomposed plant material

A horizon:
Color—hue of 10YR or 2.5Y, value of 2 to 7, and chroma of 1 or 2
Texture—fine sand

AC horizon:
Color—hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2
Texture—sand, fine sand, or coarse sand

C horizon:
Color—hue of 10YR to 2.5Y, value of 5 to 8, and chroma of 3 to 8
Texture—sand, fine sand, or coarse sand

Ingleside Series

Drainage class: Well drained
Permeability: Moderately rapid
Landscape: Coastal plain
Landform: Flats and terraces
Landform position: Summits and side slopes
Parent material: Loamy and sandy coastal plain sediments (fig. 16)
Slope range: 0 to 5 percent
Taxonomic class: Coarse-loamy, siliceous, semiactive, mesic Typic Hapludults

Typical Pedon

Ingleside sandy loam, 0 to 2 percent slopes; 0.4 mile east of the intersection of State Route 50 and Tuckahoe Road on Tuckahoe Road to the entrance of Tuckahoe Wildlife Management Area, 0.2 mile north to the first road, 0.6 mile east, 100 feet north of the road, in a cultivated field; USGS Marmora topographic quadrangle; lat. 39 degrees 16 minutes 14 seconds N. and long. 74 degrees 43 minutes 05 seconds W.

Ap—0 to 12 inches; dark grayish brown (10YR 4/2) sandy loam; moderate fine granular structure; friable; nonsticky, nonplastic; many fine roots; slightly acid; abrupt smooth boundary.
Bt1—12 to 17 inches; yellowish brown (10YR 5/6) sandy loam; moderate medium subangular blocky structure; friable; nonsticky, nonplastic; common fine and medium roots; clay bridging between sand grains; moderately acid; clear smooth boundary.
Bt2—17 to 27 inches; strong brown (7.5YR 5/6) sandy

loam; moderate medium and coarse subangular blocky structure; friable; slightly sticky, slightly plastic; common medium roots; clay bridging between sand grains; strongly acid; clear smooth boundary.

Bt3—27 to 38 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; friable; nonsticky, nonplastic; few fine and medium roots; clay bridging between sand grains; very strongly acid; clear smooth boundary.

BC—38 to 48 inches; yellowish brown (10YR 5/6) sandy loam; weak fine subangular blocky structure; friable; nonsticky, nonplastic; common medium prominent yellowish red (5YR 5/6) irregular shaped iron accumulations with clear boundaries throughout; very strongly acid; clear smooth boundary.

C1—48 to 66 inches; yellow (10YR 7/6) sand; single grain; loose; nonsticky, nonplastic; common medium distinct light brownish gray (10YR 6/2) irregular shaped iron depletions with clear boundaries throughout; very strongly acid; abrupt smooth boundary.

C2—66 to 72 inches; brownish yellow (10YR 6/8) fine sandy loam; massive; friable; nonsticky, nonplastic; common medium distinct light brownish gray (10YR 6/2) irregular shaped iron depletions with clear boundaries throughout; very strongly acid.

Range in Characteristics

Thickness of the solum: 20 to 45 inches
Depth to high water table: 3.5 to 6 feet
Rock fragments: 0 to 15 percent, by volume, in the A, E, and B horizons; 0 to 25 percent in the C horizon
Depth to gravelly layers: More than 40 inches
Soil reaction: Extremely acid or very strongly acid throughout the profile, except in limed areas

A or Ap horizon:
Color—hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4
Texture—sandy loam or loamy sand

E, BE, or BA horizon (if it occurs):
Color—hue of 7.5YR or 2.5Y, value of 5 or 6, and chroma of 3 to 6
Texture—sandy loam or loamy sand

Bt horizon:
Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8
Texture—sandy loam; thin layers of sandy clay loam or loam occur in some pedons

BC horizon:
Color—hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 6 to 8
Texture—loamy sand or sandy loam

C horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 to 8, and chroma of 3 to 8
Texture (fine-earth fraction)—sand, loamy sand, or loamy fine sand that has strata of fine sandy loam, sandy clay loam, loam, silt loam, or silty clay loam in some pedons
Redoximorphic features—iron depletions in shades of white or gray and iron accumulations in shades of red, yellow, or brown

Cg horizon (if it occurs):
Color—hue of 7.5YR to 2.5Y, value of 4 to 8, and chroma of 1 or 2
Texture (fine-earth fraction)—sand, loamy sand, or loamy fine sand that has strata of fine sandy loam, sandy clay loam, loam, silt loam, or silty clay loam in some pedons
Redoximorphic features—iron depletions in shades of white or gray and iron accumulations in shades of red, yellow, or brown

Manahawkin Series

Drainage class: Very poorly drained
Permeability: Rapid in the organic layers and moderately rapid in the mineral horizons
Landscape: Coastal plain
Landform: Freshwater swamps, drainageways, and depressions
Landform position: Freshwater flats, depressions, and drainageways
Parent material: Organic deposits underlain by sandy marine sediments
Slope range: 0 to 1 percent
Taxonomic class: Sandy or sandy-skeletal, siliceous, dysic, mesic Terric Haplosaprists

Typical Pedon

Manahawkin muck, frequently flooded; 1.9 miles southwest of Belleplain on Delmont-Belleplain Road to Sunset Road, 1.0 mile east on Sunset Road to Savages Creek, 50 feet north of the road and 50 feet west of the creek, in a wooded area; USGS Heislerville topographic quadrangle; lat. 39 degrees 14 minutes 28 seconds N. and long. 74 degrees 52 minutes 33 seconds W.

Oa1—0 to 9 inches; black (5YR 2.5/1) muck; about 10 percent, by volume, fibers, less than 2 percent fibers after rubbing; moderate medium granular structure; many fine and medium roots; about 90 percent organic material; extremely acid; clear smooth boundary.

Oa2—9 to 23 inches; black (5YR 2.5/1) muck; about 15 percent, by volume, fibers, less than 2 percent fibers after rubbing; weak medium granular structure; common fine and medium roots; about 90 percent organic material; very strongly acid; gradual smooth boundary.

Oa3—23 to 28 inches; black (5YR 2.5/1) muck; about 15 percent, by volume, fibers, less than 2 percent fibers after rubbing; weak medium granular structure; about 90 percent organic material; 10 percent soft woody fragments as much as 2 inches in diameter; very strongly acid; gradual smooth boundary.

Oa4—28 to 35 inches; black (5YR 2.5/1) muck; about 5 percent, by volume, fibers, less than 2 percent fibers after rubbing; massive; about 90 percent organic material; 20 percent soft woody fragments as much as 2 inches in diameter; very strongly acid; abrupt smooth boundary.

Cg—35 to 72 inches; gray (10YR 5/1) sand; massive; friable; nonsticky, nonplastic; very strongly acid.

Range in Characteristics

Thickness of the organic layers: 16 to 51 inches
Woody fragments: 0 to 50 percent, by volume, in the organic layers
High water table: 0 to 1 foot above the soil surface
Rock fragments: 0 to 50 percent, by volume, in the mineral layers
Soil reaction: Extremely acid or very strongly acid throughout the profile

O horizon:
Color—horizon has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3
Texture—muck

Cg horizon:
Color—horizon has hue of 7.5YR or 10YR, value of 2 to 5, and chroma of 1 to 4, or it is neutral in hue and has value of 2 to 5
Texture (fine-earth fraction)—sand or fine sand; horizon has lenses of loamy sand or loamy fine sand in some pedons

Mispillion Series

Drainage class: Very poorly drained
Permeability: Moderately slow in the mineral layers and moderately rapid or rapid in the organic layers
Landscape: Coastal plain
Landform: Tidal marshes
Landform position: Tidal flats and drainageways
Parent material: Organic sediments over loamy marine sediments
Slope range: 0 to 1 percent
Taxonomic class: Loamy, mixed, euic, mesic Terric Sulfihemists

Typical Pedon

Mispillion mucky peat in an area of Mispillion-Transquaking-Appoquinimink complex, very frequently flooded; 1.0 mile east of Garden State Parkway on North Wildwood Boulevard, 500 feet north of the road, in a tidal marsh; USGS Stone Harbor topographic quadrangle; lat. 39 degrees 02 minutes 15 seconds N. and long. 74 degrees 49 minutes 02 seconds W.

Oe—0 to 10 inches; very dark grayish brown (10YR 3/2) mucky peat; 70 percent, by volume, fibers, 30 percent fibers after rubbing; 2 percent mineral soil material; weak fine granular structure; 60 percent fine and medium live roots; neutral, extremely acid after drying; gradual smooth boundary.

Oa—10 to 26 inches; very dark grayish brown (10YR 3/2) muck; 50 percent, by volume, fibers, 15 percent fibers after rubbing; 20 percent mineral soil material; massive; neutral, extremely acid after drying; clear smooth boundary.

Cg—26 to 90 inches; dark gray (5Y 4/1) silt loam; 5 percent organic soil material; massive; very friable; moderately sticky, moderately plastic; *n* value greater than 1.0; neutral, extremely acid after drying.

Range in Characteristics

Thickness of the organic deposits: 16 to 51 inches
High water table: 0 to about 1 foot above the soil surface
Electrical conductivity: Greater than 8 millimhos per centimeter throughout the profile
n *value:* Greater than 1.0 throughout the profile
Soil reaction: Moist soil—slightly acid to mildly alkaline; dry soil—strongly acid to ultra acid

Oe horizon:
Color—horizon has hue of 7.5YR to 5Y, value of 2 to 4, and chroma of 1 to 3, or it is neutral in hue and has value of 2 to 4
Texture—mucky peat

Oa horizon:
Color—horizon has hue of 5YR to 5Y, value of 2 to 5, and chroma of 1 to 3, or it is neutral in hue and has value of 2 to 4
Texture—muck or mucky peat

Cg horizon:
Color—horizon has hue of 7.5YR to 5GY, value of 2 to 6, and chroma of 1 or 2, or it is neutral in hue and has value of 2 to 4
Texture—silt loam, loam, or silty clay loam

Mullica Series

Drainage class: Very poorly drained (fig. 17)
Permeability: Moderate
Landscape: Coastal plain
Landform: Freshwater flats, flood plains, and depressions
Landform position: Freshwater flats, drainageways, and depressions
Parent material: Coastal plain sediments
Slope range: 0 to 1 percent
Taxonomic class: Coarse-loamy, siliceous, semiactive, acid, mesic Typic Humaquepts

Typical Pedon

Mullica sandy loam in an area of Berryland and Mullica soils, occasionally flooded; 3.0 miles south of Woodbine on County Road 557 to Pine Swamp Road, 1.7 miles west on Pine Swamp Road, 75 feet north of the road, in a wooded area; USGS Woodbine topographic quadrangle; lat. 39 degrees 13 minutes 20 seconds N. and long. 74 degrees 51 minutes 03 seconds W.

Ag—0 to 12 inches; black (10YR 2/1) sandy loam; moderate fine granular structure; friable; slightly sticky, slightly plastic; many fine and medium roots; extremely acid; abrupt smooth boundary.

Bg—12 to 31 inches; grayish brown (10YR 5/2) sandy loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; few fine and medium distinct yellow (10YR 7/8) irregular shaped iron accumulations with clear boundaries throughout; common fine and medium roots; very strongly acid; clear smooth boundary.

BCg—31 to 36 inches; light brownish gray (10YR 6/2) loamy sand; single grain; loose; nonsticky, nonplastic; few fine and medium roots; very strongly acid; clear smooth boundary.

Cg—36 to 72 inches; light brownish gray (10YR 6/2) sand; single grain; loose; nonsticky, nonplastic; very strongly acid.

Range in Characteristics

Thickness of the solum: 20 to 40 inches
Rock fragments: 0 to 15 percent in the A, E, and B horizons; 0 to 35 percent in the C horizon
Depth to high water table: 0 to 0.5 foot
Soil reaction: Very strongly acid or extremely acid throughout the profile

O horizon (if it occurs):
Color—hue of 5YR to 10YR, value of 3 to 6, and chroma of 1 or 2
Texture—mucky peat or muck

Ag or Ap horizon:
Color—horizon has hue of 10YR to 5Y, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3
Texture—sandy loam

Bg horizon:
Color—horizon has hue of 10YR to 5Y, value of 3 to 6, and chroma of 1 or 2, or it is neutral in hue and has value of 4 to 6
Texture—sandy loam; thin strata of loamy sand or sandy clay loam occur in some pedons
Redoximorphic features—iron accumulations in shades of yellow, red, brown, or olive and iron depletions in shades of gray or white

BCg horizon:
Color—horizon has hue of 10YR to 5Y, value of 3 to 6, and chroma of 1 or 2, or it is neutral in hue and has value of 3 to 6
Texture—sandy loam or loamy sand; thin strata of loam or sandy clay loam occur in some pedons
Redoximorphic features—iron accumulations in shades of yellow, red, brown, or olive and iron depletions in shades of gray or white

Cg horizon:
Color—horizon has hue of 10YR to 2.5Y, value of 3 to 6, and chroma of 1 or 2, or it is neutral in hue and has value of 3 to 6
Texture (fine-earth fraction)—loamy sand or sand; thin strata of loam or sandy clay loam occur in some pedons
Redoximorphic features—iron accumulations in shades of yellow, red, brown, or olive and iron depletions in shades of gray or white

Pawcatuck Series

Drainage class: Very poorly drained
Permeability: Rapid in the organic deposits and slow in the mineral material
Landscape: Coastal plain
Landform: Tidal marshes
Landform position: Tidal flats and drainageways
Parent material: Organic sediments over sandy mineral sediments
Slope range: 0 to 1 percent

Taxonomic class: Sandy or sandy-skeletal, mixed, euic, mesic Terric Sulfihemists

Typical Pedon

Pawcatuck mucky peat in an area of Pawcatuck-Transquaking complex, very frequently flooded; 400 feet west of mile post number 6 on the Garden State Parkway heading south, in a tidal marsh; USGS Cape May topographic quadrangle; lat. 38 degrees 57 minutes 07 seconds N. and long. 74 degrees 55 minutes 00 seconds W.

