United States Department of Agriculture

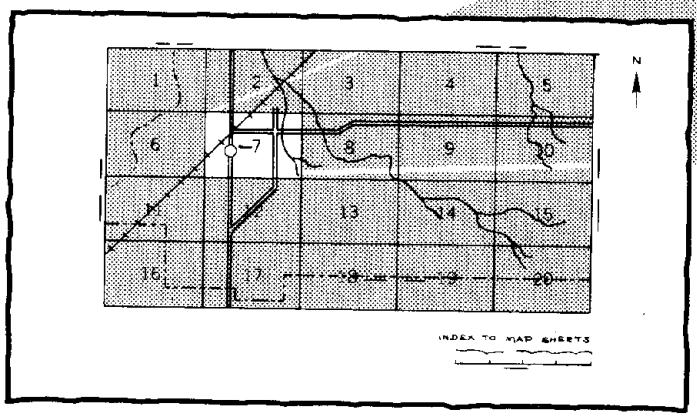
Soil Conservation Service

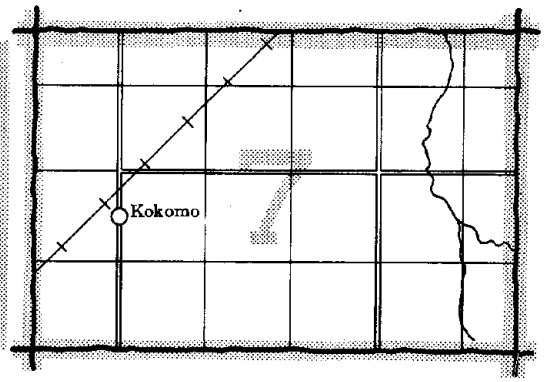
In cooperation with New Jersey Agricultural Experiment Station, Cook College, Rutgers, The State University; and the New Jersey Department of Agriculture, State Soil Conservation Committee

Soil Survey of Monmouth County New Jersey

HOW TO USE

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





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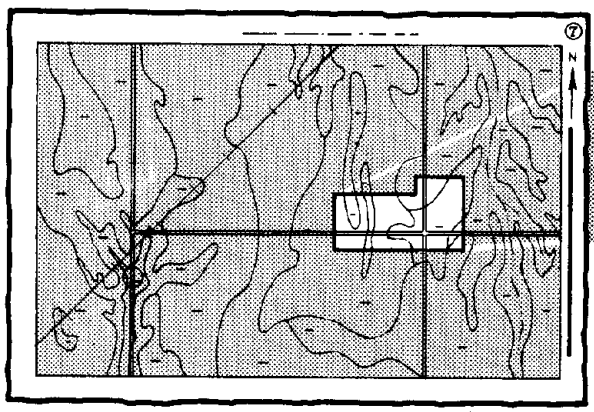

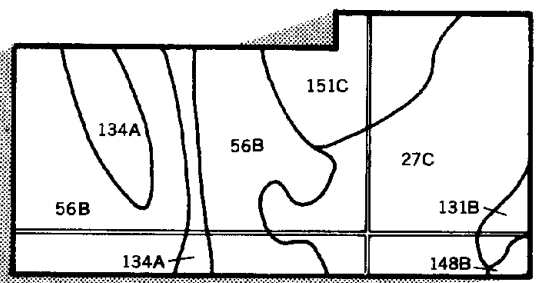

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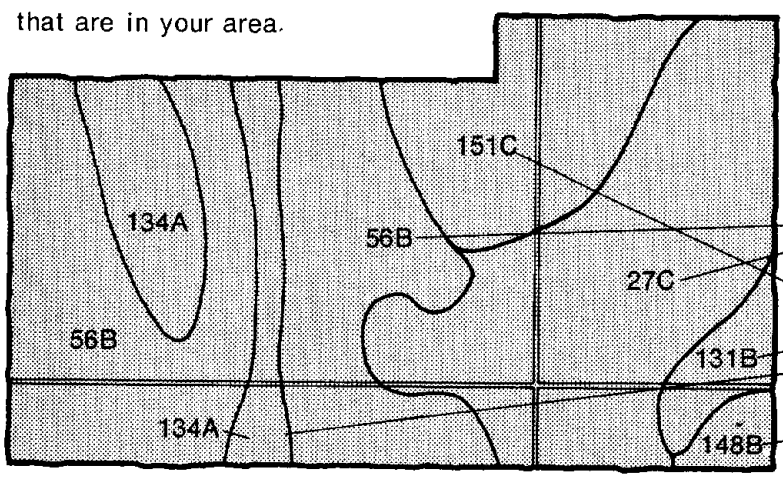

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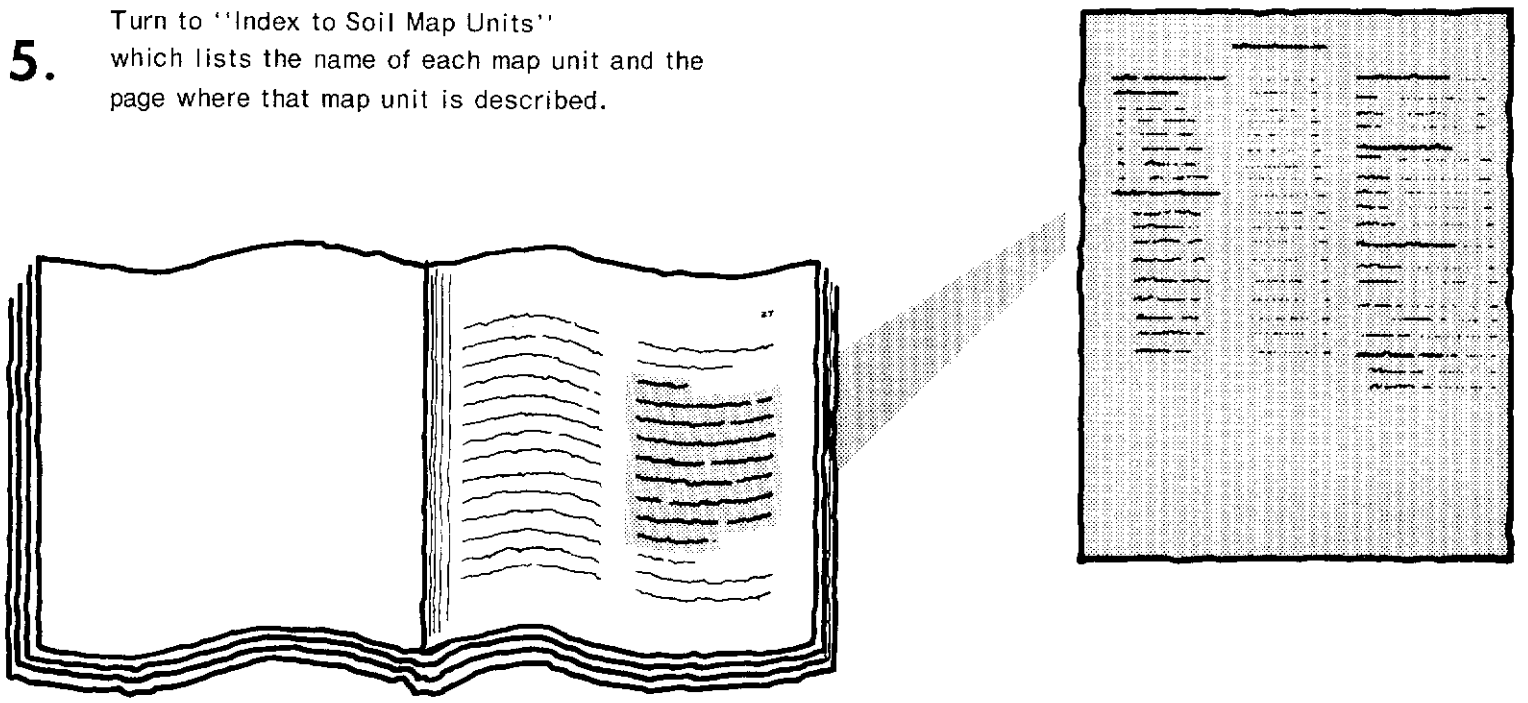
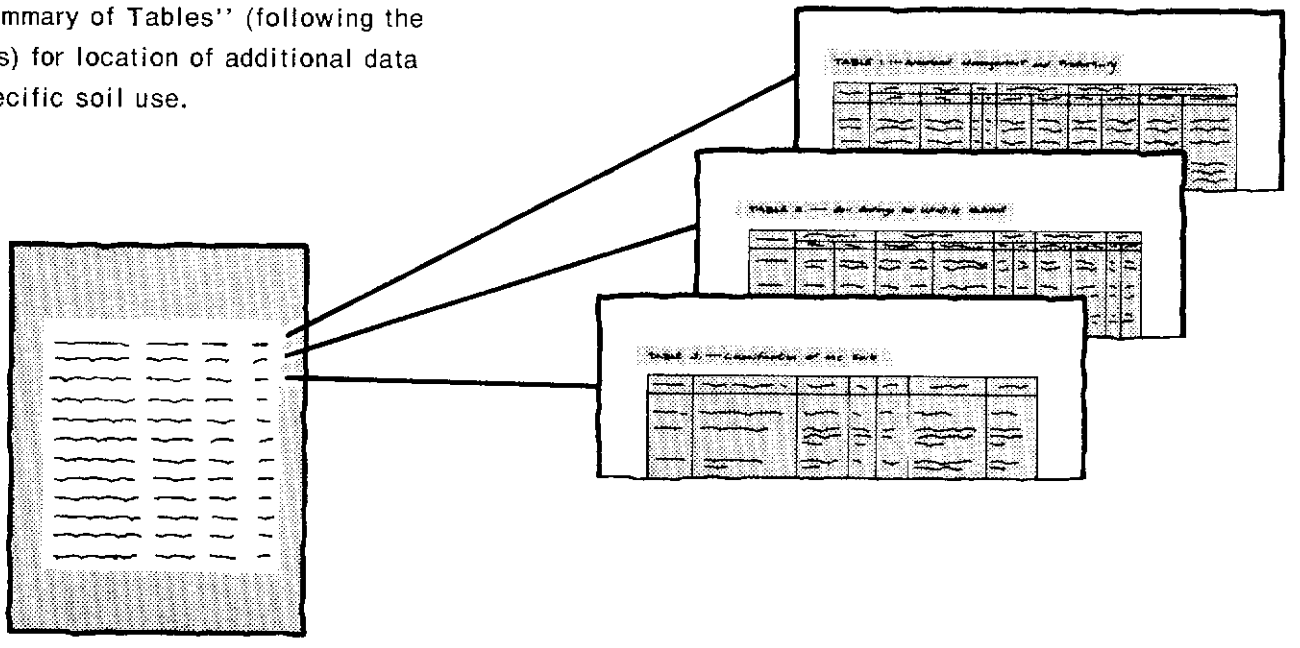
THIS SOIL SURVEY

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



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



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

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in 1980. Soil names and descriptions were approved in 1983. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1981. This survey was made cooperatively by the Soil Conservation Service and the New Jersey Agricultural Experiment Station, Cook College, Rutgers, The State University; and the New Jersey Department of Agriculture, State Soil Conservation Committee. The survey is part of the technical assistance furnished to the Freehold Soil Conservation District.

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

Cover: An area of the Freehold-Urban land-Collington general soil map unit. In the nearly level and gently sloping areas, Freehold and Collington soils are used mainly for high-value vegetable crops.

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Issued April 1989

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Foreword

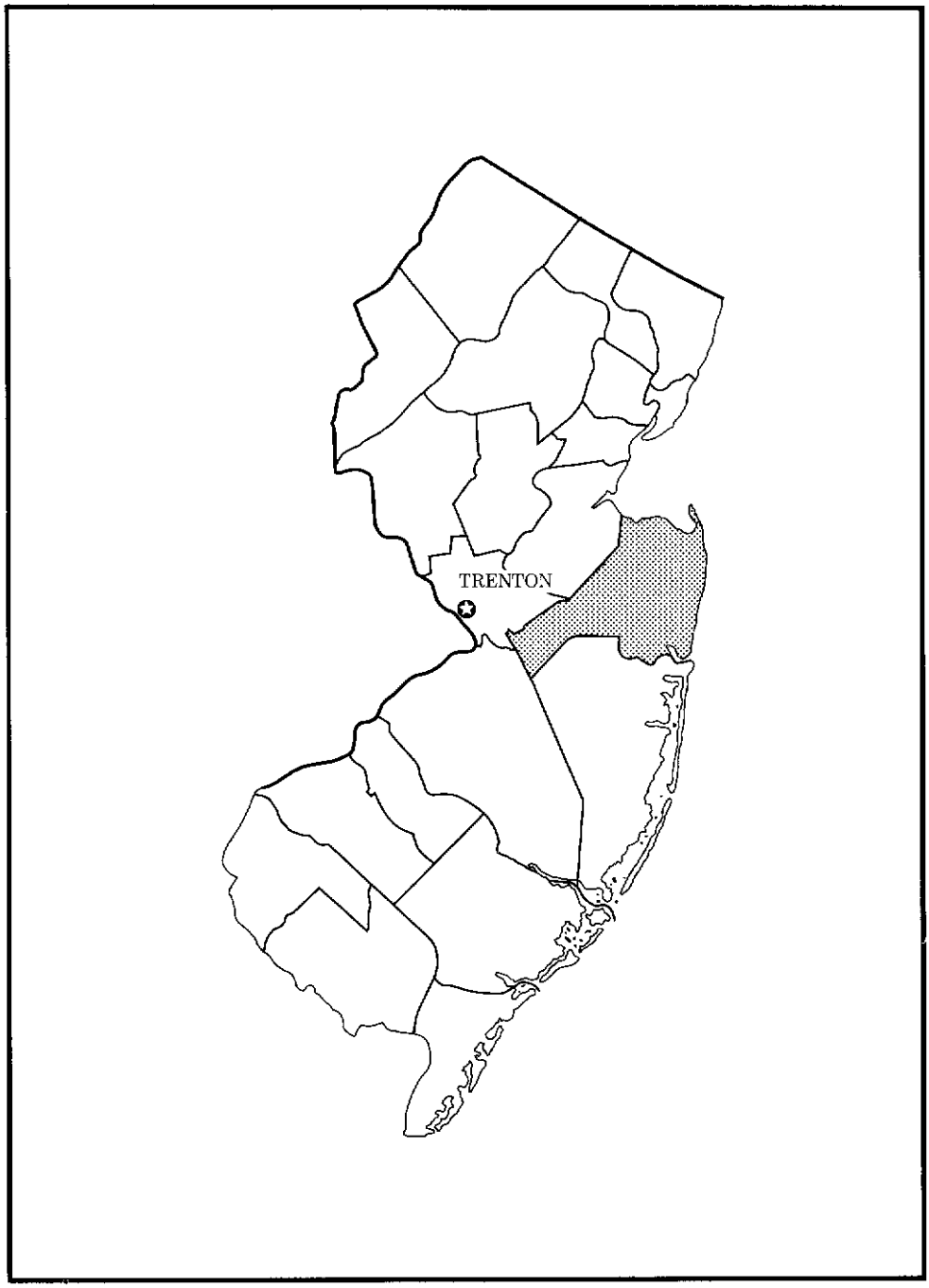
This soil survey contains information that can be used in land-planning programs in Monmouth County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact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

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

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

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

Barbara Osgood
State Conservationist
Soil Conservation Service



Location of Monmouth County in New Jersey.