Oe1—0 to 12 inches; black (5YR 2.5/1) mucky peat; 70 percent, by volume, fibers, 40 percent fibers after rubbing; 50 percent, by weight, mineral soil material; moderate weak subangular blocky structure; neutral, extremely acid after drying; gradual smooth boundary.

Oe2—12 to 26 inches; dark reddish brown (5YR 3/2) mucky peat; 65 percent, by volume, fibers, 30 percent fibers after rubbing; 60 percent, by weight, mineral soil material; massive; neutral, extremely acid after drying; clear smooth boundary.

Oe3—26 to 35 inches; dark reddish brown (5YR 3/3) mucky peat; 40 percent, by volume, fibers, 20 percent fibers after rubbing; 35 percent, by weight, mineral soil material; massive; neutral, strongly acid after drying; clear smooth boundary.

Oe4—35 to 45 inches; dark reddish brown (5YR 3/2) mucky peat; 35 percent fibers, 20 percent fibers after rubbing; 30 percent, by weight, mineral soil material; massive; neutral, very strongly acid after drying; clear smooth boundary.

Cg1—45 to 50 inches; dark gray (10YR 4/2) loamy sand; single grain; loose; nonsticky, nonplastic; neutral, very strongly acid after drying; clear smooth boundary.

Cg2—50 to 72 inches; gray (10YR 5/1) sand; single grain; loose; nonsticky, nonplastic; neutral, very strongly acid after drying.

Range in Characteristics

Thickness of the organic deposits: 16 to 51 inches
High water table: 0 to about 1 foot above the soil surface
Electrical conductivity: Greater than 8 millimhos per centimeter throughout the profile
Rock fragments: 0 to 25 percent, by volume, in the C horizon
Soil reaction: Moist soil—slightly acid to mildly alkaline; dry soil—strongly acid to ultra acid

Oe horizon:
Color—horizon has hue of 5YR to 5Y, value of 2 to 5, and chroma of 0 to 3, or it is neutral in hue and has value of 2 to 5
Texture—mucky peat

Oa horizon (if it occurs):
Color—horizon has hue of 5YR to 5Y, value of 2 to 5, and chroma of 0 to 3, or it is neutral in hue and has value of 2 to 5
Texture—muck

Cg horizon:
Color—horizon has hue of 10YR to 5BG, value of 2 to 7, and chroma of 0 to 3, or it is neutral in hue and has value of 2 to 7
Texture (fine-earth fraction)—sand, loamy sand, or loamy fine sand

Psamments

Drainage class: Variable
Permeability: Variable
Landscape: Coastal plain
Landform: Filled tidal marshes, flood plains, flats, and swamps
Parent material: Fill materials excavated from sandy coastal plain soils
Slope range: 0 to 5 percent
Taxonomic class: Psamments

Typical Pedon

Psamments are composed of fill material over coastal plain sediments. The profile is commonly sand, fine sand, or loamy sand in the upper part. In map units having a wet substratum, texture is commonly sand, sandy loam, or loamy sand or the profile has mucky organic materials in the lower part. The lower part of the profile in map units having a sulfidic substratum is silty materials that have a high content of organic matter. Because of the variability of these soils, a typical pedon is not provided.

Range in Characteristics

Thickness of the fill material: Variable; commonly 2 to 4 feet
Soil reaction: Variable; typically strongly acid to extremely acid throughout the profile, except in limed areas

Swainton Series

Drainage class: Well drained
Permeability: Moderately rapid
Landscape: Coastal plain

Landform: Flats and terraces
Landform position: Summits and side slopes
Parent material: Sandy and loamy coastal plain sediments
Slope range: 0 to 5 percent
Taxonomic class: Coarse-loamy, siliceous, semiactive, mesic Typic Hapludults

Typical Pedon

Swainton sandy loam, 2 to 5 percent slopes; 0.3 mile northwest of Petersburg (intersection of State Route 50 and County Road 585), 1,000 feet southwest of State Route 50, in a wooded area; USGS Marmora topographic quadrangle; lat. 39 degrees 15 minutes 16 seconds N. and long. 74 degrees 43 minutes 29 seconds W.

Oe—0 to 1 inch; dark reddish brown (5YR 4/2) moderately decomposed plant materials; moderate fine granular structure; very friable; nonsticky, nonplastic; many very fine and fine roots; extremely acid; abrupt smooth boundary.
A—1 to 2 inches; dark grayish brown (10YR 3/2) sandy loam; moderate fine granular structure; friable; nonsticky, nonplastic; many very fine and fine roots; 5 percent, by volume, rounded quartzose gravel; extremely acid; abrupt smooth boundary.
E—2 to 3 inches; light grayish brown (10YR 6/2) sandy loam; weak fine granular structure; friable; nonsticky, nonplastic; common fine and few medium roots; 5 percent, by volume, rounded quartzose gravel; extremely acid; abrupt smooth boundary.
Bh—3 to 4 inches; yellowish red (5YR 5/6) sandy loam; massive; friable; slightly brittle; slightly dense and compact; nonsticky, nonplastic; common fine and few medium roots; 5 percent, by volume, rounded quartzose gravel; extremely acid; abrupt smooth boundary.
Bt1—4 to 12 inches; strong brown (7.5YR 5/6) sandy loam; moderate medium subangular blocky structure; friable; slightly sticky, slightly plastic; common fine and medium roots; common clay bridges between sand grains; 5 percent, by volume, rounded quartzose gravel; very strongly acid; clear smooth boundary.
Bt2—12 to 23 inches; yellowish brown (10YR 5/6) sandy loam; moderate medium and coarse subangular blocky structure; friable; slightly sticky, slightly plastic; common fine and medium roots; common clay bridges between sand grains; 5 percent, by volume, rounded quartzose gravel; very strongly acid; clear smooth boundary.
BC—23 to 35 inches; yellowish red (5YR 5/6) gravelly loamy sand; single grain; loose; nonsticky, nonplastic; few fine and medium roots; 20 percent, by volume, rounded quartzose gravel; very strongly acid; clear smooth boundary.
C1—35 to 47 inches; yellowish red (5YR 5/6) very gravelly sand; single grain; loose; nonsticky, nonplastic; few fine and medium roots; 40 percent, by volume, rounded quartzose gravel; very strongly acid; clear smooth boundary.
C2—47 to 58 inches; yellow (10YR 7/6) sand that has few thin discontinuous strata of strong brown (7.5YR 5/6) sandy loam; single grain; loose; nonsticky, nonplastic; very strongly acid; clear wavy boundary.
C3—58 to 74 inches; very pale brown (10YR 8/4) fine sand; single grain; loose; nonsticky, nonplastic; very strongly acid.

Range in Characteristics

Thickness of the solum: 20 to 45 inches
Depth to very gravelly horizons: 20 to 40 inches
Depth to high water table: More than 6 feet
Rock fragments: 0 to 15 percent, by volume, in the A and E horizons and the upper part of the B horizon; 15 to 50 percent in the lower part of the B horizon and in the C horizon; 0 to 50 percent in the lower part of the C horizon; at least one subhorizon within the 20- to 40-inch zone contains more than 35 percent rock fragments
Soil reaction: Extremely acid or very strongly acid throughout the profile, except in limed areas

O horizon:
Color—hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 to 3
Texture—highly decomposed to slightly decomposed plant material

A horizon:
Color—hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 2 or 3
Texture—sandy loam

Ap horizon (if it occurs):
Color—hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4
Texture—sandy loam or loamy sand

E horizon:
Color—hue of 10YR, value of 5 to 7, and chroma of 1 or 2
Texture—sandy loam or loamy sand

Bh horizon:
Color—hue of 5YR or 7.5YR and value and chroma of 4 to 6
Texture—sandy loam or loamy sand

Bt horizon:
Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8
Texture (fine-earth fraction)—sandy loam

BC horizon:
Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8
Texture (fine-earth fraction)—loamy sand or sandy loam

C horizon:
Color—hue of 5YR to 2.5Y, value of 5 to 8, and chroma of 3 to 8
Texture (fine-earth fraction)—fine sand or sand; commonly stratified with thin layers of sandy loam or loamy sand

Transquaking Series

Drainage class: Very poorly drained
Permeability: Moderately slow in the mineral layers and moderately rapid or rapid in the organic layers
Landscape: Coastal plain
Landform: Tidal marshes
Landform position: Tidal flats and drainageways
Parent material: Organic deposits underlain by loamy sediments
Slope range: 0 to 1 percent
Taxonomic class: Euic, mesic Typic Sulfihemists

Typical Pedon

Transquaking mucky peat in an area of Appoquinimink-Transquaking-Mispillion complex, very frequently flooded; 0.4 mile southwest of Stone Harbor Bridge on Ocean Drive, 600 feet north of Ocean Drive at the north end of Nummy Island, in a tidal marsh; USGS Stone Harbor topographic quadrangle; lat. 39 degrees 02 minutes 23 seconds N. and long. 74 degrees 47 minutes 26 seconds W.

Oe1—0 to 15 inches; dark reddish brown (5YR 3/2) mucky peat; 5 percent mineral soil material; 40 percent fibers after rubbing; 70 percent fine and medium live roots; neutral, extremely acid after moist incubation; gradual smooth boundary.

Oe2—15 to 60 inches; dark reddish brown (5YR 3/2) mucky peat; 20 percent mineral soil material; 30 percent fibers after rubbing; neutral, extremely acid after moist incubation; clear smooth boundary.

Cg—60 to 90 inches; dark gray (5Y 4/1) silt loam; 10 percent, by volume, organic soil material; massive; very friable; slightly sticky, slightly plastic; *n* value greater than 1.0; neutral, very strongly acid after drying.

Range in Characteristics

Thickness of the organic deposits: More than 52 inches
High water table: 0 to about 1 foot above the soil surface
Electrical conductivity: Greater than 8 millimhos per centimeter throughout the profile
Soil reaction: Moist soil—slightly acid to mildly alkaline; dry soil—strongly acid to ultra acid

Oi horizon (if it occurs):
Color—hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 to 3
Texture—peat or mucky peat

Oe horizon:
Color—hue of 5YR to 2.5YR, value of 2 to 5, and chroma of 1 to 4
Texture—mucky peat

Oa horizon (if it occurs):
Color—hue of 10YR to 5Y, value of 2 to 4, and chroma of 1 or 2
Texture—muck or mucky peat

Cg horizon:
Color—hue of 10YR to 5GY, value of 3 or 4, and chroma of 1 or 2
Texture—silt loam, silty clay loam, or silty clay; in some pedons, texture is stratified with thin sandy mineral or organic layers or has subhorizons of gravelly sand to loamy fine sand below the silty material

Udorthents

Drainage class: Variable
Permeability: Variable
Setting: Sanitary landfills
Parent material: Fill materials excavated from coastal plain soils mixed with household and industrial refuse
Taxonomic class: Udorthents

Typical Pedon

Udorthents are commonly clay loam, silty clay loam, or clay in the upper part. In the lower part, they are commonly sandy or loamy material mixed with refuse from sanitary landfill operations. Because of the variability of these soils, a typical pedon is not given.

Range in Characteristics

Thickness of the fill material: Variable
Soil reaction: Variable

Formation of the Soils

This section describes the factors of soil formation and relates them to the soils in the survey area. It also discusses the processes of horizon differentiation.

Factors of Soil Formation

Soils are formed by processes of the environment acting upon geologic agents, such as metamorphic, igneous, and sedimentary rocks and fluvial stream sediments. The characteristics of a soil are determined by the combined influence of parent material, climate, plant and animal life, relief, and time. These five factors are responsible for the profile development and chemical properties that differentiate soils *(3)*.

Parent Material

Parent material is the unconsolidated mass in which a soil forms. In Cape May County, parent material is a major factor in determining what kind of soil forms and can be correlated to some degree to geologic formations. The general soil map can be used as an approximate guide to the geology of the county.

Parent material is largely responsible for the chemical and mineralogical composition of soils and for the major differences among the soils of the county. Major differences in parent material, such as differences in texture, can be observed in the field. Less distinct differences, such as differences in mineralogical composition, can be determined only by careful laboratory analysis.

Nearly all of the soils in Cape May County formed in unconsolidated geologic deposits, in reworked unconsolidated deposits, or in organic deposits. The deposits are probably of Pleistocene age *(9)*. Although the glaciers did not reach so far south as the survey area, meltwater from the glaciers probably covered almost all of the area and mixed the materials of the older marine deposits. Rounded quartzose gravel, probably of Pleistocene age, occurs in all parts of the county, including areas at the highest elevations. This gravel is not abundant in extensive areas; it occurs in small amounts.

During the Pleistocene Period, the climate of the survey area was much colder than it is now and the sea level fluctuated greatly. When the water level was low, much erosion by wind and water reworked the original soil deposits. Except for this mixing, the soils of the county are closely related to the parent material from which they formed.

Climate

Climate, particularly precipitation and temperature, affects the physical, chemical, and biological relationships in the soil. It influences the rate at which rocks weather and organic matter decomposes. The amount of leaching in a soil is related to the amount of rainfall and the movement of water through the soil. The effects of climate also control the kinds of plants and animals living in and on the soil. Temperature influences the kind and growth of organisms and the speed of chemical and physical reactions in the soil.

Cape May County has a warm, humid climate. It occupies a moderate plateau ranging in elevation from about sea level to 95 feet above sea level. The climate favors rapid chemical processes, which result in the decomposition of organic matter and the weathering of marine sediments. The effects of climate are reflected in the soils of the county. Mild temperatures throughout the year and abundant rainfall have resulted in the depletion of organic matter and considerable leaching of soluble bases. Because variations in the climate of the county are small, climate has probably not caused major local differences among soils. Climate has mainly affected the formation of soils in Cape May County by altering the parent material through changes in temperature and in the amount of precipitation and through influences on plant and animal life.

Climatic changes were most dramatic during and after the Ice Age. Meltwater from glaciers to the north was responsible for the mixing of soil materials. High winds during this period were probably responsible for the sand deposits in such soils as Evesboro and Fort Mott soils.