Soil Survey of Monmouth County, New Jersey

By C.F. Jablonski, Soil Conservation Service,
and Robert J. Baumiey, New Jersey Department of Agriculture

Fieldwork by C.F. Jablonski and David Smith, Soil Conservation Service,
and Robert J. Baumley, New Jersey Department of Agriculture

United States Department of Agriculture, Soil Conservation Service
In cooperation with
New Jersey Agricultural Experiment Station, Cook College, Rutgers,
The State University; and New Jersey Department of Agriculture,
State Soil Conservation Committee

MONMOUTH COUNTY is located in the east-central part of New Jersey. It is bounded by Raritan Bay on the north, the Atlantic Ocean on the east, Middlesex and Mercer Counties on the west, and Burlington and Ocean Counties on the south. The total land area is 304,640 acres. The elevation ranges from sea level along the coast to 380 feet at Crawford Hill, in Holmdel.

The population of Monmouth County in 1980 was 493,313. The population of Freehold, the county seat, was 10,000.

The county was first settled in 1664 in the area of Middletown and Shrewsbury Townships. In 1683, it became one of the first four counties in East Jersey, part of what is now New Jersey, and was named after Monmouthshire, in Wales (*7*). Freehold, the county seat, was established in 1713. The county has been the scene of many historic events. Among them is the Battle of Monmouth, fought on June 28, 1778, during the American Revolution.

Industry is growing rapidly in the northeastern part of the county. The major industries include computers, electronics, chemicals, cosmetics, and high-tech research in communications.

Agriculture is an important enterprise in the county. According to farmland assessment, in 1981 approximately 800 farms, totaling 90,000 acres, were in the county. Many horse farms, as well as nurseries, are located here. However, because of industrial growth, every year since 1969 about 550 acres of farmland was converted to urban land (*8*).

County, state, and federal recreation areas are located throughout the county. They offer diversified recreation. County-owned parkland takes in 4,228 acres. The Assunpink Wildlife Management Area and other state parkland take in 10,014 acres. Raritan Bay and the Atlantic Ocean attract many visitors seeking recreation. Gateway National Recreational Area, Sandy Hook Unit, which is federally owned, has beaches and recreation facilities. Other areas and resorts along the coast have beaches for swimming, fishing, and boating.

Soil surveys of the Freehold Area, New Jersey, were published in 1913 and 1927. This survey updates the earlier ones and provides additional information and larger maps that show the soils in greater detail.

General Nature of the County

This section provides information about the climate of the survey area.

Climate

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

Table 1 gives data on temperature and precipitation for the survey area as recorded at Freehold in the period

1951 to 1973. 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 33 degrees F, and the average daily minimum temperature is 24 degrees. The lowest temperature on record, which occurred at Freehold on Feb. 2, 1961, is -8 degrees. In summer the average temperature is 72 degrees, and the average daily maximum temperature is 83 degrees. The highest recorded temperature, which occurred at Freehold on July 31, 1954, is 103 degrees.

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

The total annual precipitation is 45.18 inches. Of this, 23 inches, or 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 19 inches. The heaviest 1-day rainfall during the period of record was 7.18 inches at Freehold on Aug. 28, 1971. Thunderstorms occur on about 35 days each year, and most occur in summer.

The average seasonal snowfall is 25 inches. The greatest snow depth at any one time during the period of record was 26 inches. On the average, 9 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 50 percent. Humidity is higher at night, and the average at dawn is about 75 percent. The sun shines 60 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 11 miles per hour, in spring.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and the native plants growing on the soil. 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 has few or no roots or other living organisms and has been changed very little by other biologic activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil 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 soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were 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 were 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 state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

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

Map Unit Composition

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

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

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

General Soil Map Units

The general soil map at the back of this publication shows the soil associations in this survey area. Each map unit has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

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

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

As a result of improvements in the classification of soils, particularly modifications or refinements in soil series concepts, and because of the range in slope that is permitted in map units in different surveys, some of the boundaries and soil series names on the general soil map of Monmouth County do not match the boundaries and soil series names on the general soil maps of adjacent counties published at earlier dates.

Soil Descriptions

1. Klej-Keyport-Urban land

Nearly level to moderately steep, deep, somewhat poorly drained and moderately well drained, sandy and clayey soils and Urban land; on uplands

This map unit makes up about 8 percent of the county. The map unit is about 25 percent Klej soils, 15 percent Keyport soils, 15 percent Urban land, and 45 percent minor soils.

Klej soils are nearly level and gently sloping and moderately well drained and somewhat poorly drained. They are in depressions and on low divides. They have a surface layer and subsoil of loamy sand. Included with these soils in mapping are areas of Klej soils that have a clayey substratum. They have a surface layer and subsoil of loamy sand and a clayey substratum.

Keyport soils are nearly level to moderately steep and moderately well drained. They are in depressions and on side slopes. They have a surface layer of sandy loam and a subsoil of silty clay loam.

Urban land consists of areas that are covered by industrial, commercial, and residential development. Keyport, Klej, and Elkton soils that have been cut or graded are in most areas around building foundations. These soils also make up most fill material used to support buildings.

The minor soils in the map unit are Elkton, Evesboro, Tinton, Hammonton, Pemberton, and Atsion soils and Udorthents. Elkton and Atsion soils are poorly drained. Evesboro soils are excessively drained, and Tinton soils are well drained. Hammonton and Pemberton soils are moderately well drained and somewhat poorly drained. Udorthents are disturbed soils that differ greatly from area to area.

Most areas of this map unit are used for community development. Some areas that are somewhat poorly drained or that are poorly suited to farming are wooded. A few areas are used as orchards, for general farming, and for irrigated truck crops.

The soils in this map unit formed in pyritic materials and thus have pyritic clay. Pyritic clay is common in Keyport and Elkton soils and in the Klej soils that have a clayey substratum. In some areas of the other included soils it is in the substratum or at a depth of more than 60 inches.

The pyritic clay that is exposed during excavations will become extremely acid (pH about 2.5-3.0). If used as topsoil, it will not support vegetation. Contact the local office of the Soil Conservation Service (SCS) for information about the probable locations of pyritic clay. SCS can also provide information about the management practices needed to establish vegetation where pyritic clay has been excavated.

2. Evesboro-Klej

Nearly level to steep, deep, excessively drained, moderately well drained, and somewhat poorly drained, sandy soils; on uplands

This map unit makes up about 9 percent of the county. The map unit is about 65 percent Evesboro soils, 10 percent Klej soils, and 25 percent minor soils.

Evesboro soils are gently sloping to steep and excessively drained. They are on divides and side slopes. The surface layer and the subsoil are sand.

Klej soils are nearly level and gently sloping and moderately well drained and somewhat poorly drained. They are in depressions and on low divides. The surface layer and the subsoil are loamy sand.

The minor soils in the map unit are Downer, Tinton, Hammonton, Lakewood, and Atsion soils. Downer and Tinton soils are well drained. Hammonton soils are moderately well drained and somewhat poorly drained. Lakewood soils are excessively drained. Atsion soils are poorly drained.

Most areas of this map unit in the eastern part of the county are used for community development. Most of the rest of the areas that are poorly suited to farming are wooded. A few areas are used for pasture, general farming, and irrigated truck crops.

3. Freehold-Urban land-Collington

Nearly level to moderately steep, deep, well drained, loamy soils and Urban land; on uplands

This map unit makes up about 22 percent of the county. The map unit is about 40 percent Freehold soils, 15 percent Urban land, 10 percent Collington soils, and 35 percent minor soils.

Freehold soils are nearly level to moderately steep and well drained. They are on divides and side slopes. The surface layer is loamy sand, sandy loam, and loam. The subsoil is sandy loam and sandy clay loam.

Urban land consists of areas that are covered by industrial, commercial, and residential development. Keyport, Klej, and Elkton soils that have been cut or graded are in most areas around building foundations. These soils also make up most fill material used to support buildings.

Collington soils are nearly level to strongly sloping and well drained. They are on divides and side slopes. The surface layer is sandy loam and loam. The subsoil is sandy loam and sandy clay loam.

The minor soils in this map unit are Shrewsbury, Colts Neck, Phalanx, Marlton, Colemantown, Evesboro, and Pemberton soils. Shrewsbury and Colemantown soils are poorly drained. Colts Neck and Phalanx soils are well drained. Marlton soils are well drained, and Pemberton soils are moderately well drained and somewhat poorly drained.

This map unit is the agricultural center of the county. Most areas of this map unit are used for common field crops, hay, sod, and vegetables. Some areas are used for pasture. Many horse farms are located throughout the map unit. Many areas in the central and eastern parts of the unit are rapidly being converted to community development. The rest of the areas, which are either poorly suited to farming or are not in urban use, are mainly wooded.

4. Sassafras-Downer-Woodstown

Nearly level to steep, deep, well drained and moderately well drained, loamy soils; on uplands

This map unit makes up about 11 percent of the county. The unit is about 30 percent Sassafras soils, 25 percent Downer soils, 15 percent Woodstown soils, and 30 percent minor soils.

Sassafras soils are nearly level to steep and well drained. They are on divides and side slopes. The surface layer is sandy loam, gravelly sandy loam, and loam. The subsoil is sandy loam and sandy clay loam.

Downer soils are nearly level to strongly sloping and well drained. They are on divides and side slopes. The surface layer is loamy sand and sandy loam. The subsoil is sandy loam.

Woodstown soils are nearly level and gently sloping and moderately well drained. They are in depressions, in swales, and on low divides. The surface layer is sandy loam and loam. The subsoil is sandy loam and sandy clay loam.

The minor soils in this map unit are Fallsington, Evesboro, Hammonton, Freehold, and Klej soils. Fallsington soils are poorly drained. Evesboro soils are excessively drained. Hammonton and Klej soils are moderately well drained and somewhat poorly drained. Freehold soils are well drained.

Most areas of this map unit are used for common field crops, hay, sod, and vegetables. Some areas are used for pasture. Many horse farms are located throughout the unit. Many areas in the southeastern part of the county are in urban use. Some areas in that part of the county, which are not farmed or in urban use, are mainly wooded.

5. Lakewood-Lakehurst-Evesboro

Nearly level to moderately sloping, deep, excessively drained, moderately well drained, and somewhat poorly drained, sandy soils; on uplands

This map unit makes up about 11 percent of the county. The unit is about 28 percent Lakewood soils, 21 percent Lakehurst soils, 15 percent Evesboro soils, and 36 percent minor soils.

Lakewood soils are nearly level to moderately sloping and excessively drained. They are on divides and side slopes. The surface layer and the subsoil are sand.

Lakehurst soils are nearly level and moderately well drained and somewhat poorly drained. They are in depressions and on low divides. The surface layer is sand. The subsoil is loamy sand and sand.

Evesboro soils are gently sloping and moderately sloping and excessively drained. They are on divides and side slopes. The surface layer and the subsoil are sand.

The minor soils in the map unit are Atsion, Manahawkin, Tinton, and Klej soils and Humaquepts. Atsion soils are poorly drained. Manahawkin soils are very poorly drained. Tinton soils are well drained. Klej soils are moderately well drained and somewhat poorly

drained. Humaquepts are somewhat poorly drained or poorly drained.

Most areas of this map unit, which are poorly suited to general farming, are mainly wooded. A few areas are farmed, but irrigation is needed. A few areas are used for pasture, but droughtiness is a limitation.

6. Atsion

Nearly level, deep, poorly drained, sandy soils; on upland flats

This map unit makes up about 7 percent of the county. The unit is about 80 percent Atsion soils and 20 percent minor soils.

Atsion soils are in depressions and on broad flats. The surface and subsurface layers are sand. The subsoil is loamy sand and sand.

The minor soils in the map unit are Evesboro, Klej, Manahawkin, Lakehurst, and Elkton soils. Evesboro soils are excessively drained. Klej and Lakehurst soils are moderately well drained and somewhat poorly drained. Manahawkin soils are very poorly drained, and Elkton soils are poorly drained.

Almost all areas of this map unit are wooded. If drained and properly managed, these soils are suited to specialty crops, such as blueberries and cranberries. Some areas are used for blueberries.

7. Sulfaquents-Sulfihemists-Hooksan

Nearly level and gently sloping, deep, poorly drained, very poorly drained, and excessively drained, mucky and sandy soils; on coastal dunes and on tidal flats

This map unit makes up about 2 percent of the county. The map unit is about 45 percent Sulfaquents and Sulfihemists, 33 percent Hooksan soils, and 22 percent minor soils.

Sulfaquents and Sulfihemists are nearly level and poorly drained and very poorly drained. They are in tidal flats adjacent to bays and tidal streams. Sulfaquents have a surface layer of mucky silt loam. The substratum is loamy sand and sand. Sulfihemists have surface and subsurface layers of muck. The substratum is sand.

Hooksan soils are nearly level and gently sloping and excessively drained. They are on coastal dunes. The surface layer and the subsoil are sand.

The minor soils in the map unit are Hooksan Variant soils, Udorthents, and Humaquepts. Also included in the unit are Urban land and beaches. Hooksan Variant soils are poorly drained. Udorthents differ greatly from area to area; thus, no properties can be given. Humaquepts are somewhat poorly drained or poorly drained soils on flood plains. Beaches consist of areas of sandy soils that are subject to daily tidal flooding.

Almost all areas of this map unit are used as habitat for wildlife and for recreation. A few areas have been filled in and are used as sites for marinas or other community buildings.

8. Humaquepts, frequently flooded-Manahawkin

Nearly level, deep, somewhat poorly drained to very poorly drained, mucky and sandy soils; on flood plains and on lowlands

This map unit makes up about 5 percent of the county. The unit is about 85 percent Humaquepts, frequently flooded, 10 percent Manahawkin soils, and 5 percent minor soils.

Humaquepts, frequently flooded, are somewhat poorly drained to very poorly drained. They are in flood plains along perennial and intermittent streams. The surface layer and the subsoil are stratified sandy loam, loam, and silt loam.

Manahawkin soils are very poorly drained. They are in wide depressions and on broad flats on lowlands. The upper layers are muck. The substratum is loamy sand and sand.

The minor soils in the map unit are Atsion, Shrewsbury, Fallsington, and Colemantown soils. These soils are poorly drained.

Most areas of this map unit are wooded. Areas of the unit are poorly suited to most uses because of the seasonal high water table and flooding. A few areas along some of the wider flood plains are used for pasture.

9. Tinton-Phalanx-Urban land

Nearly level to steep, deep, well drained, loamy soils and Urban land; on uplands

This map unit makes up about 4 percent of the county. The map unit is about 40 percent Tinton soils, 35 percent Phalanx soils, 15 percent Urban land, and 10 percent minor soils (fig. 1).

Tinton soils are deep and well drained. They are on divides and side slopes. The surface layer is loamy sand more than 20 inches thick. The subsoil is sandy clay loam.

Phalanx soils are deep and well drained. They are on side slopes. The surface layer is loamy sand. The subsoil is loamy sand and sandy loam.

Urban land consists of areas that are covered by industrial, commercial, and residential development. Tinton and Phalanx soils that have been cut or graded are in most areas around building foundations. These soils also make up most fill material used to support buildings.

The minor soils in the map unit are Collington, Colts Neck, Evesboro, Freehold, and Sassafras soils. Collington, Colts Neck, Freehold, and Sassafras soils are well drained. Evesboro soils are excessively drained.

Most areas of this map unit are used as woodland and for community development. The rest of the areas, which are fairly well suited to farming, are used for pasture, general farming, and irrigated truck crops.

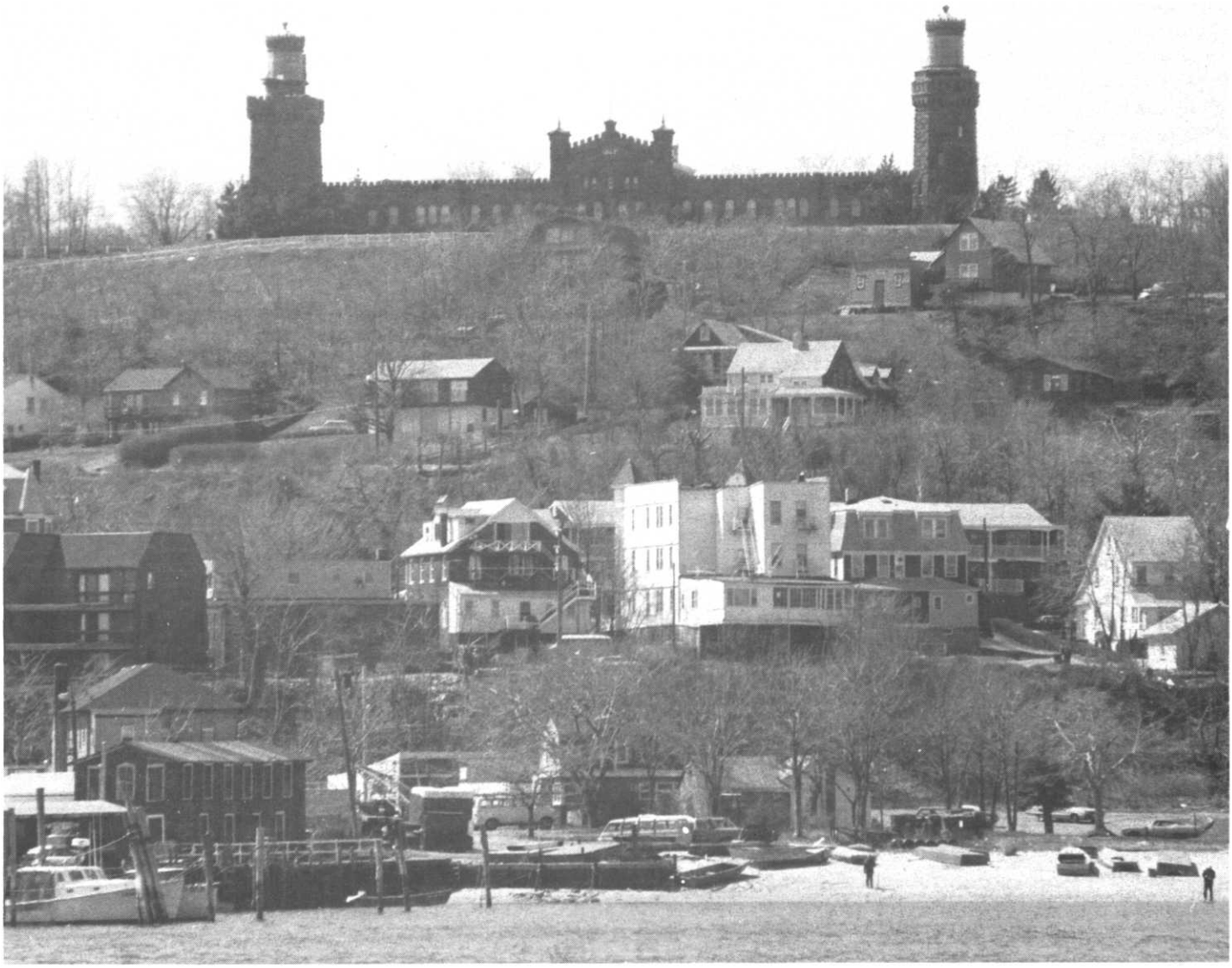


Figure 1.—An area along the eastern edge of the Tinton-Phalanx-Urban land general soil map unit.

10. Freehold-Urban land-Holmdel

Nearly level to steep, deep, well drained to somewhat poorly drained, loamy soils and Urban land; on uplands

This map unit makes up about 6 percent of the county. The unit is about 30 percent Freehold soils, 30 percent Urban land, 25 percent Holmdel, and 15 percent minor soils.

Freehold soils are nearly level to steep and well drained. They are on divides and side slopes. The surface layer is loamy sand, sandy loam, and loam. The subsoil is sandy loam and sandy clay loam.

Urban land consists of areas that are covered by industrial, commercial, and residential development. Freehold and Holmdel soils that have been cut or graded are in most areas around building foundations. These soils also make up most fill material used to support buildings.

Holmdel soils are nearly level and gently sloping and moderately well drained and somewhat poorly drained. They are in depressions and on low divides. The surface layer is sandy loam. The subsoil is sandy loam and sandy clay loam.

The minor soils in the map unit are Adelphia, Shrewsbury, Colts Neck, Phalanx, Marlton,

Colemantown, Evesboro, and Pemberton soils. Adelphia soils are somewhat poorly drained. Shrewsbury and Colemantown soils are poorly drained. Colts Neck and Phalanx soils are well drained. Marlton soils are well drained and moderately well drained. Evesboro soils are excessively drained, and Pemberton soils are moderately well drained and somewhat poorly drained.

Most areas of this map unit are used for common field crops, hay, sod, and vegetables. Some areas are used for pasture. Many horse farms are located throughout the unit. Many areas are being rapidly converted to community development. The rest of the areas, which are either poorly suited to farming or are not in urban use, are mainly wooded.

11. Tinton-Collington-Colts Neck

Nearly level to steep, deep, well drained, loamy soils; on uplands

This map unit makes up about 9 percent of the county. The map unit is about 35 percent Tinton soils, 20 percent Collington soils, 15 percent Colts Neck soils, and 30 percent minor soils.

Tinton soils are nearly level to steep and well drained. They are on divides and side slopes. The surface and subsurface layers are loamy sand. The subsoil is sandy loam and sandy clay loam.

Collington soils are nearly level to strongly sloping and well drained. They are on divides and side slopes. The surface layer is sandy loam and loam. The subsoil is sandy loam and sandy clay loam.

Colts Neck soils are gently sloping to steep and well drained. They are on divides and side slopes. The surface layer is reddish brown sandy loam. The subsoil is reddish brown sandy loam and sandy clay loam.

The minor soils in this map unit are Pemberton, Adelphia, Freehold, Holmdel, Evesboro, and Shrewsbury soils. Pemberton, Adelphia, and Holmdel soils are moderately well drained to somewhat poorly drained. Freehold soils are well drained. Evesboro soils are excessively drained. Shrewsbury soils are poorly drained.

Most areas of this map unit are used for common field crops, hay, sod, fruit, vegetables, and nursery stock. Some areas are used for pasture. Many horse farms are located throughout the unit. The rest of the areas, which are either poorly suited to farming or are not in community development, are mainly wooded.

Figure 2.—An area of the Freehold-Shrewsbury-Tinton general soil map unit. Some gently sloping areas of Freehold and Tinton soils are in the foreground and background. Shrewsbury soils are at the lower elevations.

12. Freehold-Shrewsbury-Tinton

Nearly level to steep, deep, well drained and poorly drained, loamy soils; on uplands

This map unit makes up about 6 percent of the county. The unit is about 35 percent Freehold soils, 30 percent Shrewsbury soils, 15 percent Tinton soils, and 20 percent minor soils (fig. 2).

Freehold soils are nearly level to steep and well drained. They are on divides and side slopes. The surface layer is loamy sand, sandy loam, and loam. The subsoil is sandy loam and sandy clay loam.

Shrewsbury soils are nearly level and poorly drained. They are on broad flats and in depressions and drainageways. The surface layer is sandy loam. The subsoil is sandy loam and sandy clay loam.

Tinton soils are nearly level to steep and well drained. They are on divides and side slopes. The surface layer is loamy sand. The subsoil is sandy loam and sandy clay loam.

The minor soils in the map unit are Holmdel and Pemberton soils. These soils are moderately well drained and somewhat poorly drained.

Most areas of this map unit are used for common field crops, hay, sod, orchards, and nursery stock. Some areas are used for pasture. A few areas are woodland.

Detailed Soil Map Units

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

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

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

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

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Collington sandy loam, 2 to 5 percent slopes, is one of several phases in the Collington series.

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

A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Evesboro sand-Urban land complex, 0 to 10 percent slopes, is an example.

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

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

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

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

Soil Descriptions

AeA—Adelphia loam, 0 to 2 percent slopes. This soil is nearly level, moderately well drained and somewhat poorly drained. It is in depressional areas and on low divides. Areas of the soil are irregular in shape and typically range from 10 to 40 acres in size.

Typically, the surface layer is very dark grayish brown loam 8 inches thick. The subsoil is 30 inches thick. It is strong brown sandy clay loam to a depth of 31 inches. Below that, it is mottled strong brown sandy loam to a depth of 38 inches. The substratum extends to a depth of 60 inches or more. It is mottled, strong brown sandy loam that has thin lenses of sandy clay loam.

Included with this unit in mapping are areas of Adelphia soils that have a surface layer of sandy loam. Also included are areas of Holmdel and gently sloping Adelphia soils. These soils, which make up about 40 percent of the unit, are similar to the nearly level Adelphia loam in use and management. Also included are areas of Freehold, Collington, Marlton, and Shrewsbury soils. These soils, which make up as much

as 15 percent of the unit, are dissimilar to the nearly level Adelphia loam in use and management.

Permeability of the Adelphia soil is moderately slow or moderate in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is high. The apparent seasonal high water table is at a depth of 1 1/2 to 4 feet from January to April. Runoff is slow. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, sod, and vegetables. The main limitation for crops is the seasonal high water. The main management concern is providing drainage (fig. 3). The seasonal high water table is a limitation for certain crops and restricts the time when the soils can be worked. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In the wetter areas improved drainage is needed.

This soil is well suited to commercial woodland production. Potential productivity for northern red oak is moderately high. The common species are northern red oak, black oak, white oak, yellow poplar, sweetgum and red maple. The wetter areas are dominated by sweetgum and red maple.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, cutbanks caving, frost action potential, and shrink-swell.

This soil is in capability subclass IIw; the woodland ordination symbol is 4A.

AeB—Adelphia loam, 2 to 5 percent slopes. This soil is gently sloping and moderately well drained and somewhat poorly drained. It is in depressional areas, in

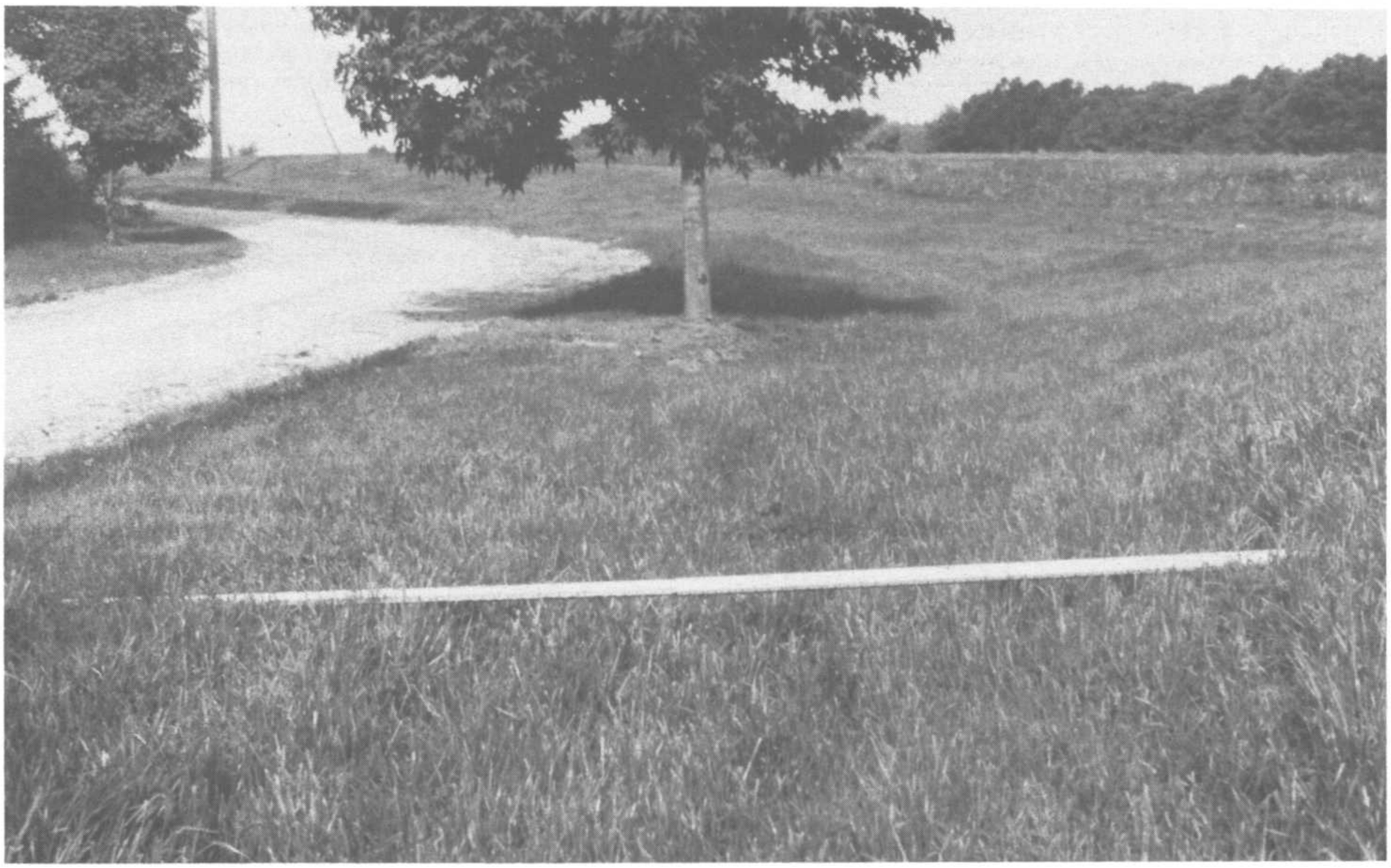


Figure 3.—A well established grassed waterway, planted to tall fescue, provides drainage on an area of Adelphia loam, 0 to 2 percent slopes.

swales, and on low divides. Areas of the soil are irregular in shape and typically range from 10 to 50 acres in size.

Typically, the surface layer is very dark grayish brown loam 8 inches thick. The subsoil is 30 inches thick. It is strong brown sandy clay loam to a depth of 31 inches. Below that, it is mottled, strong brown sandy loam to a depth of 38 inches. The substratum extends to a depth of 60 inches or more. It is mottled, strong brown sandy loam that has thin lenses of sandy clay loam.