During the time that the soils were forming from glacial meltwater parent materials, water covered many low parts of the survey area. Soils in these water-covered areas developed thick accumulations of organic matter. This is apparent in the dark, organic-rich surface layers of such soils as Manahawkin soils. Gray colors in the subsoil indicate that iron oxides were not able to form in soils that formed in water-covered areas. Other soils that formed in the higher landscape positions generally were well drained and developed less organic-rich surface layers. In these soils, iron oxides were able to form freely, resulting in brighter colors.

Plant and Animal Life

Plants and animals influence the formation and differentiation of soil horizons. The type and number of organisms in and on the soil are determined in part by climate and in part by the nature of the soil material, relief, and the age of the soil. Bacteria, fungi, and other micro-organisms aid in the weathering of rocks and in the decomposition of organic matter. The plants and animals that live on a soil are the primary source of organic material.

Plants largely determine the kinds and amounts of organic matter that are added to a soil under normal conditions and the way in which the organic matter is added. They also are important for the changes of base status and for the leaching process of a soil.

Animals convert complex compounds into simpler forms, add organic matter to the soil, and modify certain chemical and physical properties of soil. In Cape May County most of the organic material accumulates on the surface. It is acted upon by micro-organisms, fungi, insects, and other forms of life and by direct chemical reaction. It is mixed with the uppermost mineral part of the soil by the activities of earthworms and other small invertebrates.

Under the native forest of this county, not enough bases are brought to the surface by plants to counteract the effects of leaching. Generally, the soils of the county developed under a hardwood or pine forest. Trees took up elements from the subsoil and added organic matter to the soil by depositing leaves, roots, twigs, and other plant remains on the surface. The material deposited on the surface was acted upon by organisms and underwent chemical reaction.

In the better drained upland areas, organic matter decomposes at a moderate rate because of the moderate temperatures and moisture supply and the high levels of acidity. Examples of soils that have little accumulation of organic matter are Downer and Aura soils. In the wetter areas, organic matter decomposes more slowly and accumulates to a greater degree. Berryland, Mullica, and Manahawkin soils and soils occurring in tidal areas are examples.

Relief

Relief causes differences in free drainage, surface runoff, soil temperature, and the extent of geologic erosion. Relief in Cape May County is largely determined by the kind of underlying bedrock, the geology of the area, and the extent that the landscape is dissected by streams. Most slopes in the county range from 0 to 5 percent.

Relief affects the percolation of water through the profile. Water movement through the profile is important in soil development because it aids chemical reactions and is necessary for leaching.

Relief affects drainage in the county to a great degree. For example, a high water table usually occurs in nearly level and gently sloping areas. Hammonton and Galloway soils on uplands are moderately well drained because they are nearly level or gently sloping. They receive runoff and seepage from higher adjacent areas.

Soils at the lower elevations are less sloping and receive runoff from the adjacent higher areas. This runoff tends to accumulate in the nearly level to slightly concave areas. The poorly drained Berryland and Mullica soils on flood plains are in these areas.

Time

The length of time that soil material has been exposed to the soil-forming processes accounts for some differences between soils. The formation of a well defined profile, however, also depends on other factors. Less time is required for a profile to develop in coarse-textured material than in similar but finer textured material, even if the environment is the same for both materials. Less time is required for a profile to develop in an area, such as Cape May County, that is warm and humid and has a dense plant cover than in a cold, dry area that has a sparse plant cover.

Soils vary considerably in age. The length of time that a soil has been forming is generally reflected in the profile. Old soils generally have better defined horizons than young soils. In Cape May County, the effects of time as a soil-forming factor are more apparent in the older soils that are in the broader parts of the uplands. An example is Aura soils. These soils have well defined horizons. In contrast, young soils, such as Hooksan and Evesboro soils, formed in windblown sediments and have not been in place long enough to develop as completely as Aura soils.

Processes of Horizon Differentiation

One or more soil-forming processes are involved in the formation of soil horizons. These processes are the accumulation of organic matter; the leaching of carbonates and other soluble material; the chemical weathering, mainly by hydrolysis, of primary minerals into silicate clay minerals; the translocation of silicate clay and some silt-sized particles from one horizon to another; and the reduction and transfer of iron.

These processes have been active in the formation of most of the soils in Cape May County. The interaction of the first four processes is indicated by the strongly expressed horizons in Aura soils. All five processes have probably been active in the formation of the moderately well drained Hammonton soils.

Some organic matter has accumulated in all of the soils in the survey area. Most of the soils contain moderate amounts of organic matter in the surface layer. The content of organic matter ranges from low, as in Fort Mott soils, to high, as in Manahawkin soils.

The translocation of clay minerals is an important process in the development of many soils in the survey area. As clay minerals are removed from the A horizon, they accumulate as clay films on the faces of peds, in pores, and in root channels in the B horizon.

As silicate clay forms from primary minerals, some iron is commonly released as hydrated oxides. These oxides are generally red. Even if they occur in small amounts, they give the soil material a brownish color. They are largely responsible for the strong brown, yellowish brown, or reddish brown colors that are dominant in the subsoil of many soils in the survey area.

The reduction and transfer of iron have occurred in all of the soils that are not characterized by good natural drainage. This process, known as gleying, is evidenced by a gray matrix color and by iron or clay depletions. Some of the iron may be reoxidized and segregated and thus form yellow, brown, red, or other brightly colored masses of iron accumulation in an essentially gray matrix in the subsoil. Nodules or concretions of iron or manganese also commonly form as a result of this process. Soil features associated with chemically reduced iron are referred to as redoximorphic features *(20)*.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Access road. A road constructed to facilitate the use and management of the land. Access roads are designed for limited traffic and typically consist of a cut slope, a roadbed, and a fill outslope.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Aquifer. A water-bearing bed or stratum of permeable rock, sand, or gravel capable of fielding considerable quantities of water to wells or springs.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces. Generally, cool aspects are north- to east-facing and warm aspects are south- to west-facing.

Atterberg limits. Atterberg limits are measured for soil materials passing the No. 40 sieve. They include the liquid limit (LL), which is the moisture content at which the soil passes from a plastic to a liquid state, and the plasticity index (PI), which is the water content corresponding to an arbitrary limit between the plastic and semisolid states of consistency of a soil.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Ball and burlap harvest. A method of harvesting nursery plants in which burlap is wrapped around a ball of soil that is attached to the root system.

Bare-root harvest. A method of harvesting in which nursery plants are removed from the soil with their roots bare and are packed in moist shipping material.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

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

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Benchmark soil. A soil of large extent that holds a key position in the soil classification system or is of special significance to farming, engineering, forestry, or other uses.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a 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.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Borrow pit. An open excavation from which the soil and underlying material have been removed, generally for use in road construction. Borrow pits support few or no plants without major reclamation. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

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

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. 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.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

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

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clayey. A general textural term that includes sandy clay, silty clay, and clay. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) containing 35 percent or more clay, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

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.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

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.

Coastal plain. The physiographic region that consists of ocean-deposited sediments of sand, silt, and clay. These sediments are in level to rolling areas and vary in thickness.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

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.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cove. The steep or very steep, concave colluvial area at the head of drainageways in piedmont and mountainous areas. Coves commonly have higher tree site indexes than surrounding slopes.

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

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

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

Dbh (diameter at breast height). The diameter of a tree at 4.5 feet above the ground level on the uphill side.

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

Delineation. The process of drawing or plotting features on a map with lines and symbols.

Delta. A body of alluvium having a surface that is nearly flat and fan shaped; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

Denitrification. The biochemical reduction of nitrate or nitrite to gaseous nitrogen either as molecular nitrogen or as an oxide of nitrogen.

Depression (depressional area). A portion of land surrounded on all sides by higher land. These areas generally do not have outlets for drainage.

Depth class. Refers to the depth to a root-restricting layer. Unless otherwise stated, this layer is understood to be consolidated bedrock. The depth classes in this survey are:

Very shallow	less than 10 inches
Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 to 60 inches
Very deep	more than 60 inches

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Dispersion (soils). The breakup of compound particles, such as soil aggregates or saprolite, into single grains, resulting in a highly erosive condition. This phenomenon results from the failure of grains to adhere or bond to one another and generally is associated with a high water content in soil containing high levels of sodium.

Dispersive material. Soil material generally associated with high levels of sodium that causes a breakup of compound particles, such as soil aggregates or saprolite, into single grains resulting in a highly erosive condition.

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

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained.* These classes are defined in the "Soil Survey Manual."

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

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Engineering index test data. Laboratory test and mechanical analysis of selected soils in the county.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Eroded (soil phase). Because of erosion, the soil has lost an average of 25 to 75 percent of the original A horizon or the uppermost 2 to 6 inches if the original A horizon was less than 8 inches thick.

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

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

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion classes. Classes based on estimates of past erosion. The classes are as follows:
Class 1.—Soils that have lost some of the original A horizon but on the average less than 25 percent of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most areas, the thickness of the surface layer is within the normal range of variability of the uneroded soil. Class 1 erosion typically is not designated in the name of the map unit or in the map symbol.
Class 2.—Soils that have lost an average of 25 to 75 percent of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most cultivated areas of class 2 erosion, the surface layer consists of a mixture of the original A horizon and material from below. Some areas may have intricate patterns ranging from uneroded spots to spots where all of the original A horizon has been removed.
Class 3.—Soils that have lost an average of 75 percent or more of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). In most cultivated areas of class 3 erosion, material that was below the original A horizon is exposed. The plow layer consists entirely or largely of this material.
Class 4.—Soils that have lost all of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick) plus some or all of the deeper horizons throughout most of the area. The original soil can be identified only in spots. Some areas may be smooth, but most have an intricate pattern of gullies.

Erosion hazard. A term describing the potential for future erosion, inherent in the soil itself, in inadequately protected areas. The following definitions are based on estimated annual soil loss in metric tons per hectare (values determined by the Universal Soil Loss Equation assuming bare soil conditions and using rainfall and climate factors for the survey area):

0 tons per hectare	none
Less than 2.5 tons per hectare	slight
2.5 to 10 tons per hectare	moderate
10 to 25 tons per hectare	severe
More than 25 tons per hectare	very severe

Evapotranspiration. The combined loss of water from a given area through surface evaporation and through transpiration by plants during a specified period.

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

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess 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.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

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 border. A strip of perennial vegetation (trees, shrubs, or herbaceous plants) established on the edge of a field to control erosion, provide travel lanes for farm machinery, control competition from adjacent woodland, or provide food and cover for wildlife.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

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

Firebreak. An area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

Flat. A general term for a level or nearly level surface or small area of land marked by little or no relief.

Flooding. The temporary covering of the soil surface by flowing water from any source, such as overflowing streams, runoff from adjacent or surrounding slopes, and inflow from high tides. The frequency of flooding generally 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). The duration of flooding 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).

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

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

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

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors which differentiate it from other stands.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Geomorphic surface. A part of the surface of the land that represents an episode of landscape development and consists of one or more landforms. It is a mappable part of the land surface that is defined in terms of morphology (relief, slope, aspect, etc.); origin (erosional, constructional, etc.); age (absolute or relative); and stability of component landforms.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material, ranging from fine clay to sand, derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Gravelly spot. An area of soils where the content of rock fragments generally less than 3 inches in diameter is more than 15 percent, by volume, in the surface layer, occurring in a map unit in which the surface layer of the dominant soil or soils has less than 15 percent gravel. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Gravel pit. An open excavation in which the soil and underlying material are used as a source of sand and gravel. The excavated material is not crushed for use. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

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. Water filling all the unblocked pores of the material below the water table.

Gully. A very small channel with steep sides cut by running water and through which water ordinarily runs only after rainfall, icemelt, or snowmelt. 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. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

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

High-residue crops. Such crops as small grain and corn that are used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

High shrink-swell spot. An area of soils where the subsoil has a high shrink-swell potential, occurring in a map unit in which the dominant soil or soils have a low shrink-swell potential; or an area of soils where the subsoil has a very high shrink-swell potential, occurring in a map unit in which the dominant soil or soils have a moderate shrink-swell potential. Areas identified on the detailed soil maps by a special symbol typically are less than 0.5 acre in size. (See Shrink-swell.)

High water table (seasonal). The highest level of a saturated zone in the soil (the apparent or perched water table) over a continuous period of more than 2 weeks in most years, but not a permanent water table.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above the surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A 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) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Hydroseeding. Applying seed, fertilizer, and mulch to steep areas by spraying a mixture of those ingredients and water under pressure from a truck.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermittent spodic horizon. An area of soils that have a spodic horizon occurring in a map unit in which the dominant soil or soils do not have a spodic horizon. These areas are referred to locally as red sand rock. The spodic horizon is a layer of soil cemented with organic matter and iron or aluminum. It occurs at a depth of 10 to 60 inches and is 2 to 20 inches thick. Areas identified on the detailed soil maps by a special symbol typically are less than 5 acres in size.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Interstream divide (or interstream area). The nearly level land between drainageways in relatively undissected parts of the Coastal Plain. It is in areas on uplands, low marine terraces, and stream terraces. Soils in these areas are generally poorly drained or very poorly drained.

Iron depletions. Low-chroma zones that have a low content of iron and manganese oxide because of chemical reduction and removal but also have a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

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.

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.

Kame. An irregular, short ridge or hill of stratified glacial drift.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lamellae. Very thin, mostly horizontal layers of accumulated clay, iron, or other material common in some sands or loamy sands; associated with soil formation rather than geologic deposition.

Landfill. An area of accumulated wastes produced by human activities. These areas can be above or below the natural ground level. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

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

Levees. Small dikes, generally less than 50 feet wide and several hundred feet in length, used to prevent intrusions of brackish water or to retain fresh water. Areas identified on the detailed soil maps by a special symbol typically are 5 to 20 acres in size.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy. A general textural term that includes coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, and silty clay loam. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) of loamy very fine sand or finer textured material that contains less than 35 percent clay, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Loess. Fine-grained material, dominantly of silt-sized particles, deposited by the wind.