Included with this unit in mapping are Adelphia soils that have a sandy loam surface layer. This soil, which makes up a significant portion of the map unit, is similar to the Adelphia loam in use and management. Also included are areas of Holmdel and nearly level Adelphia soils. These soils, which make up about 45 percent of the unit, are similar to the gently sloping Adelphia loam in use and management. Also included are areas of Freehold, Collington, Marlton, and Shrewsbury soils. These soils, which make up as much as 15 percent of the unit, are dissimilar to the gently sloping Adelphia loam in use and management.

Permeability of the Adelphia soil is moderately slow or moderate in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is high. The apparent seasonal high water table is at a depth of 1 1/2 to 4 feet from January to April. Runoff is medium. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, sod, and vegetables. The main limitation is the seasonal high water table. The main management concern is providing drainage. The seasonal high water table limits the soil for certain crops and restricts the time when the soils can be worked. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The major management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In some wetter areas improved drainage is needed.

This soil is well suited to commercial woodland production. Potential productivity for northern red oak is moderately high. The common species are northern red oak, black oak, white oak, yellow poplar, sweetgum, and red maple. The wetter areas are dominated by sweetgum and red maple.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, cutbanks caving, frost action potential, and shrinking and swelling.

This soil is in capability subclass IIw; the woodland ordination symbol is 4A.

ALA—Adelphia loam-Urban land complex, 0 to 5 percent slopes. This map unit consists of nearly level and gently sloping, moderately well drained and somewhat poorly drained Adelphia loam and Urban land. Areas of each are in such an intricate pattern that it was not practical to map them separately. The mapped areas are irregular in shape and typically range from 25 to 75 acres in size.

Adelphia loam makes up about 45 percent of each mapped area. Urban land makes up 30 percent, and other soils make up 25 percent.

Typically, the surface layer of the Adelphia soil is very dark grayish brown loam 8 inches thick. The subsoil is 30 inches thick. It is strong brown sandy clay loam to a depth of 31 inches. Below that, it is mottled, strong brown sandy loam to a depth of 38 inches. The substratum extends to a depth of 60 inches or more. It is mottled, strong brown sandy loam that has thin lenses of sandy clay loam.

Urban land unit consists of areas covered by impermeable surfaces, such as dwellings, roads and streets, shopping centers, parking lots, and industrial parks.

Included with this complex in mapping are areas of Adelphia soils that have a sandy loam surface layer and Holmdel soils. These soils are similar to the Adelphia loam in use and management. Also included are areas of Udorthents and Freehold, Collington, Marlton, and Shrewsbury soils. These soils are dissimilar to the Adelphia loam in use and management. The similar and dissimilar soils make up as much as 25 percent of the complex.

Permeability of the Adelphia soil is moderately slow or moderate in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is high. The apparent seasonal high water table is at a depth of 1 1/2 to 4 feet from January to April.

The open areas of this map unit are used for lawns, vacant wooded lots, gardens, and small parks.

The main limitations to use of the Adelphia soil as sites for dwellings and some other types of community development are the seasonal high water table, cutbanks caving, frost action potential, and shrinking and swelling.

This map unit is not assigned to a capability subclass; the woodland ordination symbol is 4A.

At—Atsion sand. This is a nearly level, poorly drained soil in depressional areas and on broad flats. Areas of this soil are irregular in shape and typically range from 10 to 75 acres in size.

Typically, the surface layer is 8 inches thick. The uppermost 2 inches is matted, partly decomposed organic material and roots, and below that, it is black sand. The subsurface layer is grayish brown sand 14 inches thick. The subsoil is 18 inches thick. It is dark reddish brown loamy sand to a depth of 30 inches.

Below that, it is mottled, brown sand to a depth of 40 inches. The substratum is mottled, yellowish brown fine sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Humaquepts and Manahawkin, Lakehurst, and Klej soils. Also included, in the vicinity of Holmeson and Turkey Swamp, are areas of soils that have a glaucontic substratum. These soils, which make up as much as 25 percent of the map unit, are dissimilar to the Atsion soil in use and management.

Permeability of the Atsion soil is moderately rapid or rapid in the subsoil and rapid in the substratum. The available water capacity is low. The apparent seasonal high water table is between the surface and a depth of 1 foot from November to June. Runoff is very slow. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are wooded. A few acres is used for blueberries.

This soil is suited to specialty crops, such as blueberries. For blueberries drainage and land smoothing are needed. The major limitation for most other crops is the seasonal high water table.

This soil is poorly suited to commercial woodland production. Potential productivity for pitch pine is high. The common species are pitch pine, black gum, and red maple.

The main limitation to use of this soil as sites for dwellings and some other types of community development is the seasonal high water table.

This soil is in capability subclass Vw; the woodland ordination symbol is 7W.

Cm—Colemantown loam. This is a nearly level, poorly drained soil in depressional areas and on broad flats. Areas of the soil are irregular in shape and typically range from 10 to 50 acres in size.

Typically, the surface layer is very dark brown loam 9 inches thick. The subsoil is mottled, dark greenish gray clay loam 27 inches thick. The substratum extends to a depth of 60 inches or more. It is mottled, dark greenish gray stratified sandy clay loam, sandy loam, and sandy clay to a depth of 48 inches. Below that, it is dark greenish gray sandy clay to a depth of 60 inches or more.

Included with this soil in mapping are areas of Kresson and Shrewsbury soils. These soils, which make up about 35 percent of the map unit, are similar to the Colemantown soil in use and management. Also included are areas of Adelphia soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Colemantown soil in use and management.

Permeability of this Colemantown soil is slow in the subsoil and moderately slow in the substratum. The available water capacity is high. The perched seasonal high water table is between the surface and a depth of 1 foot from October to June. Runoff is slow. Erosion is a slight hazard. Organic matter content is moderate to high. The soil is subject to occasional flooding. In unlimed areas reaction is extremely acid or very strongly acid.

About half the acreage of this soil is farmed. A few acres is used for pasture. The rest of the acreage is woodland.

This soil is suited to common field crops, hay, and vegetables. The main limitation is the seasonal high water table. The main management concern is providing drainage. In some areas the clayey subsoil and substratum limit the efficiency of subsurface drainage. The seasonal high water table limits the soil for certain crops and restricts the time when the soils can be worked. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. The major management practices are proper seeding, proper stocking, liming and fertilizing, and rotation of grazing. In some wetter areas improved drainage is needed.

This soil is suited to commercial woodland production. Potential productivity for pin oak is moderately high. During wet periods the use of equipment for harvesting trees is limited. The common species are pin oak, sweetgum, and red maple.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table and flooding.

This soil is in capability subclass IIIw; the woodland ordination symbol is 4W.

CnB—Collington sandy loam, 2 to 5 percent slopes. This is a gently sloping, well drained soil on divides. Areas of the soil are irregular in shape and typically range from 10 to 50 acres in size.

Typically, the surface layer is dark brown sandy loam 11 inches thick. The subsoil is 21 inches thick. It is dark brown loam and sandy clay loam to a depth of 29 inches. Below that, it is dark brown sandy loam to a depth of 32 inches. The substratum is dark brown and brown sandy loam and coarse sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Collington soils that have a loam surface layer and Freehold soils. These soils, which make up about 35 percent of the map unit, are similar to the Collington sandy loam. Also included are areas of Holmdel, Adelphia, and Marlton soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to Collington sandy loam in use and management.

Permeability of this Collington soil is moderately slow or moderate in the subsoil and moderately slow to moderately rapid in the substratum. The available water capacity is high. The seasonal high water table is at

depth of more than 6 feet. Runoff is medium. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

Most areas of this soil are farmed (fig. 4). A small acreage is used for pasture. A few acres is woodland.

This soil is well suited to common field crops, hay, sod, and vegetables. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The major management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is well suited to commercial woodland production. Potential productivity for northern red oak is moderately high. The common species are northern red oak, black oak, yellow poplar, scarlet oak, and white oak.

The main limitations to use of this soil as sites for dwellings and some other types of community development are shrinking and swelling and cutbanks caving.

This soil is in capability subclass IIe; the woodland ordination symbol is 4A.

CnC2—Collington sandy loam, 5 to 10 percent slopes, eroded. This is a moderately sloping, well drained soil on side slopes. Areas of the soil are irregular in shape and typically range from 5 to 30 acres in size.

Typically, the surface layer is dark brown sandy loam 11 inches thick. The subsoil is 21 inches thick. It is dark brown loam and sandy clay loam to a depth of 29 inches. Below that, it is dark brown sandy loam to a depth of 32 inches. The substratum is dark brown and brown sandy loam and coarse sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Freehold soils. These soils, which make up about 25

Figure 4.—An apple orchard pruned and trained on wire at the Cream Ridge Research Farm, Rutgers, The State University. The soil is Collington sandy loam, 2 to 5 percent slopes.

percent of the map unit, are similar to the Collington soil in use and management.

Permeability of this Collington soil is moderately slow or moderate in the subsoil and moderately slow to moderately rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is medium. Erosion is a moderate hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, sod, and vegetables. Erosion is a hazard. The main management concern is reducing runoff and controlling erosion. Contour farming, stripcropping, grassed waterways, and cropland terraces or diversion terraces generally are needed to reduce runoff and to control erosion. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is suited to commercial woodland production. Potential productivity for northern red oak is moderately high. The common species are northern red oak, black oak, yellow poplar, scarlet oak, and white oak.

The main limitations to use of this soil as sites for dwellings and some other types of community development are shrinking and swelling, cutbanks caving, and slope.

This soil is in capability subclass IIIe; the woodland ordination symbol is 4A.

CnD3—Collington sandy loam, 10 to 15 percent slopes, severely eroded. This is a strongly sloping, well drained soil on side slopes. Areas of the soil are long and narrow in shape and typically range from 5 to 20 acres in size. Erosion has removed much of the original surface layer, and the subsoil is exposed in places.

Typically, the surface layer is dark brown sandy loam 11 inches thick. The subsoil is 21 inches thick. It is dark brown loam and sandy clay loam to a depth of 29 inches. Below that, it is dark brown sandy loam to a depth of 32 inches. The substratum is dark brown and brown sandy loam and coarse sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Freehold soils and the moderately steep and steep Collington soils. These soils, which make up about 30 percent of the map unit, are similar to the strongly sloping Collington soil in use and management.

Permeability of the Collington soil is moderately slow or moderate in the subsoil and moderately slow to moderately rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is rapid. Erosion is a severe hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

A few acres of this soil is farmed. A small acreage is used for pasture. The rest of the acreage is woodland.

This soil is poorly suited to common field crops, hay, and vegetables. Erosion is a hazard. The soil has poor tilth, and erosion of the original surface layer has removed most of the organic matter and many nutrients, causing poor germination and low yields. The main management concern is reducing runoff and controlling erosion. Contour farming, stripcropping, grassed waterways, and cropland terraces or diversion terraces help to reduce runoff and to control erosion. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is poorly suited to pasture. Proper seeding, proper stocking, liming and fertilizing, and rotation grazing help to maintain plant cover and control erosion.

This soil is well suited to commercial woodland production. Potential productivity for northern red oak is moderately high. The common species are northern red oak, black oak, yellow poplar, scarlet oak, and white oak.

The main limitations to use of this soil as sites for dwellings and some other types of community development are slope, shrinking and swelling, and cutbanks caving.

This soil is in capability subclass VIe; the woodland ordination symbol is 4A.

CoA—Collington loam, 0 to 2 percent slopes. This is a nearly level, well drained soil on divides. Areas of the soil are irregular in shape and typically range from 5 to 30 acres in size.

Typically, the surface layer is dark brown loam 11 inches thick. The subsoil is 21 inches thick. It is dark brown loam and sandy clay loam to a depth of 29 inches. Below that, it is dark brown sandy loam to a depth of 32 inches. The substratum is dark brown and brown sandy loam and coarse sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Collington soils that have a sandy loam surface layer and Freehold soils. These soils, which make up about 35 percent of the map unit, are similar to the Collington loam in use and management. Also included are areas of Holmdel, Adelphia, and Marlton soils. These soils, which make up as much as 15 percent of the map unit, are similar to the Collington loam in use and management.

Permeability of this Collington soil is moderately slow or moderate in the subsoil and moderately slow to moderately rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is slow. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is well suited to common field crops, hay, sod, and vegetables. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is well suited to commercial woodland production. Potential productivity for northern red oak is moderately high. The common species are northern red oak, black oak, yellow poplar, scarlet oak, and white oak.

The main limitations to use of this soil as sites for dwellings and some other types of community development are shrinking and swelling and cutbanks caving.

This soil is in capability class I; the woodland ordination symbol is 4A.

CRB—Collington sandy loam-Urban land complex, 0 to 10 percent slopes. This map unit consists of gently sloping and moderately sloping, well drained Collington sandy loam and Urban land. Areas of each are in such an intricate pattern that it was not practical to map them separately. The mapped areas are irregular in shape and typically range from 20 to 40 acres in size.

Collington sandy loam makes up about 40 percent of each mapped area. Urban land makes up 30 percent, and other soils make up 30 percent.

Typically, the surface layer of the Collington soil is dark brown sandy loam 11 inches thick. The subsoil is 21 inches thick. It is dark brown loam and sandy clay loam to a depth of 29 inches. Below that, it is dark brown sandy loam to a depth of 32 inches. The substratum is dark brown and brown sandy loam and coarse sandy loam to a depth of 60 inches or more.

Urban land consists of areas covered by impermeable surfaces, such as dwellings, roads and streets, shopping centers, parking lots, and industrial parks.

Included with this complex in mapping are areas of Collington soils that have a loam surface layer and Colts Neck and Freehold soils. These soils are similar to the Collington sandy loam in use and management. Also included are areas of Udorthents and Holmdel, Shrewsbury, Adelphia, and Marlton soils. These soils are dissimilar to the Collington sandy loam in use and management. The similar and dissimilar soils make up as much as 30 percent of the complex.

Permeability of the Collington soil is moderately slow or moderate in the subsoil and moderately slow to moderately rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet.

The open areas of this map unit are used for lawns, vacant wooded lots, gardens, and small parks.

The main limitations to use of the Collington soil as sites for dwellings and some other types of community development are shrinking and swelling and cutbanks caving.

This soil is not assigned to a capability subclass; the woodland ordination symbol is 4A.

CtB—Colts Neck sandy loam, 2 to 5 percent slopes. This is a gently sloping, well drained soil on divides. Areas of the soil are irregular in shape and typically range from 10 to 50 acres in size.

Typically, the surface layer is dark reddish brown sandy loam 10 inches thick. The subsoil is 32 inches thick. It is dark reddish brown and reddish brown sandy loam and sandy clay loam to a depth of 35 inches. Below that, it is reddish brown loamy sand to a depth of 42 inches. The substratum is reddish brown loamy coarse sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Colts Neck soils that have a loam surface layer. Also included are areas of Collington and Freehold soils and Colts Neck soils that have a loamy sand surface layer as much as 20 inches thick. These soils, which make up about 30 percent of the map unit, are similar to the Colts Neck sandy loam in use and management. Also included are areas of Holmdel and Phalanx soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Colts Neck sandy loam in use and management.

Permeability of this Colts Neck soil is moderate in the subsoil and moderately rapid or rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is medium. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to very strongly acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, sod, and vegetables (fig. 5). Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is well suited to commercial woodland production. Potential productivity for yellow poplar is moderately high. The common species are yellow poplar, Virginia pine, white oak, black oak, and northern red oak.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the cemented pan, frost action, and poor filter.