Low-residue crops. Such crops as corn that are used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low stream terrace. A terrace in an area that floods, commonly 3 to 10 feet higher in elevation than the adjacent flood plain.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Marsh. Periodically wet or continually flooded areas where the surface is not deeply submerged. Marshes generally are covered with sedges, cattails, rushes, or other hydrophytic plants. Areas identified on the detailed soil maps by a special symbol are less than 2 acres in size. Subgroups are as follows:

Freshwater.—Lowland areas bordering rivers, creeks, and lakes that are flooded by fresh water and dominated by halophobic (salt-intolerant) plants.

Salt.—Lowland areas bordering coastal islands, sounds, bays, and sloughs that are flooded by salt water and dominated by halophytic (salt-tolerant) plants.

Tidal.—Lowland areas bordering rivers, creeks, and sloughs and traversed by interlacing channels. During high tides these areas are inundated by either salt water or brackish water. They are dominated by halophytic (salt-tolerant) plants.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mean annual increment. The average annual volume of a stand of trees from the year of origin to the age under consideration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Microrelief. The concave to convex changes in the land surface occurring over a relatively short distance or within a small area, such as 1 acre.

Mine or quarry (map symbol). An open excavation from which the soil and underlying material have been removed, exposing bedrock; or the surface opening to underground mines. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Mineral soil spot. An area of mineral soils in a salt marsh or in a map unit in which the dominant soil or soils are organic. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

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.

Miscellaneous water. An area where water is artificially impounded for industrial, sanitary, or mining uses or for a fish hatchery or an area where water is impounded by animal activity, such as a beaver pond. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Montmorillonite. An aluminosilicate clay mineral with 2:1 layer structure; that is, two silicon tetrahedral sheets enclosing an aluminum octahedral sheet. Considerable expansion may occur when water mixes with the clay.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

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.

Native pasture. Pasture that has seeded naturally in native grasses. It is on slopes too steep to manage with modern machinery.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

No-till planting. A method of planting crops in which there is virtually no seedbed preparation. A thin slice of the soil is opened, and the seed is planted at the desired depth.

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.

Opaques. Dark, sand-sized, resistant minerals that consist mostly of iron or titanium.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Overstory. The portion of the trees in a forest stand forming the upper crown cover.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

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.

Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher areas of the erosion surface.

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.

Perennial stream. A stream, or reach of a stream, that flows continuously throughout the year.

Perennial water. An area that generally provides water for human or livestock consumption; commonly a lake, pond, river, or stream. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Permafrost. Layers of soil, or even bedrock, occurring in arctic or subarctic regions, in which a temperature below freezing has existed continuously for a long time.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse-grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate weather conditions and soil moisture conditions and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

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

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. They indicate chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. They indicate the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation. Descriptive terms for concentrations and depletions 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).

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Reforestation. The process in which tree seedlings are planted or become naturally established in an area that was once forested.

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.

Ridge. A long, narrow elevation of the land surface, usually having a sharp crest and steep sides.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Rippable bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 drawbar horsepower rating.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments ranging from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandy. A general textural term that includes coarse sand, sand, fine sand, very fine sand, loamy coarse sand, loamy sand, loamy fine sand, and loamy very fine sand. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) of sand or loamy sand that contains less than 50 percent very fine sand, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Sandy spot. An area where the surface layer is sandy (loamy sand or sand) occurring in a map unit in which the dominant soil or soils have a loamy, silty, or clayey surface layer. Excluded are areas where the textural classes are adjoining, such as an area of loamy sand occurring in a map unit in which the dominant soil or soils have a surface layer of sandy loam. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

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.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Scarp (marine). An area having a short, steep slope of considerable linear extent along the transition line dividing marine terraces.

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. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sesquioxides. A general term for oxides and hydroxides of iron and aluminum.

Severely eroded spot. An area that has lost an average of 75 percent or more of the original surface layer because of accelerated erosion, occurring in a map unit in which the dominant soil or soils have lost less than 25 percent of the original surface layer. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Short, steep slope. An area of soils that are at least two slope classes steeper than the named soils in the surrounding map unit. Areas identified on the detailed soil maps by a special symbol typically are long, narrow bands that are less than 2 acres in size. (See Slope.)

Shoulder. The landscape position, parallel to the summit, that is directly below the ridgetop and directly above the side slope.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope. The landscape position that is directly below the shoulder and directly above the toe slope. It makes up most of the mountainside or hillside.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Skid trails. The paths left by skidding logs and the bulldozer or tractor used to pull them.

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. In this survey, classes for simple slopes are as follows:

Level	0 to 1 percent
Nearly level	0 to 2 percent
Gently sloping	2 to 5 percent
Strongly sloping	5 to 10 percent
Moderately steep	10 to 15 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil compaction. An alteration of soil structure that ultimately can affect the biological and chemical properties of the soil. Compaction decreases the extent of voids and increases bulk density.

Soil creep. The slow mass movement of soil and soil materials downslope, primarily under the influence of gravity, facilitated by water saturation and by alternating periods of freezing and thawing.

Soil map unit. A kind of soil or miscellaneous area or a combination of two or more soils or one or more soils and one or more miscellaneous areas that can be shown at the scale of mapping for the defined purposes and objectives of the soil survey. Soil map units generally are designed to reflect significant differences in use and management among the soils of a survey area.

Soil sample site (map symbol). The location of a typifying pedon in the survey area.

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

Soil strength. The load-supporting capacity of a soil at specific moisture and density conditions.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Spoil area. An area where earthy material has been piled and either smoothed or left uneven. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Stand density. The degree to which an area is covered with living trees. It is usually expressed in units of basal areas per acre, number of trees per acre, or the percentage of ground covered by the tree canopy as viewed from above.

Stone line. A concentration of rock 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.

Stony spot. An area where 0.01 to 0.1 percent of the surface is covered by rock fragments larger than 10 inches in diameter. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that 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.

Subsidence. A pronounced reduction in volume in some drained soils because of the removal of water, shrinkage of organic material, and the oxidation of organic compounds. Generally associated with soils that have a high content of organic matter.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Swamp. A saturated, very poorly drained area that is intermittently or permanently covered by water. Swamps are dominantly covered by trees or shrubs. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine." The textural classes are defined as follows:

Sands (coarse sand, sand, fine sand, and very fine sand).—Soil material in which the content of sand is 85 percent or more and the percentage of silt plus $1\frac{1}{2}$ times the percentage of clay does not exceed 15.

Loamy sands (loamy coarse sand, loamy sand, loamy fine sand, and loamy very fine sand).—Soil material in which, at the upper limit, the content of sand is 85 to 90 percent and the percentage of silt plus $1\frac{1}{2}$ times the percentage of clay is not less than 15; at the lower limit, the content of sand is 70 to 85 percent and the percentage of silt plus twice the percentage of clay does not exceed 30.

Sandy loams (coarse sandy loam, sandy loam, fine sandy loam, and very fine sandy loam).—Soil material in which the content of clay is 20 percent or less, the percentage of silt plus twice the percentage of clay exceeds 30, and the content of sand is 52 percent or more or soil material in which the content of clay is less than 7 percent, the content of silt is less than 50 percent, and the content of sand is 43 to 52 percent.

Loam.—Soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

Silt loam.—Soil material that contains 50 percent or more silt and 12 to 27 percent clay or 50 to 80 percent silt and less than 12 percent clay.

Silt.—Soil material that contains 80 percent or more silt and less than 12 percent clay.
Sandy clay loam.—Soil material that contains 20 to 35 percent clay, less than 28 percent silt, and 45 percent or more sand.
Clay loam.—Soil material that contains 27 to 40 percent clay and 20 to 45 percent sand.
Silty clay loam.—Soil material that contains 27 to 40 percent clay and less than 20 percent sand.
Sandy clay.—Soil material that contains 35 percent or more clay and 45 percent or more sand.
Silty clay.—Soil material that contains 40 percent or more clay and 40 percent or more silt.
Clay.—Soil material that contains 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

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.

Topography. The relative positions and elevations of the natural or manmade features of an area that describe the configuration of its surface.

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.

Triassic. The earliest of the three geologic periods comprising the Mesozoic era; approximately 225 million years ago to 180 million years ago.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Underlying material. Technically the C horizon; the part of the soil below the biologically altered A and B horizons.

Understory. The trees and other woody species growing under a more or less continuous cover of branches and foliage formed collectively by the upper portions of adjacent trees and other woody growth.

Upland. 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.

Water table (apparent). A thick zone of free water in the soil. The apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table (perched). A saturated zone of water in the soil standing above an unsaturated zone.

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.

Wetness. A general term applied to soils that hold water at or near the surface long enough to be a common management problem.

Wet spot. An area of somewhat poorly drained to very poorly drained soils that are at least two drainage classes wetter than the named soils in the surrounding map unit. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size. (See Drainage class.)

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Yield (forest land). The volume of wood fiber from trees harvested in a certain unit of area. Yield is usually measured in board feet or cubic feet per acre.

Tables

Table 1.-Temperature and Precipitation

(Recorded in the period 1961-90 at Belleplain State Forest, New Jersey)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	42.7	22.0	32.3	66	-7	37	3.41	2.02	4.64	6	4.9
February----	45.2	23.6	34.4	68	-1	49	3.05	1.95	4.04	5	5.7
March-------	54.8	31.3	43.0	79	10	156	3.47	2.10	4.70	6	1.5
April-------	64.8	39.1	52.0	88	20	361	3.67	1.90	5.21	7	.1
May---------	74.7	49.1	61.9	92	29	671	3.54	2.08	4.84	6	.0
June--------	82.3	58.1	70.2	95	40	894	3.10	1.66	4.37	5	.0
July--------	86.1	63.7	74.9	98	46	1,061	3.67	2.17	5.02	6	.0
August------	84.7	62.5	73.6	95	43	1,036	4.60	1.86	6.90	6	.0
September---	78.8	55.4	67.1	93	34	812	3.29	1.78	4.62	4	.0
October-----	68.5	44.0	56.3	84	22	499	3.43	1.50	5.07	4	.0
November----	58.2	35.9	47.1	77	14	241	3.36	1.64	4.86	5	.4
December----	47.4	27.0	37.2	68	2	79	3.45	1.43	5.15	5	1.6
Yearly:											
Average---	65.7	42.6	54.2	---	---	---	---	---	---	---	
Extreme---	103	-14	---	99	-7	---	---	---	---	---	
Total-----	---	---	---	---	---	5,894	42.03	35.46	47.03	65	14.2

* 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

(Recorded in the period 1961-90 at Belleplain State Forest, New Jersey)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 19	May 4	May 12
2 years in 10 later than--	Apr. 14	Apr. 29	May 8
5 years in 10 later than--	Apb. 3	Apr. 20	May 1
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 17	Oct. 11	Sept. 28
2 years in 10 earlier than--	Oct. 23	Oct. 16	Oct. 3
5 years in 10 earlier than--	Nov. 5	Oct. 26	Oct. 13

Table 3.-Growing Season

(Recorded in the period 1961-90 at Belleplain State Forest, New Jersey)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	190	166	143
8 years in 10	198	173	150
5 years in 10	215	188	164
2 years in 10	231	202	178
1 year in 10	239	209	185

Table 4.-Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
Aptv	Appoquinimink-Transquaking-Mispillion complex, very frequently flooded	20,347	11.1
AugA	Aura sandy loam, 0 to 2 percent slopes	1,165	0.6
AugB	Aura sandy loam, 2 to 5 percent slopes	580	0.3
BEAV	Beaches, very frequently flooded	2,011	1.1
BEXS	Berryland and Mullica soils, occasionally flooded	25,172	13.7
DenA	Dennisville sandy loam, 0 to 2 percent slopes	2,200	1.2
DocB	Downer loamy sand, 0 to 5 percent slopes	4,219	2.3
DoeA	Downer sandy loam, 0 to 2 percent slopes	6,900	3.8
DoeB	Downer sandy loam, 2 to 5 percent slopes	1,760	1.0
EveB	Evesboro sand, 0 to 5 percent slopes	1,619	0.9
FobB	Fort Mott sand, 0 to 5 percent slopes	3,408	1.9
GamB	Galloway loamy sand, 0 to 5 percent slopes	2,094	1.1
HbmB	Hammonton loamy sand, 0 to 5 percent slopes	9,921	5.4
HboA	Hammonton sandy loam, 0 to 2 percent slopes	14,863	8.1
HorD	Hooksan sand, 2 to 15 percent slopes, rarely flooded	1,417	0.8
IngB	Ingleside loamy sand, 0 to 5 percent slopes	5,880	3.2
InnA	Ingleside sandy loam, 0 to 2 percent slopes	4,799	2.7
Makt	Manahawkin muck, frequently flooded	7,619	4.2
Mmtv	Mispillion-Transquaking-Appoquinimink complex, very frequently flooded	7,759	4.2
Pdwv	Pawcatuck-Transquaking complex, very frequently flooded	11,936	6.5
PHG	Pits, sand and gravel	3,237	1.8
Ptt	Psamments, sulfidic substratum, frequently flooded	1,585	0.9
Pvr	Psamments, wet substratum, rarely flooded	574	0.3
SwaA	Swainton sandy loam, 0 to 2 percent slopes	3,355	1.8
SwaB	Swainton sandy loam, 2 to 5 percent slopes	352	0.2
Trkv	Transquaking mucky peat, very frequently flooded	3,784	2.0
Udz	Udorthents, refuse substratum	266	0.1
UR	Urban land	1,445	0.8
URPTS	Urban land-Psamments, sulfidic substratum complex, occasionally flooded	4,056	2.3
URPVR	Urban land-Psamments, wet substratum complex, rarely flooded	5,134	2.9
	Water	23,543	12.8
	Total	183,000	100.0

Table 5.-Land Capability and Yields per Acre of Crops

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Wheat	Soybeans	Tomatoes	Sweet corn	Snap beans	Barley
		Bu	Bu	Bu	Tons*	Tons*	Bu	Bu
Aptv------------ Appoquinimink-Transquaking-Mispillion	VIIIw	---	---	---	---	---	---	---
AugA------------ Aura	I	95	40	30	25	6	265	60
AugB------------ Aura	IIe	90	35	25	22	6	263	55
BEAV------------ Beaches	VIIIs	---	---	---	---	---	---	---
BEXS:								
Berryland------	Vw	---	---	---	---	---	---	---
Mullica--------	IVw	---	---	---	---	---	---	---
DenA------------ Dennisville	I	95	40	30	25	6	265	60
DocB------------ Downer	IIs	85	35	25	20	5	260	55
DoeA------------ Downer	I	100	40	35	25	7	265	60
DoeB------------ Downer	IIe	90	35	25	22	6	263	55
EveB------------ Evesboro	VIIs	---	---	---	---	---	---	---
FobB------------ Fort Mott	IIIs	85	35	25	18	5	253	52
GamB------------ Galloway	IVs	80	30	20	17	5	250	50
HbmB------------ Hammonton	IIw	90	35	25	20	5	260	55
HboA------------ Hammonton	IIw	105	40	35	25	7	270	65
HorD------------ Hooksan	VIIs	---	---	---	---	---	---	---
IngB------------ Ingleside	IIs	85	35	25	20	5	260	55
InnA------------ Ingleside	I	100	40	35	25	7	265	60

See footnote at end of table.