This soil is in capability subclass IIe; the woodland ordination symbol is 4A.

Figure 5.—A potato field in an area of Colts Neck sandy loam, 2 to 5 percent slopes.

CtC—Colts Neck sandy loam, 5 to 10 percent slopes. This is a moderately sloping, well drained soil on side slopes. Areas of the soil are long and narrow in shape and typically range from 10 to 25 acres in size.

Typically, the surface layer is dark reddish brown sandy loam 10 inches thick. The subsoil is 32 inches thick. It is dark reddish brown and reddish brown sandy loam and sandy clay loam to a depth of 35 inches. Below that, it is reddish brown loamy sand to a depth of 42 inches. The substratum is reddish brown loamy coarse sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Freehold and Collington soils and Colts Neck soils that have a loamy sand surface layer as much as 20 inches thick. These soils, which make up about 20 percent of the map unit, are similar to the Colts Neck sandy loam in use and management. Also included are areas of Phalanx soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Colts Neck sandy loam in use and management.

Permeability of this Colts Neck soil is moderate in the subsoil and moderately rapid or rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is medium. Erosion is a moderate hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to very strongly acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, and vegetables. Erosion is a hazard. The main management concerns are reducing runoff and controlling erosion. Contour farming, stripcropping, grassed waterways, and cropland terraces or diversion terraces help to reduce runoff and to control erosion. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. Proper seeding, proper stocking, liming and fertilizing, and rotation grazing help to maintain plant cover.

This soil is suited to commercial woodland production. Potential productivity for yellow poplar is moderately high. The common species are yellow poplar, Virginia pine, white oak, black oak, and northern red oak.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the cemented pan, frost action, poor filter, and slope.

This soil is in capability subclass IIIe; the woodland ordination symbol is 4A.

CtC2—Colts Neck sandy loam, 5 to 10 percent slopes, eroded. This is a moderately sloping, well drained soil on side slopes. Areas of the soil are long

and narrow in shape and typically range from 10 to 50 acres in size.

Typically, the surface layer is dark reddish brown sandy loam 10 inches thick. The subsoil is 32 inches thick. It is dark reddish brown and reddish brown sandy loam and sandy clay loam to a depth of 35 inches. Below that, it is reddish brown loamy sand to a depth of 42 inches. The substratum is reddish brown loamy coarse sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Freehold and Collington soils and Colts Neck soils that have a loamy sand surface layer as much as 20 inches thick. These soils, which make up about 20 percent of the map unit, are similar to the Colts Neck sandy loam in use and management. Also included are areas of Phalanx soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Colts Neck sandy loam in use and management.

Permeability of this Colts Neck soil is moderate in the subsoil and moderately rapid or rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is medium. Erosion is a moderate hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to very strongly acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, and vegetables. Erosion is a hazard. The main management concerns are reducing runoff and controlling erosion. Contour farming, stripcropping, grassed waterways, and cropland terraces or diversion terraces help to reduce runoff and to control erosion. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. Proper seeding, proper stocking, liming and fertilizing, and rotation grazing help to maintain plant cover.

This soil is well suited to commercial woodland production. Potential productivity for yellow poplar is moderately high. The common species are yellow poplar, Virginia pine, white oak, black oak, and northern red oak.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the cemented pan, frost action, poor filter, and slope.

This soil is in capability subclass IIIe; the woodland ordination symbol is 4A.

CtD2—Colts Neck sandy loam, 10 to 15 percent slopes, eroded. This is a strongly sloping, well drained soil on side slopes. Areas of the soil are long and narrow in shape and typically range from 5 to 25 acres in size.

Typically, the surface layer is dark reddish brown sandy loam 10 inches thick. The subsoil extends to a depth of 42 inches. It is dark reddish brown and reddish brown sandy loam and sandy clay loam to a depth of 35 inches. Below that, it is reddish brown loamy sand to a depth of 42 inches. The substratum is reddish brown loamy coarse sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Collington and Freehold soils and Colts Neck soils that have a loamy sand surface layer as much as 20 inches thick. These soils, which make up about 20 percent of the map unit, are similar to the Colts Neck sandy loam in use and management. Also included are areas of Phalanx and Tinton soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Colts Neck sandy loam in use and management.

Permeability of this Colts Neck soil is moderate in the subsoil and moderately rapid or rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is rapid. Erosion is a severe hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to very strongly acid.

Most of the acreage of this soil is woodland. A few acres is farmed. A small acreage is used for pasture.

This soil is poorly suited to common field crops, hay, and vegetables. Erosion is a hazard. The main management concerns are reducing runoff and controlling erosion. Contour farming, stripcropping, grassed waterways, and cropland terraces or diversion terraces help to reduce runoff and to control erosion. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. Proper seeding, proper stocking, liming and fertilizing, and rotation grazing help to maintain plant cover and to control erosion.

This soil is well suited to commercial woodland production. Potential productvity for yellow poplar is moderately high. The common species are yellow poplar, Virginia pine, white oak, black oak, and northern red oak.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the cemented pan, frost action, poor filter, and slope.

This soil is in capability subclass IVe; the woodland ordination symbol is 4A.

CtE2—Colts Neck sandy loam, 15 to 25 percent slopes, eroded. This is a moderately steep to steep, well drained soil on side slopes. Areas of the soil are long and narrow in shape and typically range from 5 to 25 acres in size.

Typically, the surface layer is dark reddish brown sandy loam 10 inches thick. The subsoil is 32 inches thick. It is dark reddish brown and reddish brown sandy loam and sandy clay loam to a depth of 35 inches. Below that, it is reddish brown loamy sand to a depth of 42 inches. The substratum is reddish brown loamy coarse sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Collington and Freehold soils and Colts Neck soils that

have a loamy sand surface layer as much as 20 inches thick. These soils, which make up about 20 percent of the map unit, are similar to the Colts Neck sandy loam in use and management. Also included are areas of Phalanx and Tinton soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Colts Neck sandy loam in use and management.

Permeability of this Colts Neck soil is moderate in the subsoil and moderately rapid or rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is very rapid. Erosion is a severe hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid or very strongly acid.

Most of the acreage of this soil is woodland. A few acres are used for pasture.

This soil is poorly suited to common field crops, hay, vegetables, and pasture. Erosion is a hazard. The main limitation is slope. The main management concern is reducing runoff and controlling erosion.

This soil is suited to commercial woodland production. Potential productivity for yellow poplar is moderately high. The common species are yellow poplar, Virginia pine, white oak, black oak, and northern red oak.

The main limitation to use of this soil as sites for dwellings and some other types of community development is slope.

This soil is in capability subclass VIe; the woodland ordination symbol is 4R.

DnA—Downer loamy sand, 0 to 5 percent slopes. This is a nearly level to gently sloping, well drained soil on divides. Areas of the soil are irregular in shape and typically range from 5 to 30 acres in size.

Typically, the surface layer is dark brown loamy sand 10 inches thick. The subsoil is strong brown sandy loam 16 inches thick. The substratum is strong brown gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Downer soils that have a sandy loam surface layer and Sassafras soils. These soils, which make up about 25 percent of the map unit, are similar to the Downer loamy sand in use and management. Also included are areas of Hammonton soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Downer loamy sand in use and management.

Permeability of this Downer soil is moderate or moderately rapid in the subsoil and moderately rapid in the substratum. The available water capacity is moderate. The seasonal high water table is at a depth of more than 6 feet. Runoff is slow. Water erosion is a slight hazard. Wind erosion is a moderate hazard. Organic matter content is low or moderate. In unlimed areas reaction is extremely acid or strongly acid.

Some areas of this soil are farmed. A few acres is used for pasture. A small acreage is woodland.

This soil is suited to common field crops, hay, and vegetables. In some areas irrigation and more frequent applications of lime and fertilizer are needed. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is suited to commercial woodland production. Potential productivity for black oak is moderately high. The common species are black oak, white oak, scarlet oak, and Virginia pine.

The main limitations to use of this soil as sites for dwellings and some other types of community development are poor filter and seepage.

This soil is in capability subclass IIs; the woodland ordination symbol is 4A.

DnC—Downer loamy sand, 5 to 10 percent slopes. This is a moderately sloping, well drained soil on side slopes. Areas of the soil are irregular in shape and typically range from 5 to 30 acres in size.

Typically, the surface layer is dark brown loamy sand 10 inches thick. The subsoil is strong brown sandy loam 16 inches thick. The substratum is strong brown gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Downer soils that have a sandy loam surface layer and Sassafras soils. These soils, which make up about 25 percent of the map unit, are similar to the Downer loamy sand in use and management. Also included are areas of Evesboro soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Downer loamy sand in use and management.

Permeability of this Downer soil is moderate or moderately rapid in the subsoil and moderately rapid in the substratum. The available water capacity is moderate. The seasonal high water table is at a depth of more than 6 feet. Runoff is medium. Water erosion is a moderate hazard. Wind erosion is a moderate hazard. Organic matter content is low or moderate. In unlimed areas reaction is extremely acid or strongly acid.

A few areas of this soil are farmed. A small acreage is used for pasture. A small acreage is in woodland.

This soil is suited to common field crops, hay, and vegetables. In some areas irrigation and more frequent applications of lime and fertilizer are needed. Erosion is a hazard. The main management concerns are reducing runoff and controlling erosion. Contour farming, stripcropping, grassed waterways, and cropland terraces or diversion terraces help to reduce runoff and to control erosion. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. Proper seeding, proper stocking, liming and fertilizing, and rotation grazing help to maintain plant cover.

This soil is suited to commercial woodland production. Potential productivity for black oak is moderately high. The common species are black oak, white oak, scarlet oak, and Virginia pine.

The main limitations to use of this soil as sites for dwellings and some other types of community development are poor filter, seepage, and slope.

This soil is in capability subclass IIIe; the woodland ordination symbol is 4A.

DoA—Downer sandy loam, 0 to 2 percent slopes. This is a nearly level, well drained soil on divides. Areas of the soil are irregular in shape and typically range from 5 to 25 acres in size.

Typically, the surface layer is dark brown sandy loam 10 inches thick. The subsoil is strong brown sandy loam 16 inches thick. The substratum is strong brown gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Downer soils that have a loamy sand surface layer and Sassafras soils. These soils, which make up about 25 percent of the map unit, are similar to the Downer sandy loam in use and management. Also included are areas of Hammonton soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Downer sandy loam in use and management.

Permeability of this Downer soil is moderate or moderately rapid in the subsoil and moderately rapid in the substratum. The available water capacity is moderate. The seasonal high water table is at a depth of more than 6 feet. Runoff is slow. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or strongly acid.

Most areas of this soil are farmed (fig. 6). A few acres is used for pasture. A small acreage is woodland.

This soil is suited to common field crops, hay, sod, and vegetables. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is suited to commercial woodland production. Potential productivity for black oak is moderately high. The common species are black oak, white oak, scarlet oak, and Virginia pine.

The main limitations to use of this soil as sites for dwellings and some other types of community development are poor filter and seepage.

This soil is in capability class I; the woodland ordination symbol is 4A.

DoB—Downer sandy loam, 2 to 5 percent slopes. This is a gently sloping, well drained soil on divides. Areas of the soil are irregular in shape and typically range from 10 to 50 acres in size.

Typically, the surface layer is dark brown sandy loam 10 inches thick. The subsoil is strong brown sandy loam 16 inches thick. The substratum is strong brown gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Downer soils that have a loamy sand surface layer and Sassafras soils. These soils, which make up about 25 percent of the map unit, are similar to the Downer sandy loam in use and management. Also included are areas of Hammonton soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Downer sandy loam in use and management.

Permeability of this Downer soil is moderate or moderately rapid in the subsoil and moderately rapid in the substratum. The available water capacity is moderate. The seasonal high water table is at a depth of more than 6 feet. Runoff is slow. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or strongly acid.

Most areas of this soil are farmed. A few acres is used for pasture. A small acreage is woodland.

This soil is well suited to common field crops, hay, sod, and vegetables. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is suited to commercial woodland production. Potential productivity for black oak is moderately high. The common species are black oak, white oak, scarlet oak, and Virginia pine.

The main limitations to use of this soil as sites for dwellings and some other types of community development are poor filter and seepage.

This soil is in capability subclass IIe; the woodland ordination symbol is 4A.

DUB—Downer sandy loam-Urban land complex, 0 to 10 percent slopes. This map unit consists of nearly level and gently sloping, well drained Downer sandy loam and Urban land. The areas of each are in such an intricate pattern that it was not practical to map them separately. The mapped areas are irregular in shape and typically range from 20 to 100 acres in size.

Downer sandy loam makes up about 50 percent of each mapped area. Urban land makes up 30 percent, and other soils make up 20 percent.

Typically, the surface layer of the Downer soil is dark brown sandy loam 10 inches thick. The subsoil is strong dark brown sandy loam 16 inches thick. The substratum is strong brown gravelly loamy sand to a depth of 60 inches or more.

Urban land consists of areas covered by impermeable surfaces, such as dwellings, roads and streets, shopping centers, parking lots, and industrial parks.

Figure 6.—Deciduous tree nursery stock on an area of Downer sandy loam, 0 to 2 percent slopes. The strips of fescue between the tree rows help to control erosion.

Included with this complex in mapping are areas of Downer soils that have a loamy sand surface layer and Sassafras soils. These soils are similar to the Downer sandy loam in use and management. Also included are Hammonton soils and Udorthents. These soils are dissimilar to the Downer sandy loam in use and management. The similar and dissimilar soils make up as much as 20 percent of the complex.

Permeability of the Downer soil is moderate or moderately rapid in the subsoil and moderately rapid in the substratum. The available water capacity is moderate. The seasonal high water table is at a depth of more than 6 feet.

The open areas of this map unit are used for lawns, gardens, and small parks or are vacant wooded lots.

The main limitations to use of the Downer soil as sites for dwellings and some other types of community development are poor filter and seepage.

This map unit is not assigned to a capability subclass; the woodland ordination symbol is 4A.

En—Elkton loam. This is a nearly level, poorly drained soil in depressional areas and on broad flats. Areas of the soil are irregular in shape and typically range from 10 to 50 acres in size.

Typically, the surface layer is 4 inches thick. In the uppermost 2 inches it is matted, decomposed organic

material and roots, and below that it is very dark gray loam. The subsurface layer is dark gray loam 5 inches thick. The subsoil is 32 inches thick. It is mottled, grayish brown silty clay to a depth of 21 inches. Below that, it is mottled, dark gray silty clay to a depth of 41 inches. The substratum is mottled, dark gray silty clay to a depth of 60 inches or more.

Included with this soil in mapping are areas of Elkton soils that have a sandy loam surface layer and Fallsington and Shrewsbury soils. These soils, which make up about 45 percent of the map unit, are similar to the Elkton loam in use and management. Also included are areas of Keyport soils and Humaquepts. Also included are areas of poorly drained sandy soils that range from 10 to 40 inches deep over a clayey substratum. Also included are soils that have a muck surface layer ranging from 10 to 50 inches deep over a clayey substratum. These soils, which make up as much as 25 percent of the map unit, are dissimilar to the Elkton loam in use and management.

Permeability of this Elkton soil is slow in the subsoil and moderately slow to moderately rapid in the substratum. The available water capacity is high. The apparent seasonal high water table is between the surface and a depth of 1 foot from January to April. Runoff is slow. Erosion is a slight hazard. Organic matter content is moderate. This soil is subject to rare flooding. In unlimed areas reaction is strongly acid or very strongly acid.