Table 5.-Land Capability and Yields per Acre of Crops-Continued

Soil name and map symbol	Land capability	Corn	Wheat	Soybeans	Tomatoes	Sweet corn	Snap beans	Barley
		Bu	Bu	Bu	Tons*	Tons*	Bu	Bu
Makt----------- Manahawkin	VIIw	---	---	---	---	---	---	---
Mmtv----------- Mispillion-Transquaking-Appoquinimink	VIIIw	---	---	---	---	---	---	---
Pdwv----------- Pawcatuck-Transquaking	VIIIw	---	---	---	---	---	---	---
PHG------------ Pits	VIIIs	---	---	---	---	---	---	---
Ptt, Pvr-------- Psamments	VIIs	---	---	---	---	---	---	---
SwaA----------- Swainton	IIs	95	40	30	25	6	265	60
SwaB----------- Swainton	IIe	90	35	25	22	6	263	55
Trkv----------- Transquaking	VIIIw	---	---	---	---	---	---	---
Udz------------ Udorthents	VIIs	---	---	---	---	---	---	---
UR------------- Urban land	VIIIs	---	---	---	---	---	---	---
URPTS, URPVR:								
Urban land-----	VIIIs	---	---	---	---	---	---	---
Psamments------	VIIs	---	---	---	---	---	---	---

* Yields are for irrigated crops.

Table 6.-Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland)

Map symbol	Soil name
AugA	Aura sandy loam, 0 to 2 percent slopes
AugB	Aura sandy loam, 2 to 5 percent slopes
DenA	Dennisville sandy loam, 0 to 2 percent slopes
DoeA	Downer sandy loam, 0 to 2 percent slopes
DoeB	Downer sandy loam, 2 to 5 percent slopes
HboA	Hammonton sandy loam, 0 to 2 percent slopes
InnA	Ingleside sandy loam, 0 to 2 percent slopes

Table 7.-Woodland Management and Productivity

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Volume*	Trees to plant**
AugA, AugB------ Aura	4D	Slight	Slight	Slight	Moderate	Black oak-----------	70	52	Virginia pine, white pine, white oak.
						White oak-----------	70	52	
						Scarlet oak---------	70	52	
						Chestnut oak--------	---	---	
						Pitch pine----------	---	---	
BEXS***:									
Berryland------	7W	Slight	Severe	Severe	Severe	Sweetgum------------	90	106	Sweetgum, red maple, yellow-poplar.
						Blackgum------------	---	---	
						Red maple-----------	---	---	
						Pitch pine----------	---	---	
						Willow oak----------	---	---	
Mullica--------	7W	Slight	Severe	Severe	Moderate	Sweetgum------------	90	106	Sweetgum, red maple, yellow-poplar.
						Blackgum------------	---	---	
						Red maple-----------	---	---	
						Pitch pine----------	---	---	
						Willow oak----------	---	---	
DenA------------ Dennisville	4A	Slight	Slight	Slight	Slight	Black oak-----------	70	52	Virginia pine, white pine, yellow-poplar, white oak.
						White oak-----------	---	---	
						Scarlet oak---------	---	---	
						Pitch pine----------	---	---	
DoeA, DoeB------ Downer	4A	Slight	Slight	Slight	Slight	Black oak-----------	70	52	Virginia pine, white pine, yellow-poplar, white oak.
						White oak-----------	70	52	
						Scarlet oak---------	70	52	
						Pitch pine----------	---	---	
DocB------------ Downer	4A	Slight	Slight	Moderate	Slight	Black oak-----------	70	52	Virginia pine, white pine, yellow-poplar, white oak.
						White oak-----------	70	52	
						Scarlet oak---------	70	52	
						Pitch pine----------	---	---	
EveB------------ Evesboro	3S	Slight	Moderate	Moderate	Slight	Black oak-----------	60	43	Virginia pine, pitch pine, eastern red cedar.
						Pitch pine----------	---	---	
						Virginia pine-------	---	---	
						Chesnut oak---------	60	43	
						White oak-----------	60	43	
						Post oak------------	---	---	
FobB------------ Fort Mott	3A	Slight	Moderate	Moderate	Slight	Black oak-----------	65	48	Virginia pine, white pine, white oak, pitch pine.
						Pitch pine----------	---	---	
						Virginia pine-------	---	---	
						White oak-----------	65	48	
						Chestnut oak--------	---	---	
						Post oak------------	---	---	
GamB------------ Galloway	4S	Slight	Moderate	Moderate	Slight	Pitch pine----------	60	---	Virginia pine, white pine, yellow-poplar, white oak.
						White oak-----------	---	---	
						Sweetgum------------	---	---	

See footnotes at end of table.

Table 7.-Woodland Management and Productivity-Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant**
HboA------------ Hammonton	4A	Slight	Slight	Slight	Slight	Black oak-----------	80	62	White pine,
						White oak-----------	80	62	yellow-poplar,
						Sweetgum------------	---	---	white oak,
						Pitch pine----------	---	---	sweetgum.
						Southern red oak----	---	---	
HbmB------------ Hammonton	4A	Slight	Slight	Moderate	Slight	Black oak-----------	80	62	White pine,
						White oak-----------	80	62	yellow-poplar,
						Sweetgum------------	---	---	white oak,
						Pitch pine----------	---	---	sweetgum.
						Southern red oak----	---	---	
HorD------------ Hooksan	6S	Moderate	Severe	Moderate	Slight	Eastern red cedar---	---	---	Japanese black pine, eastern red cedar.
IngB------------ Ingleside	3S	Slight	Slight	Moderate	Slight	Black oak-----------	65	48	White pine,
						Pitch pine----------	---	---	Virginia pine,
						White oak-----------	65	48	white oak.
						Scarlet oak---------	65	48	
InnA------------ Ingleside	3A	Slight	Slight	Slight	Slight	Black oak-----------	65	48	White pine,
						Pitch pine----------	---	---	Virginia pine,
						White oak-----------	65	48	white oak.
						Scarlet oak---------	65	48	
Makt------------ Manahawkin	3W	Slight	Severe	Severe	Severe	Atlantic white-cedar	50	75	Atlantic white-cedar.
						Red maple-----------	75	---	
SwaA, SwaB------ Swainton	4A	Slight	Slight	Slight	Slight	Black oak-----------	70	52	Virginia pine,
						White oak-----------	70	52	white pine,
						Scarlet oak---------	70	52	white oak.
						Pitch pine----------	---	---	

* Volume is the yield likely to be produced by the most important trees, expressed in cubic feet per acre per year. Cubic feet can be converted to board feet by multiplying by about 5.

** If hardwoods are desired on a forest site, the natural reproduction (seeds or sprouts) of acceptable species should be used.

*** See description of the map unit for composition and behavior characteristics of the map unit.

Table 8.-Recreational Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Aptv*:					
Appoquinmink	Severe: flooding, wetness, excess salt.	Severe: wetness, excess salt.	Severe: wetness, flooding, excess salt.	Severe: wetness.	Severe: excess salt, wetness, flooding.
Transquaking	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus, excess salt.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: excess salt, excess sulfur, ponding.
Mispillion	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus, excess salt.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: excess salt, excess sulfur, ponding.
AugA, AugB Aura	Severe: too acid.	Severe: too acid.	Severe: too acid.	Slight	Severe: too acid.
BEAV*. Beaches					
BEXS*:					
Berryland	Severe: flooding, wetness.	Severe: wetness.	Severe: flooding, wetness, too sandy.	Severe: wetness.	Severe: flooding, wetness, too sandy.
Mullica	Severe: flooding, wetness, too acid.	Severe: wetness, too acid.	Severe: wetness, flooding.	Severe: wetness.	Severe: too acid, wetness, flooding.
DenA Dennisville	Slight	Slight	Slight	Slight	Moderate: droughty.
DocB, DoeA, DoeB Downer	Severe: too acid.	Severe: too acid.	Severe: too acid.	Slight	Severe: too acid.
EveB Evesboro	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
FobB Fort Mott	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
GamB Galloway	Severe: too acid.	Severe: too acid.	Severe: too acid.	Moderate: too sandy.	Severe: too acid, droughty.
HbmB, HboA Hammonton	Severe: too acid.	Severe: too acid.	Severe: too acid.	Moderate: wetness.	Severe: too acid.

See footnote at end of table.

Table 8.-Recreational Development-Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
HorD------------------ Hooksan	Severe: flooding, too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
IngB------------------ Ingleside	Slight----------	Slight----------	Moderate: small stones.	Slight----------	Moderate: droughty.
InnA------------------ Ingleside	Slight----------	Slight----------	Moderate: small stones.	Slight----------	Slight.
Makt------------------ Manahawkin	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus, too acid.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: too acid, ponding, flooding.
Mmtv*:					
Mispillion-----------	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus, excess salt.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: excess salt, excess sulfur, ponding.
Transkquaking--------	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus, excess salt.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: excess salt, excess sulfur, ponding.
Appoquinimink--------	Severe: flooding, wetness, excess salt.	Severe: wetness, excess salt.	Severe: wetness, flooding, excess salt.	Severe: wetness.	Severe: excess salt, wetness, flooding.
Pdwv*:					
Pawkatuck------------	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus, excess salt.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: excess salt, excess sulfur, ponding.
Transquaking---------	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus, excess salt.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: excess salt, excess sulfur, ponding.
PHG*. Pits					
Ptt*, Pvr*. Psamments					
SwaA------------------ Swainton	Slight----------	Slight----------	Slight----------	Slight----------	Moderate: droughty.
SwaB------------------ Swainton	Slight----------	Slight----------	Moderate: slope.	Slight----------	Moderate: droughty.
Trkv------------------ Transquaking	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus, excess salt.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: excess salt, excess sulfur, ponding.

See footnote at end of table.

Table 8.-Recreational Development-Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Udz. Udorthents					
UR*. Urban land					
URPTS*, URPVR*. Urban land-Psamments					

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 9.-Wildlife Habitat

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Aptv*:										
Appoquinmink	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good
Transquaking	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Mispillion	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
AugA, AugB Aura	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
BEAV*. Beaches										
BEXS*:										
Berryland	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Mullica	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
DenA Dennisville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
DocB Downer	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
DoeA, DoeB Downer	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
EveB Evesboro	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
FobB Fort Mott	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Very poor.
GamB Galloway	Fair	Fair	Good	Fair	Fair	Poor	Poor	Fair	Fair	Poor.
HbmB Hammonton	Poor	Fair	Good	Fair	Fair	Poor	Poor	Fair	Fair	Poor.
HboA Hammonton	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor.
HorD Hooksan	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
IngB, InnA Ingleside	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Makt Manahawkin	Very poor.	Poor	Poor	Poor	Poor	Good	Poor	Poor	Poor	Fair.

See footnote at end of table.

Table 9.-Wildlife Habitat-Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Mmtv*:										
Mispillion--------	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Transkquaking-----	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Appoquinimink-----	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Pdwv*:										
Pawkatuck---------	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Transquaking------	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
PHG*. Pits										
Ptt*, Pvr*. Psamments										
SwaA, SwaB--------- Swainton	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Trkv--------------- Transquaking	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
Udz. Udorthents										
UR*. Urban land										
URPTS*, URPVR*. Urban land-Psamments										

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 10.-Building Site Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. 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
Aptv*:						
Appoquinmink-----	Severe: excess humus, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness, low strength.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: excess salt, wetness, flooding.
Transquaking-----	Severe: excess humus, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, ponding, flooding.	Severe: excess salt, excess sulfur, ponding.
Mispillion-------	Severe: excess humus, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, ponding, flooding.	Severe: excess salt, excess sulfur, ponding.
AugA, AugB-------- Aura	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Severe: too acid.
BEAV*. Beaches						
BEXS*:						
Berryland--------	Severe: wetness, cutbanks cave.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: flooding, wetness.	Severe: flooding, wetness, too sandy.
Mullica----------	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, frost action, flooding.	Severe: too acid, wetness, flooding.
DenA-------------- Dennisville	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Slight---------	Moderate: droughty.
DocB, DoeA, DoeB-- Downer	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Severe: too acid.
EveB-------------- Evesboro	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Severe: droughty.
FobB-------------- Fort Mott	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Moderate: droughty, too sandy.
GamB-------------- Galloway	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: too acid, droughty.
HbmB, HboA-------- Hammonton	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: frost action.	Severe: too acid.

See footnote at end of table.

Table 10.-Building Site Development-Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
HorD: Hooksan	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding, slope.	Moderate: slope, flooding.	Severe: droughty.
IngB: Ingleside	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
InnA: Ingleside	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Slight.
Makt: Manahawkin	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, ponding, flooding.	Severe: too acid, ponding, flooding.
Mmtv*:						
Mispillion	Severe: excess humus, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, ponding, flooding.	Severe: excess salt, excess sulfur, ponding.
Transkquaking	Severe: excess humus, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, ponding, flooding.	Severe: excess salt, excess sulfur, ponding.
Appoquinimink	Severe: excess humus, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness, low strength.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: excess salt, wetness, flooding.
Pdwv*:						
Pawkatuck	Severe: cutbanks cave, excess humus, wetness.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding.	Severe: flooding, ponding, low strength.	Severe: ponding, flooding.	Severe: excess salt, excess sulfur, ponding.
Transquaking	Severe: excess humus, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, ponding, flooding.	Severe: excess salt, excess sulfur, ponding.
PHG*. Pits						
Ptt*, Pvr*. Psamments						
SwaA, SwaB: Swainton	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
Trkv: Transquaking	Severe: excess humus, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, flooding, ponding.	Severe: subsides, ponding, flooding.	Severe: excess salt, excess sulfur, ponding.
Udz. Udorthents						

See footnote at end of table.

Table 10.-Building Site Development-Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
UR*. Urban land						
URPTS*, URPVR*. Urban land-Psamments						

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 11.-Sanitary Facilities

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "severe," "poor," 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
Aptv*:					
Appoquinmink	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness, excess humus.
Transquaking	Severe: subsides, flooding, ponding.	Severe: seepage, flooding, excess humus.	Severe: flooding, ponding, excess humus.	Severe: flooding, seepage, ponding.	Poor: ponding, excess humus, excess salt.
Mispillion	Severe: flooding, ponding, percs slowly.	Severe: seepage, flooding, excess humus.	Severe: flooding, ponding.	Severe: flooding, seepage, ponding.	Poor: ponding.
AugA, AugB Aura	Severe: percs slowly.	Severe: seepage.	Severe: too acid.	Severe: seepage.	Poor: too acid.
BEAV*. Beaches					
BEXS*:					
Berryland	Severe: wetness, flooding.	Severe: wetness, seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness, seepage.	Poor: wetness, too sandy.
Mullica	Severe: wetness, poor filter, flooding.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness, flooding.	Severe: seepage, wetness, flooding.	Poor: seepage, too sandy, wetness.
DenA Dennisville	Severe: wetness, poor filter.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
DocB, DoeA, DoeB Downer	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
EveB Evesboro	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
FobB Fort Mott	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
GamB Galloway	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, too acid.

See footnote at end of table.

Table 11.-Sanitary Facilities-Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
HbmB, HboA---------- Hammonton	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, small stones.
HorD---------------- Hooksan	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
IngB, InnA---------- Ingleside	Severe: wetness.	Severe: seepage.	Severe: wetness.	Severe: seepage.	Poor: thin layer.
Makt---------------- Manahawkin	Severe: flooding, ponding.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: ponding, excess humus, too acid.
Mmtv*:					
Mispillion---------	Severe: flooding, ponding, percs slowly.	Severe: seepage, flooding, excess humus.	Severe: flooding, ponding.	Severe: flooding, seepage, ponding.	Poor: ponding.
Transkquaking------	Severe: subsides, flooding, ponding.	Severe: seepage, flooding, excess humus.	Severe: flooding, ponding, excess humus.	Severe: flooding, seepage, ponding.	Poor: ponding, excess humus, excess salt.
Appoquinimink------	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness, excess humus.
Pdwv*:					
Pawkatuck----------	Severe: flooding, ponding, poor filter.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: ponding, excess humus, excess salt.
Transquaking-------	Severe: subsides, flooding, ponding.	Severe: seepage, flooding, excess humus.	Severe: flooding, ponding, excess humus.	Severe: flooding, seepage, ponding.	Poor: ponding, excess humus, excess salt.
PHG*. Pits					
Ptt*, Pvr*. Psamments					
SwaA, SwaB---------- Swainton	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Trkv---------------- Transquaking	Severe: subsides, flooding, ponding.	Severe: seepage, flooding, excess humus.	Severe: flooding, ponding, excess humus.	Severe: flooding, seepage, ponding.	Poor: ponding, excess humus, excess salt.

See footnote at end of table.

Table 11.-Sanitary Facilities-Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Udz. Udorthents					
UR*. Urban land					
URPTS*, URPVR*. Urban land-Psamments					

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 12.-Construction Materials

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," 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
Aptv*:				
Appoquinmink	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess salt, wetness.
Transquaking	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, excess salt, wetness.
Mispillion	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, excess salt, wetness.
AugA, AugB Aura	Good	Probable	Improbable: too sandy.	Poor: small stones, too acid.
BEAV*. Beaches				
BEXS*:				
Berryland	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness, too sandy.
Mullica	Poor: wetness.	Probable	Probable	Poor: small stones, wetness, too acid.
DenA Dennisville	Good	Probable	Improbable: too sandy.	Poor: small stones, area reclaim.
DocB, DoeA, DoeB Downer	Good	Probable	Improbable: too sandy.	Poor: too acid.
EveB Evesboro	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
FobB Fort Mott	Good	Probable	Improbable: too sandy.	Poor: too sandy.
GamB Galloway	Fair: wetness.	Probable	Improbable: thin layer.	Poor: too sandy, too acid.
HbmB, HboA Hammonton	Fair: wetness.	Probable	Probable	Poor: small stones, area reclaim, too acid.

See footnote at end of table.

Table 12.-Construction Materials-Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
HorD------------------ Hooksan	Good-----------------	Probable-------------	Improbable: too sandy.	Poor: too sandy.
IngB, InnA------------ Ingleside	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, area reclaim.
Makt------------------ Manahawkin	Poor: wetness.	Probable-------------	Probable-------------	Poor: excess humus, area reclaim, wetness.
Mmtv*:				
Mispillion-----------	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, excess salt, wetness.
Transkquaking--------	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, excess salt, wetness.
Appoquinimink--------	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess salt, wetness.
Pdwv*:				
Pawkatuck------------	Poor: wetness.	Probable-------------	Improbable: excess fines.	Poor: excess humus, excess salt, wetness.
Transquaking---------	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, excess salt, wetness.
PHG*. Pits				
Ptt*, Pvr*. Psamments				
SwaA, SwaB------------ Swainton	Good-----------------	Probable-------------	Improbable: too sandy.	Poor: small stones, area reclaim.
Trkv------------------ Transquaking	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, excess salt, wetness.
Udz. Udorthents				

See footnote at end of table.

Table 12.-Construction Materials-Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
UR*. Urban land				
URPTS*, URPVR*. Urban land-Psamments				

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 13.-Water Management

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. 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-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
Aptv*:						
Appoquinmink	Severe: seepage.	Severe: excess humus, wetness, excess salt.	Flooding, subsides, excess salt.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, excess salt, erodes easily.
Transquaking	Slight	Severe: excess humus, ponding, excess salt.	Ponding, flooding, subsides.	Ponding, flooding, excess salt.	Ponding	Wetness, excess salt.
Mispillion	Severe: seepage.	Severe: piping, ponding.	Ponding, flooding, subsides.	Ponding, flooding, excess salt.	Ponding	Wetness, excess salt.
AugA Aura	Severe: seepage.	Moderate: thin layer.	Deep to water	Droughty	Soil blowing	Droughty, rooting depth.
AugB Aura	Severe: seepage.	Moderate: thin layer.	Deep to water	Slope, droughty.	Soil blowing	Droughty, rooting depth.
BEAV*. Beaches						
BEXS*:						
Berryland	Severe: seepage.	Severe: seepage, piping, wetness.	Wetness, cutbanks cave.	Wetness, droughty.	Not needed	Not needed.
Mullica	Severe: seepage.	Severe: seepage, piping, wetness.	Frost action, cutbanks cave, too acid.	Wetness, droughty.	Wetness, too sandy.	Wetness, droughty.
DenA Dennisville	Severe: seepage.	Severe: seepage.	Deep to water	Droughty	Too sandy, soil blowing.	Droughty, rooting depth.
DocB Downer	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
DoeA Downer	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
DoeB Downer	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, soil blowing.	Too sandy, soil blowing.	Droughty.
EveB Evesboro	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.

See footnote at end of table.

Table 13.-Water Management-Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
FobB: Fort Mott	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
GamB: Galloway	Severe: seepage.	Severe: seepage.	Cutbanks cave, too acid.	Wetness, droughty.	Wetness, too sandy, soil blowing.	Droughty.
HbmB, HboA: Hammonton	Severe: seepage.	Severe: seepage, piping, wetness.	Frost action, cutbanks cave.	Wetness, droughty.	Wetness, too sandy, soil blowing.	Droughty, rooting depth.
HorD: Hooksan	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.	Slope, droughty.
IngB: Ingleside	Severe: seepage.	Severe: piping.	Deep to water	Droughty, soil blowing.	Soil blowing	Droughty.
InnA: Ingleside	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing	Soil blowing	Favorable.
Makt: Manahawkin	Severe: seepage.	Severe: excess humus, ponding.	Ponding, flooding, frost action.	Ponding, soil blowing, flooding.	Ponding, soil blowing.	Wetness.
Mmtv*:						
Mispillion	Severe: seepage.	Severe: piping, ponding.	Ponding, flooding, subsides.	Ponding, flooding, excess salt.	Ponding	Wetness, excess salt.
Transkquaking	Slight	Severe: excess humus, ponding, excess salt.	Ponding, flooding, subsides.	Ponding, flooding, excess salt.	Ponding	Wetness, excess salt.
Appoquinimink	Severe: seepage.	Severe: excess humus, wetness, excess salt.	Flooding, subsides, excess salt.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, excess salt, erodes easily.
Pdwv*:						
Pawkatuck	Severe: seepage.	Severe: excess humus, ponding, excess salt.	Flooding, excess sulfur, excess salt.	Ponding, flooding, excess salt.	Ponding	Wetness, excess salt.
Transquaking	Slight	Severe: excess humus, ponding, excess salt.	Ponding, flooding, subsides.	Ponding, flooding, excess salt.	Ponding	Wetness, excess salt.
PHG*. Pits						
Ptt*, Pvr*. Psamments						

See footnote at end of table.

Table 13.-Water Management-Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
SwaA Swainton	Severe: seepage.	Severe: seepage.	Deep to water	Droughty	Too sandy, soil blowing.	Droughty, rooting depth.
SwaB Swainton	Severe: seepage.	Severe: seepage.	Deep to water	Slope, droughty.	Too sandy, soil blowing.	Droughty, rooting depth.
Trkv Transquaking	Slight	Severe: excess humus, ponding, excess salt.	Ponding, flooding, subsides.	Ponding, flooding, excess salt.	Ponding	Wetness, excess salt.
Udz. Udorthents						
UR*. Urban land						
URPTS*, URPVR*. Urban land-Psamments						

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 14.-Engineering Index Properties

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
Aptv*:										
Appoquinmink----	0-12	Mucky silt loam	CL-ML, CL	A-4, A-6	100	100	70-100	70-90	20-34	5-13
	12-30	Silt loam, silty clay loam, mucky silt loam.	CL-ML, CL	A-4, A-6	100	100	70-100	70-90	20-39	5-16
	30-72	Muck, mucky peat	PT	A-8	---	---	---	---	0-14	---
Transquaking----	0-60	Mucky peat-------	PT	A-8	---	---	---	---	---	NP
	60-90	Silty clay, silty clay loam, silt loam.	CL, CH	A-6, A-7	100	100	80-100	70-95	35-60	20-35
Mispillion------	0-24	Mucky peat-------	PT	A-8	---	---	---	---	0	---
	24-40	Muck, mucky peat	PT	A-8	---	---	---	---	0	---
	40-80	Loam, silty clay loam, silt loam.	CL, CL-ML	A-4, A-6	100	100	80-95	70-90	15-30	5-15
AugA------------- Aura	0-12	Sandy loam-------	SM, SC, ML, CL	A-2, A-4	95-100	80-95	50-90	30-70	15-25	NP-8
	12-32	Sandy loam, coarse sandy loam, gravelly sandy loam.	SC, SC-SM	A-2, A-4, A-6	75-100	70-90	30-70	20-50	25-40	6-15
	32-68	Gravelly sandy loam to sandy clay loam.	SC, SC-SM	A-2-4, A-4, A-6	70-100	70-90	30-70	20-50	25-40	6-15
	68-72	Sandy loam, loamy sand, sand.	SC, SM, SP-SM, SC-SM	A-1, A-2, A-3, A-4	75-100	70-100	35-90	5-55	10-30	NP-10
AugB------------- Aura	0-12	Sandy loam-------	SM, SC, ML, CL	A-2, A-4	95-100	80-95	50-90	30-70	15-25	NP-8
	12-32	Sandy loam, coarse sandy loam, gravelly sandy loam.	SC, SC-SM	A-2, A-4, A-6	75-100	70-90	30-70	20-50	25-40	6-15
	32-68	Gravelly sandy loam to sandy clay loam.	SC, SC-SM	A-2-4, A-4, A-6	70-100	70-90	30-70	20-50	25-40	6-15
	68-72	Sandy loam, loamy sand, sand.	SC, SM, SP-SM, SC-SM	A-1, A-2, A-3, A-4	75-100	70-100	35-90	5-55	10-30	NP-10
BEAV*. Beaches										
BEXS*:										
Berryland-------	0-11	Sand-------------	SP, SP-SM	A-3	95-100	90-100	55-90	2-10	---	NP
	11-19	Sand, loamy sand	SP, SP-SM	A-2, A-3	95-100	90-100	55-90	2-10	---	NP
	19-40	Sand, loamy sand	SP, SM, SC-SM, SP-SM	A-1, A-2, A-3	95-100	80-100	40-90	2-35	<25	NP-8
	40-72	Stratified sand to sandy loam.	SP, SM, SC-SM, SP-SM	A-1, A-2, A-3, A-4	95-100	80-100	40-90	2-50	---	---

See footnote at end of table.