Most of the acreage of this soil is wooded. A small acreage is used for farming. A few acres is used for pasture.

This soil is suited to common field crops, hay, and vegetables. The main limitation is the seasonal high water table. The main management concern is providing drainage. In some areas the clayey subsoil and the substratum limit the efficiency of subsurface drainage. The seasonal high water table limits this soil for certain crops and the time when the soil can be worked. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In some wetter areas improved drainage is needed.

This soil is suited to commercial woodland production. Potential productivity for white oak is moderately high. The main limitation is the seasonal high water table. The common species are white oak, sweetgum, red maple, and sweetbay magnolia. The wetter areas are dominated by sweetgum and red maple.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, high clay content, slow percolation, low strength, and flooding.

This soil is in capability subclass IIIw; the woodland ordination symbol is 4W.

EvB—Evesboro sand, 2 to 5 percent slopes. This is a gently sloping, excessively drained soil on divides. Areas of the soil are irregular in shape and typically range from 25 to 100 acres in size.

Typically, the surface layer is 4 inches thick. In the uppermost 2 inches it is matted, decomposed organic matter and roots. Below that, it is grayish brown sand. The subsurface layer is yellowish brown sand 5 inches thick. The subsoil is yellowish brown sand 25 inches thick. The substratum is yellowish brown sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Lakewood soils. Also included are Evesboro soils, in areas near Phalanx soils, that have iron-cemented, sandstone fragments and channers. Also included are Evesboro soils, in areas near Lincroft and Colts Neck soils, that have a redder hue throughout the profile and have small amounts of glauconite. Lakewood and Evesboro soils, which make up about 20 percent of the map unit, are similar to the Evesboro sand in use and management. Also included are areas of Klej, Downer, Lakehurst, and Tinton soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Evesboro sand in use and management.

Permeability of this Evesboro soil is rapid in the subsoil and the substratum. The available water capacity is low. The seasonal high water table is at a depth of more than 6 feet. Runoff is very slow. Water erosion is a slight hazard. Wind erosion is a severe hazard. Organic matter content is low. In unlimed areas reaction is strongly acid to extremely acid.

Most areas of this soil are wooded. A few acres is used for farming and pasture.

This soil is poorly suited to common field crops, hay, and vegetables. The main limitations are the low available water capacity, the low organic matter content, and rapid permeability. If the soil is farmed, the main management concerns are irrigation and frequent applications of lime and fertilizer. Cover crops and crop residue management help to maintain soil tilth and organic matter content. Windbreaks and cover crops help to control wind erosion.

This soil is poorly suited to pasture. The suitable management practices are proper seeding, proper stocking, frequent liming and fertilizing, and rotation grazing.

This soil is poorly suited to commercial woodland production. Potential productivity for pitch pine is high. The common species are pitch pine, Virginia pine, black oak, white oak, and chestnut oak.

The main limitations to use of this soil as sites for dwellings and some other types of community development are poor filter, cutbanks caving, and sandiness.

This soil is in capability subclass VIIs; the woodland ordination symbol is 6S.

EvC—Evesboro sand, 5 to 10 percent slopes. This is a moderately sloping, excessively drained soil on side slopes. Areas of the soil are irregular in shape and typically range from 10 to 50 acres in size.

Typically, the surface layer is 4 inches thick. In the uppermost 2 inches it is matted, decomposed organic matter and roots. Below that, it is grayish brown sand. The subsurface layer is yellowish brown sand 5 inches thick. The subsoil is yellowish brown sand 25 inches thick. The substratum is yellowish brown sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Lakewood soils and, near Phalanx soils, areas of Evesboro soils that have iron-cemented, sandstone fragments and channers. Also included, near Colts Neck soils, are areas of Evesboro soils that have a redder hue throughout and that have small amounts of glauconite. These soils, which make up about 25 percent of the map unit, are similar to the Evesboro sand in use and management. Also included are areas of Phalanx, Downer, Sassafras, and Tinton soils. Also included in the vicinity of Englishtown are areas of moderately sloping sandy soils that have a clay substratum at a depth of 48 to 60 inches. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Evesboro sand in use and management.

Permeability of this Evesboro soil is rapid in the subsoil and the substratum. The available water capacity is low. The seasonal high water table is at a depth of more than 6 feet. Runoff is slow. Water erosion is a moderate hazard. Wind erosion is a severe hazard. Organic matter content is low. In unlimed areas reaction is strongly acid to extremely acid.

Most areas of this soil are wooded. A few acres is used for farming and pasture.

This soil is poorly suited to common field crops, hay, and vegetables. The main limitations are the low available water capacity, the low organic matter content, and rapid permeability. If the soil is farmed, the main management concerns are irrigation and frequent applications of lime and fertilizer. Cover crops and crop residue management help to maintain soil tilth and organic matter. Windbreaks and cover crops help to control wind erosion.

This soil is poorly suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is poorly suited to commercial woodland production. Potential productivity for pitch pine is high. The common species are pitch pine, Virginia pine, black oak, white oak, and chestnut oak.

The main limitations to use of this soil as sites for dwellings and some other types of community development are poor filter, cutbanks caving, slope, and sandiness.

This soil is in capability subclass VIIs; the woodland ordination symbol is 6S.

EvD—Evesboro sand, 10 to 15 percent slopes. This is a strongly sloping, excessively drained soil on side slopes. Areas of the soil are long and narrow in shape and typically range from 10 to 40 acres in size.

Typically, the surface layer is 4 inches thick. In the uppermost 2 inches it is matted, decomposed organic matter and roots, and below that it is grayish brown sand. The subsurface layer is yellowish brown sand 5 inches thick. The subsoil is yellowish brown sand 25 inches thick. The substratum is yellowish brown sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Lakewood soils and, near Phalanx soils, areas of Evesboro soils that have iron-cemented sandstone fragments and channers. Also included, near Colts Neck soils, are areas of Evesboro soils that have a redder hue throughout and that have small amounts of glauconite. These soils, which make up about 25 percent of the map unit, are similar to the Evesboro sand in use and management. Also included are areas of Phalanx, Sassafras, and Tinton soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Evesboro sand in use and management.

Permeability of this Evesboro soil is rapid in the subsoil and the substratum. The available water capacity is low. The seasonal high water table is at a depth of more than 6 feet. Runoff is medium. Water erosion is a moderate hazard. Organic matter content is low. In unlimed areas reaction is strongly acid to extremely acid.

Nearly all areas of this soil are wooded.

This soil is poorly suited to common field crops, hay, vegetables, and pasture. The main limitations are the low available water capacity, the low organic matter content, rapid permeability, and slope.

This soil is poorly suited to commercial woodland production. Potential productivity for pitch pine is high. The common species are pitch pine, Virginia pine, black oak, white oak, and chestnut oak.

The main limitations to use of this soil as sites for dwellings and some other types of community development are poor filter, cutbanks caving, slope, and sandiness.

This soil is in capability subclass VIIs; the woodland ordination symbol is 6S.

EvE—Evesboro sand, 15 to 25 percent slopes. This is a moderately steep to steep, excessively drained soil on side slopes. Areas of the soil are long and narrow in shape and typically range from 10 to 40 acres in size.

Typically, the surface layer is 4 inches thick. In the uppermost 2 inches it is matted, decomposed organic matter and roots, and below that it is grayish brown sand. The subsurface layer is yellowish brown sand 5 inches thick. The subsoil is yellowish brown sand 25 inches thick. The substratum is yellowish brown sand to a depth of 60 inches or more.

Included with this soil in mapping, near Phalanx soils, are areas of Evesboro soils that have iron-cemented sandstone fragments and channers. Also included, near Colts Neck soils, are areas of Evesboro soils that have a redder hue throughout and small amounts of glauconite. These soils, which make up about 20 percent of the map unit, are similar to the Evesboro sand in use and management. Also included are areas of Phalanx, Sassafras, and Tinton soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Evesboro sand in use and management.

Permeability of this Evesboro soil is rapid in the subsoil and the substratum. The available water capacity is low. The seasonal high water table is at a depth of more than 6 feet. Runoff is rapid. Water erosion is a severe hazard. Organic matter content is low. In unlimed areas reaction is strongly acid to extremely acid.

Nearly all areas of this soil are wooded.

This soil is poorly suited to common field crops, hay, vegetables, and pasture. The main limitations are the low available water capacity, the low organic matter content, rapid permeability, and slope.

This soil is poorly suited to commercial woodland production. Potential productivity for pitch pine is high. The common species are pitch pine, Virginia pine, black oak, white oak, and chestnut oak.

The main limitations to use of this soil as sites for dwellings and some other types of community development are poor filter, cutbanks caving, slope, and sandiness.

This soil is in capability subclass VIIs; the woodland ordination symbol is 6S.

EWB—Evesboro sand-Urban land complex, 0 to 10 percent slopes. This map unit consists of nearly level and gently sloping, excessively drained Evesboro sand and Urban land. Areas of each are in such an intricate pattern that it was not practical to map them separately. The mapped areas are irregular in shape and typically range from 100 to 300 acres in size.

Evesboro sand makes up about 40 percent of each mapped area. Urban land makes up 35 percent, and other soils make up 25 percent.

Typically, the surface layer of the Evesboro soil is grayish brown sand 2 inches thick. The subsurface layer is yellowish brown sand 5 inches thick. The subsoil is yellowish brown sand 25 inches thick. The substratum is yellowish brown sand to a depth of 60 inches or more.

Urban land consists of areas covered by impermeable surfaces, such as dwellings, roads and streets, shopping centers, parking lots, and industrial parks.

Included with this complex in mapping are areas of Lakewood soils. These soils are similar to the Evesboro soil in use and management. Also included are areas of Udorthents and Klej, Downer, Atsion, Lakehurst, and Tinton soils. These soils are dissimilar to the Evesboro soil in use and management. The similar and dissimilar soils make up as much as 25 percent of the complex.

Permeability of this Evesboro soil is rapid in the subsoil and the substratum. The available water capacity is low. The seasonal high water table is at a depth of more than 6 feet.

The open areas of this map unit are used for lawns, vacant wooded lots, gardens, and small parks.

The main limitations to use of this soil as sites for dwellings and some other types of community development are poor filter, cutbanks caving, and sandiness. Establishing and maintaining lawns are difficult because of droughtiness.

This soil is not assigned to a capability subclass; the woodland ordination symbol is 6S.

Fb—Fallsington loam. This is a nearly level, poorly drained soil in depressional areas, along drainageways, and on broad flats. Areas of the soil are irregular in shape and typically range from 25 to 50 acres in size.

Typically, the surface layer is 10 inches thick. In the uppermost 2 inches it is decomposed organic material and roots, and below that, it is mottled, dark gray loam. The subsoil is mottled, grayish brown fine sandy clay loam and sandy clay loam 28 inches thick. The substratum extends to a depth of 60 inches or more. It is mottled, olive gray fine sandy loam to a depth of 44 inches. Below that, it is dark yellowish brown loamy sand that has thin lenses of olive gray fine sandy clay loam.

Included with this soil in mapping are areas of Fallsington soils that have a sandy loam surface layer. Also included are Elkton and Shrewsbury soils. These soils, which make up about 45 percent of the map unit, are similar to the Fallsington loam in use and management. Also included are areas of Woodstown soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Fallsington loam in use and management.

Permeability of this Fallsington soil is moderate in the subsoil and moderately rapid in the substratum. The available water capacity is high. The apparent seasonal high water table is between the surface and a depth of 1 foot from December to May. Runoff is slow. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid to strongly acid.

About half of the acreage of this soil is woodland. Some areas have been cleared and are farmed (fig. 7). A small acreage is used for pasture.

This soil is suited to common field crops, hay, and vegetables. The main limitation for crops is the seasonal high water table. The main management concern is providing drainage. The seasonal high water table limits the soil for certain crops and restricts the time when the soil can be worked. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

Figure 7.—This recreation farm pond, which provides many hours of good fishing, is built on Fallsington loam.

This soil is suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In some wetter areas improved drainage is needed.

This soil is suited to commercial woodland production. Potential productivity for pitch pine is high. The common species are pitch pine, sweetgum, white oak, red maple, and pin oak. The use of equipment for harvesting trees is limited during wet periods.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, cutbanks caving, and frost action.

This soil is in capability subclass IIIw; the woodland ordination symbol is 8W.

FnA—Freehold loamy sand, 0 to 5 percent slopes. This is a nearly level to gently sloping, well drained soil on divides. Areas of the soil are irregular in shape and typically range from 5 to 25 acres in size.

Typically, the surface layer is dark yellowish brown loamy sand 9 inches thick. The subsoil is 26 inches thick. It is dark brown sandy loam and sandy clay loam to a depth of 25 inches. Below that, it is brown sandy loam to a depth of 35 inches. The substratum is

yellowish brown loamy sand to a depth of 70 inches or more.

Included with this soil in mapping are areas of Collington and Colts Neck soils and Freehold soils that have a sandy loam surface layer. These soils, which make up about 25 percent of the map unit, are similar to the Freehold loamy sand in use and management. Also included are areas of Holmdel, Shrewsbury, and Tinton soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Freehold loamy sand in use and management.

Permeability of this Freehold soil is moderate in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is slow. Water erosion is a slight hazard. Wind erosion is a moderate hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, and vegetables. The main limitation is the sandy surface layer, which in some areas requires irrigation and more frequent applications of lime and fertilizer. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is well suited to commercial woodland production. Potential productivity for northern red oak is moderately high. The common species are northern red oak, yellow poplar, white oak, black oak, and beech.

The main limitations to use of this soil as sites for dwellings and some other types of community development are slow percolation, cutbanks caving, and frost action.

This soil is in capability subclass IIs; the woodland ordination symbol is 4S.

FnC—Freehold loamy sand, 5 to 10 percent slopes. This is a moderately sloping, well drained soil on side slopes. Areas of the soil are irregular in shape and typically range from 5 to 25 acres in size.

Typically, the surface layer is dark yellowish brown loamy sand 9 inches thick. The subsoil is 26 inches thick. It is dark brown sandy loam and sandy clay loam to a depth of 25 inches. Below that, it is brown sandy loam to a depth of 35 inches. The substratum is yellowish brown loamy sand to a depth of 70 inches or more.

Included with this soil in mapping are areas of Collington and Colts Neck soils and Freehold soils that have a sandy loam surface layer. These soils, which make up about 25 percent of the map unit, are similar to the Freehold loamy sand in use and management. Also included are areas of Tinton soil. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Freehold loamy sand in use and management.

Permeability of this Freehold soil is moderate in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is medium. Water and wind erosion are moderate hazards. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, and vegetables. The main limitation is the sandy surface layer, which in some areas requires irrigation and more frequent applications of lime and fertilizer. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. Proper seeding, proper stocking, liming and fertilizing, and rotation grazing help to maintain plant cover.

This soil is well suited to commercial woodland production. Potential productivity for northern red oak is moderately high. The common species are northern red oak, yellow poplar, white oak, black oak, and beech.

The main limitations to use of this soil as sites for dwellings and some other types of community development are slow percolation, cutbanks caving, slope, and frost action.

This soil is in capability subclass IIIe; the woodland ordination symbol is 4S.