Table 14.-Engineering Index Properties-Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In								Pct	
BEXS*:										
Mullica---------	0-12	Sandy loam-------	SM, SC, ML, CL	A-2-4, A-4	95-100	85-100	50-95	25-75	0-27	NP-9
	12-36	Sandy loam, sandy clay loam, loamy sand.	SC, SM	A-2-4, A-4, A-6, A-2-6	85-100	80-100	50-75	25-45	18-30	3-13
	36-72	Stratified gravelly sand to sandy clay loam.	SM, SP-SM, SC	A-2-4, A-3, A-1-b, A-6	70-100	55-100	35-85	5-50	15-30	NP-13
DenA------------- Dennisville	1-2	Sandy loam-------	SM, SC-SM	A-2, A-4	95-100	90-100	55-75	30-40	15-20	2-5
	2-17	Sandy loam, loamy sand.	SC, SC-SM, SM	A-2, A-1, A-4	80-100	60-100	40-90	20-40	20-25	3-8
	17-32	Gravelly sandy loam to very gravelly loamy sand.	SM, SP-SM	A-1	80-90	35-75	20-50	5-20	10-15	NP-3
	32-74	Stratified sand to very gravelly sand.	SP, SP-SM	A-1, A-2, A-3	85-100	35-90	20-55	2-10	0-10	NP-2
DocB------------- Downer	0-16	Loamy sand-------	SM, SP-SM	A-2, A-1	80-100	75-100	40-75	10-30	15-20	NP-4
	16-36	Sandy loam-------	SM, SC, SC-SM	A-2, A-4	95-100	90-100	55-75	30-40	15-25	NP-8
	36-72	Stratified gravelly sand to sandy clay loam.	SC, SM, SP-SM, SC-SM	A-1, A-2, A-3, A-4	75-100	70-100	35-90	5-55	10-30	NP-10
DoeA------------- Downer	0-10	Sandy loam-------	SM, SC-SM	A-2, A-4	80-100	75-100	50-70	25-45	15-20	NP-4
	10-34	Sandy loam-------	SM, SC, SC-SM	A-2, A-4	95-100	90-100	55-75	30-40	15-25	NP-8
	34-72	Stratified gravelly sand to sandy clay loam.	SC, SM, SP-SM, SC-SM	A-1, A-2, A-3, A-4	75-100	70-100	35-90	5-55	10-30	NP-10
DoeB------------- Downer	0-2	Sandy loam-------	SM, SC-SM	A-2, A-4	80-100	75-100	50-70	25-45	15-20	NP-4
	2-38	Sandy loam-------	SM, SC, SC-SM	A-2, A-4	95-100	90-100	55-75	30-40	15-25	NP-8
	38-72	Stratified gravelly sand to sandy clay loam.	SC, SM, SP-SM, SC-SM	A-1, A-2, A-3, A-4	75-100	70-100	35-90	5-55	10-30	NP-10
EveB------------- Evesboro	2-4	Sand-------------	SM, SP-SM	A-1, A-3, A-2	90-100	85-100	40-70	5-15	10-15	NP-3
	4-38	Sand, loamy sand	SM, SP-SM	A-1, A-3, A-2	90-100	85-100	40-70	5-25	10-15	NP-3
	38-72	Stratified sand to sandy loam.	SM, SC-SM	A-2, A-3, A-1	75-100	65-100	35-90	5-35	10-15	NP-5
FobB------------- Fort Mott	2-22	Sand-------------	SM, SP-SM	A-2	90-100	85-100	50-90	10-25	15-20	NP-3
	22-35	Sandy loam, sandy clay loam, loam, coarse sandy loam.	SM, SC, SC-SM	A-2, A-4, A-6	90-100	80-100	50-90	25-45	20-35	3-12
	35-72	Stratified gravelly sandy loam to sand.	SM, SC-SM, SP-SM	A-1, A-2, A-3	80-100	75-100	40-80	5-35	15-25	NP-6

See footnote at end of table.

Table 14.-Engineering Index Properties-Continued

Soil name and map symbol	Depth	USDA texture	Classification		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	4	10	40	200		
	In								Pct	
GamB-------------- Galloway	0-9	Loamy sand-------	SP-SM, SM	A-2-4	100	95-100	50-95	10-30	0-20	NP
	9-28	Sand, loamy sand	SP-SM, SM	A-2-4	100	95-100	50-95	10-30	0-20	NP
	28-58	Gravelly sand, gravelly loamy sand.	SP, SP-SM, SM	A-2-4, A-1-b, A-3	65-85	55-75	30-55	0-20	0-20	NP
	58-72	Sand, loamy sand	SP-SM, SM	A-2-4, A-1-b, A-3	100	85-95	45-90	5-15	0-15	NP
HbmB-------------- Hammonton	0-3	Loamy sand-------	SM, SP-SM	A-2, A-1	90-100	85-100	40-75	10-30	10-15	NP-3
	3-26	Sandy loam, loamy sand.	SC, SC-SM	A-2, A-1, A-4	80-100	70-100	40-90	20-40	20-25	4-8
	26-72	Stratified gravelly sand to sandy clay loam.	SM, SP-SM, SC-SM, GM	A-2, A-1, A-4, A-3	60-100	45-100	20-80	5-50	10-30	NP-10
HboA-------------- Hammonton	3-5	Sandy loam-------	SM, SC-SM	A-2, A-4	90-100	85-100	50-70	25-40	15-20	NP-4
	5-30	Sandy loam, loamy sand.	SC, SC-SM	A-2, A-1, A-4	80-100	70-100	40-90	20-40	20-25	4-8
	30-72	Stratified gravelly sand to sandy clay loam.	SM, SP-SM, SC-SM, GM	A-2, A-1, A-4, A-3	60-100	45-100	20-80	5-50	10-30	NP-10
HorD-------------- Hooksan	0-4	Fine sand--------	SM, SP-SM	A-3, A-2	100	98-100	60-75	5-30	0-10	NP-2
	4-72	Fine sand, sand, coarse sand.	SM, SP-SM	A-3, A-2	95-100	85-100	60-75	5-30	0-10	NP-2
IngB-------------- Ingleside	0-12	Loamy sand-------	SM, SP-SM	A-2, A-1	90-100	80-100	40-75	10-35	15-15	NP-5
	12-37	Sandy loam, sandy clay loam, loam.	SM, SC, SC-SM	A-2, A-4	90-100	80-100	50-90	20-40	10-25	NP-10
	37-72	Loamy sand, sand, loamy fine sand.	SM, SP-SM	A-2, A-1	80-100	60-100	20-70	5-30	15-20	NP-5
InnA-------------- Ingleside	0-12	Sandy loam-------	SM, SC, SP-SM	A-2, A-1	90-100	80-100	40-75	10-35	10-30	NP-15
	12-48	Sandy loam, sandy clay loam, loam.	SM, SC, SC-SM	A-2, A-4	90-100	80-100	50-90	20-40	10-25	NP-10
	48-72	Loamy sand, sand, loamy fine sand.	SM, SP-SM	A-2, A-1	80-100	60-100	20-70	5-30	15-20	NP-5
Makt-------------- Manahawkin	0-35	Muck-------------	PT	A-8	---	---	---	---	0-14	---
	35-72	Gravelly sand to loamy fine sand.	SW, GP-GM, SP-SM, GW	A-1	40-100	35-100	20-50	4-10	15-20	NP-3
Mmtv*:										
Mispillion------	0-10	Mucky peat-------	PT	A-8	---	---	---	---	0	---
	10-26	Muck, mucky peat	PT	A-8	---	---	---	---	0	---
	26-90	Loam, silty clay loam, silt loam.	CL, CL-ML	A-4, A-6	100	100	80-95	70-90	15-30	5-15
Transkquaking---	0-14	Mucky peat-------	PT	A-8	---	---	---	---	---	NP
	14-80	Silty clay, silty clay loam, silt loam.	CL, CH	A-6, A-7	100	100	80-100	70-95	35-60	20-35
Appoquinimink---	0-5	Mucky silt loam	CL-ML, CL	A-4, A-6	100	100	70-100	70-90	20-34	5-13
	5-32	Silt loam, silty clay loam, mucky silt loam.	CL-ML, CL	A-4, A-6	100	100	70-100	70-90	20-39	5-16
	32-73	Muck, mucky peat	PT	A-8	---	---	---	---	0-14	---

See footnote at end of table.

Table 14.-Engineering Index Properties-Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In								Pct	
Pdwv*:										
Pawkatuck-------	0-45	Mucky peat-------	PT	A-8	---	---	---	---	---	NP
	45-72	Gravelly sand to loamy fine sand.	SM, SP, SW	A-1, A-2, A-3	80-100	60-100	35-75	0-30	---	NP
Transquaking----	0-60	Peat-------------	PT	A-8	---	---	---	---	---	NP
	60-72	Silty clay, silty clay loam, silt loam.	CL, CH	A-6, A-7	100	100	80-100	70-95	35-60	20-35
	72-96	Gravelly sand to loamy fine sand.	SM, SP, SW	A-1, A-2, A-3	80-100	60-100	35-75	0-30	---	NP
PHG*. Pits										
Ptt*, Pvr*. Psamments										
SwaA------------- Swainton	0-4	Sandy loam-------	SM, SC-SM	A-2, A-4	95-100	90-100	55-75	30-40	15-20	2-5
	4-23	Sandy loam, gravelly sandy loam.	SC, SC-SM, SM	A-1, A-2, A-4	80-100	60-100	40-90	20-40	20-25	3-8
	23-35	Gravelly loamy sand, gravelly sandy loam.	SM, SP-SM	A-1	80-90	35-75	20-50	5-20	10-15	NP-3
	35-72	Stratified fine sand to very gravelly sand.	SP, SP-SM	A-1, A-2, A-3	85-100	35-90	20-60	2-10	0-10	NP-2
SwaB------------- Swainton	0-3	Sandy loam-------	SM, SC-SM	A-2, A-4	95-100	90-100	55-75	30-40	15-20	2-5
	3-23	Sandy loam, gravelly sandy loam.	SC, SC-SM, SM	A-1, A-2, A-4	80-100	60-100	40-90	20-40	20-25	3-8
	23-35	Gravelly loamy sand, gravelly sandy loam.	SM, SP-SM	A-1	80-90	35-75	20-50	5-20	10-15	NP-3
	35-74	Stratified fine sand to very gravelly sand.	SP, SP-SM	A-1, A-2, A-3	85-100	35-90	20-60	2-10	0-10	NP-2
Trkv------------- Transquaking	0-60	Mucky peat-------	PT	A-8	---	---	---	---	---	NP
	60-90	Silty clay, silty clay loam, silt loam.	CL, CH	A-6, A-7	100	100	80-100	70-95	35-60	20-35
Udz. Udorthents										
UR*. Urban land										
URPTS*, URPVR*. Urban land-Psamments										

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 15.-Physical and Chemical Properties of the Soils

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
Aptv*:											
Appoquinmink----	0-12	15-30	0.50-1.20	0.2-2.0	0.10-0.25	6.1-7.3	Low----------	0.37	5	8	3-18
	12-30	15-35	0.50-1.70	0.2-2.0	0.15-0.25	6.1-7.3	Moderate-----	0.43			
	30-72	---	0.50-0.80	2.0-20	0.35-0.45	6.1-7.3	Moderate-----	0.43			
Transquaking----	0-60	---	0.10-0.50	2.0-20	0.30-0.60	6.1-7.3	Low----------	0.02	3	8	30-80
	60-90	30-40	0.60-1.00	0.2-0.6	0.10-0.20	6.1-7.3	Moderate-----	0.10			
Mispillion------	0-24	0	0.10-0.80	2.0-6.0	0.35-0.45	6.1-7.3	Low----------	0.02	2	8	20-90
	24-40	0	0.10-0.80	2.0-6.0	0.35-0.45	6.1-7.3	Low----------	0.02			
	40-80	15-35	1.20-1.70	0.2-0.6	0.10-0.20	6.1-7.3	Low----------	0.28			
AugA------------- Aura	0-12	5-18	1.20-1.50	2.0-6.0	0.12-0.17	3.5-5.0	Low----------	0.28	4	3	1-3
	12-32	10-20	1.30-1.60	2.0-6.0	0.10-0.16	3.5-5.0	Low----------	0.28			
	32-68	15-30	1.68-1.78	0.2-0.6	0.08-0.12	3.5-5.0	Low----------	0.17			
	68-72	3-25	1.65-1.75	0.2-0.6	0.02-0.14	3.5-5.0	Low----------	0.17			
AugB------------- Aura	0-12	5-18	1.20-1.50	2.0-6.0	0.12-0.17	3.5-5.0	Low----------	0.28	4	3	1-3
	12-32	10-20	1.30-1.60	2.0-6.0	0.10-0.16	3.5-5.0	Low----------	0.28			
	32-68	15-30	1.68-1.78	0.2-0.6	0.08-0.12	3.5-5.0	Low----------	0.17			
	68-72	3-25	1.65-1.75	0.2-0.6	0.02-0.14	3.5-5.0	Low----------	0.17			
BEAV*. Beaches											
BEXS*:											
Berryland-------	0-11	1-5	1.30-1.45	6.0-20	0.06-0.08	3.6-5.0	Low----------	0.17	5	8	2-4
	11-19	2-7	1.40-1.55	2.0-6.0	0.08-0.12	3.5-5.0	Low----------	0.20			
	19-40	3-10	1.50-1.60	2.0-20	0.04-0.14	3.5-5.0	Low----------	0.17			
	40-72	3-10	1.50-1.60	2.0-20	0.04-0.14	3.5-5.0	Low----------	0.28			
Mullica---------	0-12	5-20	0.75-1.50	0.6-2.0	0.10-0.20	3.5-5.0	Low----------	0.28	5	8	2-4
	12-36	10-25	1.25-1.60	0.6-2.0	0.10-0.13	3.5-5.0	Low----------	0.24			
	36-72	5-25	1.30-1.65	0.6-20	0.02-0.10	3.5-5.0	Low----------	0.28			
DenA------------- Dennisville	1-2	5-10	1.20-1.60	2.0-6.0	0.10-0.13	3.5-5.5	Low----------	0.32	4	3	1-3
	2-17	10-18	1.45-1.65	2.0-6.0	0.08-0.12	3.5-5.5	Low----------	0.32			
	17-32	3-8	1.50-1.70	6.0-20	0.03-0.07	3.5-5.5	Low----------	0.15			
	32-74	1-5	1.65-1.75	6.0-20	0.02-0.05	3.5-5.5	Low----------	0.10			
DocB------------- Downer	0-16	3-8	1.20-1.60	6.0-20	0.06-0.08	3.5-5.5	Low----------	0.20	4	2	.5-2
	16-36	6-18	1.50-1.60	2.0-6.0	0.08-0.13	3.5-5.5	Low----------	0.32			
	36-72	3-25	1.40-1.75	0.6-20	0.02-0.16	3.5-5.5	Low----------	0.20			
DoeA------------- Downer	0-10	5-10	1.20-1.60	2.0-6.0	0.10-0.14	3.5-5.5	Low----------	0.32	4	3	1-3
	10-34	6-18	1.50-1.60	2.0-6.0	0.08-0.13	3.5-5.5	Low----------	0.32			
	34-72	3-25	1.40-1.75	0.6-20	0.02-0.16	3.5-5.5	Low----------	0.20			
DoeB------------- Downer	0-2	5-10	1.20-1.60	2.0-6.0	0.10-0.14	3.5-5.5	Low----------	0.32	4	3	1-3
	2-38	6-18	1.50-1.60	2.0-6.0	0.08-0.13	3.5-5.5	Low----------	0.32			
	38-72	3-25	1.40-1.75	0.6-20	0.02-0.16	3.5-5.5	Low----------	0.20			

See footnote at end of table.

Table 15.-Physical and Chemical Properties of the Soils-Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
EveB-------------- Evesboro	2-4	2-4	1.20-1.55	6.0-20	0.04-0.07	3.6-5.0	Low----------	0.17	5	1	<1
	4-38	3-6	1.30-1.60	6.0-20	0.04-0.09	3.6-5.0	Low----------	0.17			
	38-72	2-10	1.30-1.60	2.0-20	0.04-0.12	3.6-5.0	Low----------	0.17			
FobB-------------- Fort Mott	2-22	5-10	1.25-1.60	6.0-20	0.05-0.10	3.6-5.5	Low----------	0.20	5	2	.5-2
	22-35	10-30	1.25-1.80	0.6-6.0	0.12-0.16	3.6-5.5	Low----------	0.32			
	35-72	5-15	1.30-1.80	6.0-20	0.03-0.12	3.6-5.5	Low----------	0.17			
GamB-------------- Galloway	0-9	5-12	1.35-1.50	6.0-20	0.05-0.08	3.5-5.5	Low----------	0.17	5	1	1-3
	9-28	2-12	1.40-1.60	6.0-20	0.05-0.10	3.5-5.5	Low----------	0.17			
	28-58	2-12	1.25-1.50	6.0-20	0.04-0.08	3.5-5.5	Low----------	0.17			
	58-72	2-10	1.30-1.70	6.0-20	0.04-0.10	3.5-5.5	Low----------	0.10			
HbmB-------------- Hammonton	0-3	2-7	1.20-1.60	6.0-20	0.06-0.10	3.5-5.5	Low----------	0.20	5	2	.5-2
	3-26	10-18	1.45-1.65	2.0-6.0	0.08-0.13	3.5-5.5	Low----------	0.32			
	26-72	2-22	1.40-1.75	0.6-20	0.03-0.15	3.5-5.5	Low----------	0.17			
HboA-------------- Hammonton	3-5	5-10	1.20-1.60	2.0-6.0	0.10-0.14	3.5-5.5	Low----------	0.32	5	3	1-3
	5-30	10-18	1.45-1.65	2.0-6.0	0.08-0.13	3.5-5.5	Low----------	0.32			
	30-72	2-22	1.40-1.75	0.6-20	0.03-0.15	3.5-5.5	Low----------	0.17			
HorD-------------- Hooksan	0-4	1-5	1.30-1.70	6.0-20	0.05-0.08	5.1-7.8	Low----------	0.10	5	1	.5-1
	4-72	1-5	1.30-1.70	6.0-20	0.04-0.07	5.6-7.8	Low----------	0.15			
IngB-------------- Ingleside	0-12	3-8	1.30-1.70	6.0-20	0.05-0.10	3.6-5.0	Low----------	0.20	5	2	.5-2
	12-37	8-25	1.45-1.65	2.0-6.0	0.10-0.16	3.6-5.0	Low----------	0.28			
	37-72	3-8	1.40-1.70	2.0-20	0.05-0.10	3.6-5.0	Low----------	0.15			
InnA-------------- Ingleside	0-12	5-12	1.20-1.60	2.0-6.0	0.10-0.16	3.6-5.0	Low----------	0.20	5	3	.5-3
	12-48	8-25	1.45-1.65	2.0-6.0	0.10-0.16	3.6-5.0	Low----------	0.28			
	48-72	3-8	1.40-1.70	2.0-20	0.05-0.10	3.6-5.0	Low----------	0.15			
Makt-------------- Manahawkin	0-35	0	0.30-0.65	6.0-20	0.30-0.40	3.5-5.0	--------------	0.05	2	2	20-95
	35-72	0-10	1.10-1.70	2.0-20	0.04-0.08	3.5-5.0	Low----------	0.17			
Mmtv*:											
Mispillion-------	0-10	0	0.10-0.80	2.0-6.0	0.35-0.45	6.1-7.3	Low----------	0.02	2	8	20-90
	10-26	0	0.10-0.80	2.0-6.0	0.35-0.45	6.1-7.3	Low----------	0.02			
	26-90	15-35	1.20-1.70	0.2-0.6	0.10-0.20	6.1-7.3	Low----------	0.28			
Transkquaking----	0-14	---	0.10-0.50	2.0-20	0.30-0.60	6.1-7.3	Low----------	0.02	3	8	30-80
	14-80	30-40	0.60-1.00	0.2-0.6	0.10-0.20	6.1-7.3	Moderate-----	0.10			
Appoquinimink----	0-5	15-30	0.50-1.20	0.2-2.0	0.10-0.25	6.1-7.3	Low----------	0.37	5	8	3-18
	5-32	15-35	0.50-1.70	0.2-2.0	0.15-0.25	6.1-7.3	Moderate-----	0.43			
	32-73	---	0.50-0.80	2.0-20	0.35-0.45	6.1-7.3	Moderate-----	0.43			
Pdwv*:											
Pawkatuck--------	0-45	---	0.10-0.70	0.6-20	0.18-0.36	6.1-7.3	Low----------	----	2	---	20-90
	45-72	0-2	1.45-1.70	>20	0.02-0.13	6.1-7.3	Low----------	0.10			
Transquaking-----	0-60	---	0.10-0.50	2.0-20	0.30-0.60	6.1-7.3	Low----------	0.02	3	8	30-80
	60-72	30-40	0.60-1.00	0.2-0.6	0.10-0.20	6.1-7.3	Moderate-----	0.10			
	72-96	0-2	1.45-1.70	>20	0.02-0.13	6.1-7.3	Low----------	0.10			
PHG*. Pits											

See footnote at end of table.

Table 15.-Physical and Chemical Properties of the Soils-Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
Ptt*, Pvr*. Psamments											
SwaA------------- Swainton	0-4	5-10	1.20-1.60	2.0-6.0	0.10-0.13	3.5-5.0	Low----------	0.32	4	3	1-3
	4-23	10-18	1.45-1.65	2.0-6.0	0.08-0.12	3.5-5.0	Low----------	0.32			
	23-35	3-8	1.50-1.70	6.0-20	0.03-0.07	3.5-5.0	Low----------	0.15			
	35-72	1-5	1.65-1.75	6.0-20	0.02-0.06	3.5-5.0	Low----------	0.10			
SwaB------------- Swainton	1-3	5-10	1.20-1.60	2.0-6.0	0.10-0.13	3.5-5.0	Low----------	0.32	4	3	1-3
	3-23	10-18	1.45-1.65	2.0-6.0	0.08-0.12	3.5-5.0	Low----------	0.32			
	23-35	3-8	1.50-1.70	6.0-20	0.02-0.05	3.5-5.0	Low----------	0.15			
	35-74	1-5	1.65-1.75	6.0-20	0.02-0.06	3.5-5.0	Low----------	0.10			
Trkv------------- Transquaking	0-60	---	0.10-0.50	2.0-20	0.30-0.60	6.1-7.3	Low----------	0.02	3	8	30-80
	60-90	30-40	0.60-1.00	0.2-0.6	0.10-0.20	6.1-7.3	Moderate-----	0.10			
Udz. Udorthents											
UR*. Urban land											
URPTS*, URPVR*. Urban land-Psamments											

* See description of the map unit for composition and behavior characteristics of the map unit.

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: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Subsidence: Initial	Subsidence: Total	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In	In		
Aptv*:											
Appoquinmink--	D	Very frequent.	Very brief.	Jan-Dec	+1-0	Apparent	Jan-Dec	0-4	4-8	High-----	High.
Transquaking--	D	Very frequent	Very brief.	Jan-Dec	+1-0	Apparent	Jan-Dec	15-25	25-35	High-----	High.
Mispillion----	D	Very frequent.	Very brief.	Jan-Dec	+1-0	Apparent	Jan-Dec	10-20	20-40	High-----	High.
AugA, AugB----- Aura	B	None-------	---	---	>6.0	---	---	0	---	Low------	High.
BEAV*---------- Beaches	D	Very frequent.	---	---	---	---	---	---	---	---	---
BEXS*:											
Berryland-----	B/D	Occasional	Brief to long.	Mar-Jun	0-0.5	Apparent	Dec-May	---	---	High-----	High.
Mullica-------	C	Occasional	Brief to long.	Mar-Jun	0-0.5	Apparent	Dec-May	0	---	High-----	High.
DenA----------- Dennisville	B	None-------	---	---	3.5-6.0	Apparent	Dec-May	---	---	Moderate	High.
DocB, DoeA, DoeB---------- Downer	B	None-------	---	---	>6.0	---	---	0	---	Moderate	High.
EveB----------- Evesboro	A	None-------	---	---	>6.0	---	---	---	---	Low------	High.
FobB----------- Fort Mott	A	None-------	---	---	>6.0	---	---	0	---	Moderate	High.
GamB----------- Galloway	A	None-------	---	---	2.0-4.0	Apparent	Dec-Apr	0	---	Low------	High.
HbmB, HboA----- Hammonton	B	None-------	---	---	1.5-3.5	Apparent	Jan-Apr	0	---	Moderate	High.
HorD----------- Hooksan	A	Rare-------	Brief--	---	>6.0	---	---	---	---	Low------	Low.
IngB, InnA----- Ingleside	B	None-------	---	---	3.5-6.0	Apparent	Jan-May	---	---	Moderate	High.
Makt----------- Manahawkin	D	Frequent---	Long---	Jan-Mar	+1-0	Apparent	Oct-Jul	6-12	18-32	High-----	High.

See footnote at end of table.

Table 16.-Soil and Water Features-Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Subsidence: Initial	Subsidence: Total	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In	In		
Mmtv*:											
Mispillion----	D	Very frequent.	Very brief.	Jan-Dec	+1-0	Apparent	Jan-Dec	10-20	20-40	High-----	High.
Transkquaking	D	Very frequent.	Very brief.	Jan-Dec	+1-0	Apparent	Jan-Dec	15-25	25-35	High-----	High.
Appoquinimink	D	Very frequent.	Very brief.	Jan-Dec	+1-0	Apparent	Jan-Dec	0-4	4-8	High-----	High.
Pdwv*:											
Pawkatuck-----	D	Very frequent.	Very brief.	Jan-Dec	+1-0	Apparent	Jan-Dec	---	---	High-----	High.
Transquaking--	D	Very frequent.	Very brief.	Jan-Dec	+1-0	Apparent	Jan-Dec	15-25	25-35	High-----	High.
PHG*. Pits											
Ptt*----------- Psamments	A	Frequent---	---	---	2.0-4.0	---	---	---	---	---	---
Pvr*----------- Psamments	A	Rare-------	---	---	2.0-4.0	---	---	---	---	---	---
SwaA, SwaB----- Swainton	B	None-------	---	---	>6.0	---	---	---	---	Moderate	High.
Trkv----------- Transquaking	D	Very frequent.	Very brief.	Jan-Dec	+1-0	Apparent	Jan-Dec	15-25	25-35	High-----	High.
Udz. Udorthents											
UR*. Urban land											
URPTS*:											
Urban land----	---	Occasional	---	---	---	---	---	---	---	---	---
Psamments-----	A	Occasional	---	---	2.0-4.0	---	---	---	---	---	---
URPVR*:											
Urban land----	---	Rare-------	---	---	---	---	---	---	---	---	---
Psamments-----	A	Rare-------	---	---	2.0-4.0	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 17.-Classification of the Soils

Soil name	Family or higher taxonomic class
Appoquinimink	Fine-silty, mixed, active, nonacid, mesic Thapto-Histic Sulfaquents
Aura	Coarse-loamy, siliceous, semiactive, mesic Typic Fragiudults
Berryland	Sandy, siliceous, mesic Typic Alaquods
Dennisville	Coarse-loamy, siliceous, semiactive, mesic Typic Hapludults
Downer	Coarse-loamy, siliceous, semiactive, mesic Typic Hapludults
Evesboro	Mesic, coated Typic Quartzipsamments
Fort Mott	Loamy, siliceous, semiactive, mesic Arenic Hapludults
Galloway	Mesic, coated Aquic Quartzipsamments
Hammonton	Coarse-loamy, siliceous, semiactive, mesic Aquic Hapludults
Hooksan	Mesic, uncoated Typic Quartzipsamments
Ingleside	Coarse-loamy, siliceous, semiactive, mesic Typic Hapludults
Manahawkin	Sandy or sandy-skeletal, siliceous, dysic, mesic Terric Haplosaprists
Mispillion	Loamy, mixed, euic, mesic Terric Sulfihemists
Mullica	Coarse-loamy, siliceous, semiactive, acid, mesic Typic Humaquepts
Pawcatuck	Sandy or sandy-skeletal, mixed, euic, mesic Terric Sulfihemists
Psamments	Psamments
Swainton	Coarse-loamy, siliceous, semiactive, mesic Typic Hapludults
Transquaking	Euic, mesic Typic Sulfihemists
Udorthents	Udorthents

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