FrB—Freehold sandy loam, 2 to 5 percent slopes. This is a gently sloping, well drained soil on divides. Areas of the soil are irregular in shape and typically range from 15 to 75 acres in size.

Typically, the surface layer is dark yellowish brown sandy loam 9 inches thick. The subsoil is 26 inches thick. It is dark brown sandy loam and sandy clay loam to a depth of 25 inches. Below that, it is brown sandy loam to a depth of 35 inches. The substratum is yellowish brown loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are Collington, Colts Neck, and Sassafras soils and Freehold soils that have a loam surface layer. These soils, which make up about 40 percent of the map unit, are similar to the Freehold sandy loam in use and management. Also included are areas of Holmdel and Shrewsbury soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Freehold sandy loam in use and management.

Permeability of this Freehold soil is moderate in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is high. The

seasonal high water table is at a depth of more than 6 feet. Runoff is medium. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is well suited to common field crops, hay, sod, and vegetables. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. Proper seeding, proper stocking, liming and fertilizing, and rotation grazing are suitable management practices.

This soil is well suited to commercial woodland production. Potential productivity for northern red oak is moderately high. The common species are northern red oak, yellow poplar, shortleaf pine, white oak, black oak, and beech.

The main limitations to use of this soil as sites for dwellings and some other types of community development are slow percolation, cutbanks caving, and frost action.

This soil is in capability subclass IIe; the woodland ordination symbol is 4A.

FrC—Freehold sandy loam, 5 to 10 percent slopes. This is a moderately sloping, well drained soil on side slopes. Areas of the soil are irregular in shape and typically range from 5 to 35 acres in size.

Typically, the surface layer is dark yellowish brown sandy loam 9 inches thick. The subsoil is 26 inches thick. It is dark brown sandy loam and sandy clay loam to a depth of 25 inches. Below that, it is brown sandy loam to a depth of 35 inches. The substratum is yellowish brown loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Collington, Colts Neck, and Sassafras soils and Freehold soils that have a loam surface layer. These soils, which make up about 30 percent of the map unit, are similar to the Freehold sandy loam in use and management. Also included are areas of Tinton soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Freehold sandy loam in use and management.

Permeability of this Freehold soil is moderate in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is medium. Erosion is a moderate hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, and vegetables. Erosion is a hazard. The main management concern is reducing runoff and controlling erosion. Contour farming, stripcropping, grassed waterways, and cropland terraces or diversion terraces help to reduce runoff and to control erosion. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. Proper seeding, proper stocking, liming and fertilizing, and rotation grazing help to maintain plant cover.

This soil is well suited to commercial woodland production. Potential productivity for northern red oak is moderately high. The common species are northern red oak, yellow poplar, shortleaf pine, white oak, black oak, and beech.

The main limitations to use of this soil as sites for dwellings and some other types of community development are slow percolation, cutbanks caving, slope, and frost action.

This soil is in capability subclass IIIe; the woodland ordination symbol is 4A.

FrC2—Freehold sandy loam, 5 to 10 percent slopes, eroded. This is a moderately sloping, well drained soil on side slopes. Areas of the soil are irregular in shape and typically range from 5 to 20 acres in size.

Typically, the surface layer is dark yellowish brown sandy loam 9 inches thick. The subsoil is 26 inches thick. It is dark brown sandy loam and sandy clay loam to a depth of 25 inches. Below that, it is brown sandy loam to a depth of 35 inches. The substratum is yellowish brown loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Collington, Colts Neck, and Sassafras soils. These soils, which make up about 30 percent of the map unit, are similar to the Freehold soil in use and management. Also included are areas of Tinton soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Freehold soil in use and management.

Permeability of this Freehold soil is moderate in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is medium. Erosion is a moderate hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, and vegetables. Erosion is a hazard. The main management concern is reducing runoff and controlling erosion. Contour farming, stripcropping, grassed waterways, and cropland terraces or diversion terraces help to reduce runoff and to control erosion. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. Proper seeding, proper stocking, liming and fertilizing, and rotation grazing help to maintain plant cover.

This soil is well suited to commercial woodland production. Potential productivity for northern red oak is moderately high. The common species are northern red oak, yellow poplar, shortleaf pine, white oak, black oak, and beech.

The main limitations to use of this soil as sites for dwellings and some other types of community development are slow percolation, cutbanks caving, slope, and frost action.

This soil is in capability subclass IIIe; the woodland ordination symbol is 4A.

FrD—Freehold sandy loam, 10 to 15 percent slopes. This is a strongly sloping, well drained soil on side slopes. Areas of the soil are long and narrow in shape and typically range from 5 to 20 acres in size.

Typically, the surface layer is dark yellowish brown sandy loam 9 inches thick. The subsoil is 26 inches thick. It is dark brown sandy loam and sandy clay loam to a depth of 25 inches. Below that, it is brown sandy loam to a depth of 35 inches. The substratum is yellowish brown loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Collington, Colts Neck, and Sassafras soils and Freehold soils that have a loamy sand surface layer. These soils, which make up about 30 percent of the map unit, are similar to the Freehold sandy loam in use and management. Also included are areas of Tinton soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Freehold sandy loam in use and management.

Permeability of this Freehold soil is moderate in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is rapid. Erosion is a severe hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

A few areas of this soil are farmed. A small acreage is used for pasture. A small acreage is woodland.

This soil is poorly suited to common field crops, hay, and vegetables. Erosion is a hazard. The main management concern is reducing runoff and controlling erosion. Contour farming, stripcropping, grassed waterways, and cropland terraces or diversion terraces help to reduce runoff and to control erosion. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. Proper seeding, proper stocking, liming and fertilizing, and rotation grazing help to maintain plant cover and to control erosion.

This soil is well suited to commercial woodland production. Potential productivity for northern red oak is moderately high. The common species are northern red oak, yellow poplar, shortleaf pine, white oak, black oak, and beech.

The main limitations to use of this soil as sites for dwellings and some other types of community development are slow percolation, cutbanks caving, slope, and frost action.

This soil is in capability subclass IVe; the woodland ordination symbol is 4A.

FrD2—Freehold sandy loam, 10 to 15 percent slopes, eroded. This is a strongly sloping, well drained soil on side slopes. Areas of the soil are long and narrow in shape and typically range from 5 to 25 acres in size.

Typically, the surface layer is dark yellowish brown sandy loam 9 inches thick. The subsoil is 26 inches thick. It is dark brown sandy loam and sandy clay loam to a depth of 25 inches. Below that, it is brown sandy loam to a depth of 35 inches. The substratum is yellowish brown loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Collington, Colts Neck, and Sassafras soils and Freehold soils that have a loamy sand surface layer. These soils, which make up about 30 percent of the map unit, are similar to the Freehold sandy loam in use and management. Also included are areas of Tinton soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Freehold sandy loam in use and management.

Permeability of this Freehold soil is moderate in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is rapid. Erosion is a severe hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

A few areas of this soil are farmed. A small acreage is used for pasture. A small acreage is woodland.

This soil is poorly suited to common field crops, hay, and vegetables. Erosion is a hazard. The main management concern is reducing runoff and controlling erosion. Contour farming, stripcropping, grassed waterways, and cropland terraces or diversion terraces help to reduce runoff and to control erosion. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. Proper seeding, proper stocking, liming and fertilizing, and rotation grazing help to maintain plant cover and to control erosion.

This soil is well suited to commercial woodland production. Potential productivity for northern red oak is moderately high. The common species are northern red oak, yellow poplar, shortleaf pine, white oak, black oak, and beech.

The main limitations to use of this soil as sites for dwellings and some other types of community

development are slow percolation, cutbanks caving, slope, and frost action.

This soil is in capability subclass IVe; the woodland ordination symbol is 4A.

FrE2—Freehold sandy loam, 15 to 25 percent slopes, eroded. This is a moderately steep and steep, well drained soil on side slopes. Areas of the soil are long and narrow in shape and typically range from 5 to 35 acres in size.

Typically, the surface layer is dark yellowish brown sandy loam 9 inches thick. The subsoil is 26 inches thick. It is dark brown sandy loam and sandy clay loam to a depth of 25 inches. It is brown sandy loam to a depth of 35 inches. The substratum is yellowish brown loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Collington, Colts Neck, and Sassafras soils and Freehold soils that have a loamy sand surface layer. These soils, which make up about 30 percent of the map unit, are similar to the Freehold sandy loam in use and management. Also included are areas of Tinton soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Freehold sandy loam in use and management.

Permeability of this Freehold soil is moderate in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is very rapid. Erosion is a severe hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

Almost all of the acreage of this soil is wooded.

This soil is poorly suited to common field crops, hay, vegetables, and pasture. Erosion is a hazard. The main limitation is slope. The main management concern is reducing runoff and controlling erosion.

This soil is suited to commercial woodland production. Potential productivity for northern red oak is moderately high. The common species are northern red oak, yellow poplar, shortleaf pine, white oak, black oak, and beech.

The main limitations to use of this soil as sites for dwellings and some other types of community development are cutbanks caving and slope.

This soil is in capability subclass VIe; the woodland ordination symbol is 4R.

FsA—Freehold loam, 0 to 2 percent slopes. This is a nearly level, well drained soil on divides. Areas of the soil are irregular in shape and typically range from 5 to 25 acres in size.

Typically, the surface layer is dark yellowish brown sandy loam 9 inches thick. The subsoil is 26 inches thick. It is dark brown sandy loam and sandy clay loam to a depth of 25 inches. Below that, it is brown sandy loam to a depth of 35 inches. The substratum is yellowish brown loamy sand to a depth of 70 inches or more.

Included with this soil in mapping are areas of Collington, Colts Neck, and Sassafras soils and Freehold soils that have a sandy loam surface layer. These soils, which make up about 30 percent of the map unit, are similar to the Freehold loam in use and management. Also included are areas of Holmdel and Shrewsbury soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Freehold loam in use and management.

Permeability of this Freehold soil is moderate in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is slow. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is well suited to common field crops, hay, sod, and vegetables. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is well suited to commercial woodland production. Potential productivity for northern red oak is moderately high. The common species are northern red oak, yellow poplar, shortleaf pine, white oak, black oak, and beech.

The main limitations to use of this soil as sites for dwellings and some other types of community development are slow percolation, cutbanks caving, and frost action.

This soil is in capability class I; the woodland ordination symbol is 4A.

FUB—Freehold sandy loam-Urban land complex, 0 to 10 percent slopes. This map unit consists of nearly level to moderately sloping, well drained Freehold sandy loam and Urban land. Areas of each are in such an intricate pattern that it was not practical to map them separately. The mapped areas are irregular in shape and typically range from 100 to 350 acres in size.

Typically, the surface layer of the Freehold soil is dark yellowish brown sandy loam 9 inches thick. The subsoil is 26 inches thick. It is dark brown sandy loam and sandy clay loam to a depth of 25 inches. Below that, it is brown sandy loam to a depth of 35 inches. The substratum is yellowish brown loamy sand to a depth of 60 inches or more.

Urban land consists of areas covered by impermeable surfaces, such as dwellings, roads and streets, shopping centers, parking lots, and industrial parks (fig. 8).

Figure 8.—Industrial encroachment on Freehold sandy loam, once highly productive, in an area of Freehold sandy loam-Urban land complex, 0 to 10 percent slopes.

Included with this complex in mapping are areas of Freehold soils that have a loamy sand and loam surface layer and Collington, Colts Neck, and Sassafras soils. These soils are similar to the Freehold sandy loam in use and management. Also included are areas of Udorthents and Holmdel and Shrewsbury soils. These soils are dissimilar to the Freehold sandy loam in use and management. The similar and dissimilar soils make up as much as 30 percent of the complex.

Permeability of the Freehold soil is moderate in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet.

The open areas of this map unit are used for lawns, vacant wooded lots, gardens, and small parks.

The main limitations to use of the Freehold soil as sites for dwellings and some other types of community development are slow percolation, cutbanks caving, and frost action.

This soil is not assigned to a capability subclass; the woodland ordination symbol is 4A.

HaB—Hammonton loamy sand, 0 to 3 percent slopes. This is a nearly level to gently sloping, moderately well drained and somewhat poorly drained soil in depressional areas and on low divides. Areas of the soil are irregular in shape and typically range from 5 to 25 acres in size.

Typically, the surface layer is dark brown loamy sand 10 inches thick. The subsoil is 21 inches thick. It is brownish yellow loamy sand to a depth of 19 inches. Below that, it is yellowish brown sandy loam to a depth of 24 inches and mottled, brownish yellow sandy loam to a depth of 31 inches. The substratum is light yellowish brown stratified loamy sand and gravelly sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Woodstown soils and Hammonton soils that have a sandy loam surface layer. These soils, which make up as much as 30 percent of the map unit, are similar to the Hammonton loamy sand in use and management. Also included are areas of Downer, Klej, and Fallsington soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Hammonton loamy sand in use and management.

Permeability of this Hammonton soil is moderate or moderately rapid in the subsoil and moderately rapid in the substratum. The available water capacity is moderate. The apparent seasonal high water table is at a depth of 1 1/2 to 4 feet from January to April. Runoff is slow. Water erosion is a slight hazard. Wind erosion is a moderate hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

Most areas of this soil are farmed. A small acreage is woodland. A few acres is used for pasture.

This soil is suited to common field crops, hay, and vegetables. The main limitation for crops is the seasonal high water table. The main management concern is providing drainage. The seasonal high water table limits the soil for certain crops and restricts the time when the soils can be worked. Because of the sandier surface horizon, in some areas irrigation and more frequent applications of lime and fertilizer are required. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In some wetter areas improved drainage is needed.

This soil is well suited to commercial woodland production. Potential productivity for black oak is moderately high. The common species are black oak, white oak, Virginia pine, shortleaf pine, pitch pine, red maple, and sweetgum.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, poor filter, and cutbanks caving.

This soil is in capability subclass IIw; the woodland ordination symbol is 4A.

HbA—Hammonton sandy loam, 0 to 2 percent slopes. This is a nearly level, moderately well drained and somewhat poorly drained soil in depressional areas and on low divides. Areas of the soil are irregular in shape and typically range from 5 to 25 acres in size.

Typically, the surface layer is dark brown sandy loam 10 inches thick. The subsoil is 21 inches thick. It is brownish yellow and yellowish brown sandy loam to a depth of 24 inches. Below that, it is mottled, brownish yellow sandy loam to a depth of 31 inches. The substratum is light yellowish brown stratified loamy sand and gravelly sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Woodstown soils and Hammonton soils that have a loamy sand surface layer. These soils, which make up as much as 40 percent of the map unit, are similar to the Hammonton sandy loam in use and management. Also included are areas of Downer, Klej, and Fallsington soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Hammonton sandy loam in use and management.

Permeability of this Hammonton soil is moderate or moderately rapid in the subsoil and moderately rapid in the substratum. The available water capacity is moderate. The apparent seasonal high water table is at a depth of 1 1/2 to 4 feet from January to April. Runoff is slow. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

Most areas of this soil are farmed. A small acreage is woodland. A few acres is used for pasture.

This soil is suited to common field crops, hay, and vegetables. The main limitation for crops is the seasonal high water table. The main management concern is providing drainage. The seasonal high water table limits the soil for certain crops and restricts the time when the soils can be worked. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In some wetter areas improved drainage is needed.

This soil is well suited to commercial woodland production. Potential productivity for black oak is moderately high. The common species are black oak, white oak, Virginia pine, shortleaf pine, pitch pine, red maple, and sweetgum.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, poor filter, and cutbanks caving.

This soil is in capability subclass IIw; the woodland ordination symbol is 4A.

HbB—Hammonton sandy loam, 2 to 5 percent slopes. This is a gently sloping, moderately well drained or somewhat poorly drained soil in depressional areas and on low divides. Areas of the soil are irregular in shape and typically range from 10 to 40 acres in size.

Typically, the surface layer is dark brown sandy loam 10 inches thick. The subsoil is 21 inches thick. It is brownish yellow and yellowish brown sandy loam to a depth of 24 inches. Below that, it is mottled, brownish yellow sandy loam to a depth of 31 inches. The substratum is light yellowish brown stratified loamy sand and gravelly sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Woodstown soils and Hammonton soils that have a loamy sand surface layer. These soils, which make up as much as 30 percent of the map unit, are similar to the Hammonton sandy loam in use and management. Also included are areas of Downer, Klej, and Fallsington soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Hammonton sandy loam in use and management.

Permeability of this Hammonton soil is moderate or moderately rapid in the subsoil and moderately rapid in the substratum. The available water capacity is moderate. The apparent seasonal high water table is at a depth of 1 1/2 to 4 feet from January to April. Runoff is slow. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

Most areas of this soil are farmed. A small acreage is woodland. A few acres is used for pasture.

This soil is suited to common field crops, hay, and vegetables. The main limitation for crops is the seasonal high water table. The main management concern is providing drainage. The seasonal high water table limits the soil for certain crops and restricts the time when the soils can be worked. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In some wetter areas improved drainage is needed.

This soil is well suited to commercial woodland production. Potential productivity for black oak is moderately high. The common species are black oak, white oak, Virginia pine, shortleaf pine, pitch pine, red maple, and sweetgum.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, poor filter, and cutbanks caving.

This soil is in capability subclass IIw; the woodland ordination symbol is 4A.

HLA—Hammonton sandy loam-Urban land complex, 0 to 3 percent slopes. This map unit consists of nearly level and gently sloping, moderately well drained and somewhat poorly drained Hammonton sandy loam and Urban land. The areas of each are in such an intricate pattern that it was not practical to map them separately. The mapped areas are irregular in shape and typically range from 25 to 100 acres in size.

Typically, the surface layer of the Hammonton soil is dark brown sandy loam 10 inches thick. The subsoil is 21 inches thick. It is brownish yellow and yellowish brown sandy loam to a depth of 24 inches. Below that, it is mottled, brownish yellow sandy loam to a depth of 31 inches. The substratum is light yellowish brown stratified loamy sand and gravelly sandy loam to a depth of 60 inches or more.

Urban land consists of areas covered by impermeable surfaces, such as dwellings, roads and streets, shopping centers, parking lots, and industrial parks.

Included with this complex in mapping are areas of Hammonton soils that have a loamy sand surface layer. These soils are similar in use and management. Also included are areas of Udorthents and Downer, Klej, and Fallsington soils. These soils are dissimilar to the Hammonton sandy loam in use and management. The similar and dissimilar soils make up as much as 30 percent of the complex.

Permeability of the Hammonton soil is moderate or moderately rapid in the subsoil and moderately rapid in the substratum. The available water capacity is moderate. The apparent seasonal high water table is at a depth of 1 1/2 to 4 feet from January to April.

The open areas of this map unit are used for lawns, gardens, and small parks or are vacant wooded lots.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, poor filter, and cutbanks caving.

This soil is not assigned to a capability subclass; the woodland ordination symbol is 4A.

HnA—Holmdel sandy loam, 0 to 2 percent slopes. This is a nearly level, moderately well drained and somewhat poorly drained soil in depressional areas and on low divides. Areas of the soil are irregular in shape and typically range from 10 to 25 acres in size.

Typically, the surface layer is dark grayish brown sandy loam 12 inches thick. The subsoil is 26 inches thick. It is yellowish brown sandy loam to a depth of 20 inches. Below that, it is mottled, yellowish brown sandy clay loam to a depth of 38 inches. The substratum is mottled, yellowish brown and light olive brown sand and sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Holmdel soils that have a loam surface layer. Also included are Adelphia soils and gently sloping Holmdel soils. These soils, which make up as much as 40 percent of the map unit, are similar to the nearly level Holmdel sandy loam in use and management. Also included are areas of Shrewsbury, Collington, and Freehold soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the nearly level Holmdel sandy loam in use and management.

Permeability of this Holmdel soil is moderate in the subsoil and the substratum. The available water capacity is high. The apparent seasonal high water table is at a depth of one-half foot to 4 feet from December to May. Runoff is slow. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, sod, and vegetables. The main limitation for crops is the seasonal high water table. The main management concern is providing drainage. The seasonal high water table limits the soil for certain crops and restricts the time when the soils can be worked. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In some wetter areas improved drainage is needed.

This soil is well suited to commercial woodland production. Potential productivity for yellow poplar is moderately high. The common species are yellow poplar, northern red oak, sweetgum, and red maple.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table and cutbanks caving.

This soil is in capability subclass IIw; the woodland ordination symbol is 6A.

HnB—Holmdel sandy loam, 2 to 5 percent slopes. This is a gently sloping, moderately well drained and somewhat poorly drained soil in depressional areas and on low divides. Areas of the soil are irregular in shape and typically range from 5 to 30 acres in size.

Typically, the surface layer is dark grayish brown sandy loam 12 inches thick. The subsoil is 26 inches thick. It is yellowish brown sandy loam to a depth of 20 inches. Below that, it is mottled, yellowish brown sandy clay loam to a depth of 38 inches. The substratum is mottled, yellowish brown and light olive brown sand and sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Holmdel soils that have a loam surface layer. Also included are Adelphia soils and the nearly level Holmdel soils. These soils, which make up as much as 35 percent of the map unit, are similar to the gently sloping Holmdel sandy loam in use and management. Also included are areas of Pemberton, Shrewsbury, Collington, and Freehold soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the gently sloping Holmdel sandy loam in use and management.

Permeability of this Holmdel soil is moderate in the subsoil and the substratum. The available water capacity is high. The apparent seasonal high water table is at a depth of one-half foot to 4 feet from December to May. Runoff is medium. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, sod, and vegetables. The main limitation for crops is the seasonal high water table. The main management concern is providing drainage. The seasonal high water table limits the soil for certain crops and restricts the time when the soil can be worked. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In some wetter areas improved drainage is needed.

This soil is well suited to commercial woodland production. Potential productivity for yellow poplar is moderately high. The common species are yellow poplar, northern red oak, sweetgum, and red maple.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table and cutbanks caving.

This soil is in capability subclass IIw; the woodland ordination symbol is 4A.

HUA—Holmdel sandy loam-Urban land complex, 0 to 5 percent slopes. This map unit consists of nearly level and gently sloping, moderately well drained and somewhat poorly drained Holmdel sandy loam and Urban land. The areas of each are in such an intricate pattern that it was not practical to map them separately. The mapped areas are irregular in shape and typically range from 15 to 75 acres in size.

Holmdel sandy loam makes up 45 percent of each mapped area. Urban land makes up 30 percent, and other soils make up 25 percent.

Typically, the surface layer of the Holmdel soil is dark grayish brown sandy loam 12 inches thick. The subsoil is 26 inches thick. It is yellowish brown sandy loam to a depth of 20 inches. Below that, it is mottled, yellowish brown sandy clay loam to a depth of 38 inches. The substratum is mottled, yellowish brown sandy loam and

mottled, light olive brown sand to a depth of 60 inches or more.

Urban land consists of areas covered by impermeable surfaces, such as dwellings, roads and streets, shopping centers, parking lots, and industrial parks.

Included with this complex in mapping are areas of Holmdel soils that have a loam surface layer and Adelphia soils. These soils are similar to the Holmdel sandy loam in use and management. Also included are areas of Udorthents and Shrewsbury, Collington, and Freehold soils. These soils are dissimilar to the Holmdel sandy loam in use and management. The similar and dissimilar soils make up as much as 25 percent of the complex.

Permeability of this Holmdel soil is moderate in the subsoil and the substratum. The available water capacity is high. The apparent seasonal high water table is at a depth of one-half foot to 4 feet from December to May.

The open areas of this map unit are used for lawns, gardens, and small parks or are vacant wooded lots.

The main limitations to use of the Holmdel soil as sites for dwellings and for some other types of community development are the seasonal high water table and cutbanks caving.

This map unit is not assigned to a capability subclass; the woodland ordination symbol is 4A.

HV—Humaquepts, frequently flooded. These are nearly level, somewhat poorly drained to very poorly drained soils. They are on flood plains along perennial and intermittent streams. Areas of these soils are long and narrow in shape and typically range from 10 to 50 acres in size.

These soils differ greatly from place to place. Generally, the surface layer and the subsoil consist of stratified layers of sandy loam, loam, and silt loam. The substratum consists of stratified layers of loamy sand, sandy loam, loam, or silt loam. In some areas the stratified layers are gravelly or mucky.

Included with these soils in mapping are Elkton, Manahawkin, Shrewsbury, and Fallsington soils, Sulfaquents, and Sulfihemists. These soils, which make up as much as 20 percent of the map unit, are dissimilar in use and management.

Permeability of Humaquepts, frequently flooded, is moderate or moderately rapid in the subsoil and the substratum. The available water capacity is high. The apparent seasonal high water table is between the surface and a depth of 1 1/2 feet. Runoff is slow. Organic matter content is low to high. The soil is subject to frequent flooding mainly in the early spring or after a heavy rainfall. In unlimed areas reaction is extremely acid to slightly acid.

Most of the acreage of these soils is idle or is wooded because of the many limitations or because it is too narrow for other uses. A few acres is used for pasture.

These soils are poorly suited to farming. The main limitations for crops are the seasonal high water table and frequent flooding. If these soils are used for crop production, improved drainage is needed.

On the broader flood plains these soils are suited to pasture. The main limitations are the seasonal high water table and frequent flooding. A suitable management practice is restricted grazing during wet periods.

These soils are suited to commercial woodland production. Potential productivity for pitch pine is high. The common species are pitch pine, sweetgum, white oak, and pin oak. The major limitations to harvesting trees are the seasonal high water table and frequent flooding.

The main limitations to use of these soils as sites for dwellings and other types of community development are the seasonal high water table and frequent flooding.

These soils are in capability subclass Vw; the woodland ordination symbol is 8W.

HwB—Hooksan sand, 0 to 5 percent slopes. This is a nearly level to gently sloping, excessively drained soil on dunes adjacent to coastal beaches. Areas of the soil are irregular in shape and typically range from 5 to 25 acres in size.

Typically, the surface layer is grayish brown sand 6 inches thick. The substratum extends to a depth of 60 inches or more. It is pale yellow sand to a depth of 36 inches. Below that, it is light yellowish brown and pale yellow sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Hooksan Variant soils, Sulfaquents, and Sulfihemists. Also included are areas of beaches. These soils and areas of beaches, which make up as much as 15 percent of the map unit, are dissimilar to the Hooksan soil in use and management.

Permeability of this Hooksan soil is rapid in the subsoil and the substratum. The available water capacity is very low. The seasonal high water is at a depth of more than 6 feet. Runoff is very slow. Water erosion is a slight hazard. Wind erosion is a severe hazard. Organic matter content is low. The soil is subject to rare flooding after severe storms. In unlimed areas reaction is strongly acid to neutral.

Almost all of the acreage of this soil is used for recreation and as habitat for wildlife (fig. 9).

This soil is poorly suited to crops and pasture. Erosion is a hazard. The main limitations are flooding, the very low available water capacity, and salt spray from the ocean.

This soil is poorly suited to commercial woodland production. Potential productivity for pitch pine is high. The common tree species are pitch pine, eastern redcedar, and American holly. The common herbaceous and shrub species are poison ivy, beach plum, smooth sumac, and pricklypear. The major limitation is

Figure 9.—Beach grass protects an area of Hooksan sand, 0 to 5 percent slopes, from wind erosion.

sandiness. Salt spray affects the types of vegetation that grow on the soil.

The main limitations to use of this soil as sites for dwellings and some other types of community development are sandiness, poor filter, cutbanks caving, and flooding (fig. 10).

This soil is in capability subclass VIIs; the woodland ordination symbol is 6S.

HxA—Hooksan Variant sand, 0 to 2 percent slopes. This is a nearly level, poorly drained soil in depressional areas and on broad flats between dunes along the coast. Areas of the soil are irregular in shape and typically range from 5 to 25 acres in size.

Typically, the surface layer is very dark brown sand 6 inches thick. The substratum extends to a depth of 60 inches or more. It is light brownish gray and pale brown fine sand to a depth of 28 inches. Below that, it is mottled, pale brown sand and coarse sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Hooksan soils, Sulfaquents, and Sulfihemists. Also included are areas of beaches and moderately well drained, sandy soils. These soils and areas of beaches, which make up as much as 15 percent of the map unit, are dissimilar to the Hooksan Variant soil in use and management.

Permeability of this Hooksan Variant soil is rapid in the subsoil and the substratum. The available water capacity is low. The apparent seasonal high water table is between the surface and a depth of 1 foot from January to December. Depth to the water table is influenced by daily tidal action. Runoff is very slow. Erosion is a slight hazard. Organic matter content is moderate. The soil is subject to rare flooding after severe storms. In unlimed areas reaction is very strongly acid to medium acid.

All of the acreage of this soil is used for recreation and as habitat for wildlife.

This soil is poorly suited to crops and pasture. The main limitations are flooding, the low available water

capacity, the seasonal high water table, and salt spray from the ocean.

This soil is poorly suited to commercial woodland production. Potential productivity for pitch pine is high. The common tree species are pitch pine and American holly. The common herbaceous species are poison ivy and greenbrier. The main limitation is the seasonal high water table. Salt spray affects the types of vegetation that grow on the soil.

The main limitations to use of this soil as sites for dwellings and some types of community development are the seasonal high water table and flooding.

This soil is in capability subclass VIIw; the woodland ordination symbol is 7W.

KeA—Keyport sandy loam, 0 to 2 percent slopes. This is a nearly level, moderately well drained soil in depressional areas and on low divides. Areas of the soil are irregular in shape and typically range from 10 to 20 acres in size.

Typically, the surface layer is brown sandy loam 8 inches thick. The subsoil is 34 inches thick. It is yellowish brown silty clay loam to a depth of 18 inches. Below that, it is mottled, dark yellowish brown silty clay loam to a depth of 42 inches. The substratum is gray silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Keyport soils that have a loam surface layer and Woodstown soils. Also included are areas of gently sloping Keyport soils and areas of Keyport soils that have a loamy sand surface layer less than 20 inches thick. These soils, which make up about 40 percent of the map unit, are similar to the nearly level Keyport sandy loam in use and management. Also included are areas of Elkton soils and Klej soils that have a clayey substratum. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the nearly level Keyport sandy loam in use and management.

Some areas of this Keyport soil have a substratum of pyritic clay. If the pyritic clay that is exposed during excavation is used as topsoil, it will become extremely acid (pH about 2.5-3.0) and will not support vegetation. Pyritic clay is mainly in the vicinity of Keyport, Hazlet,

Figure 10.—Aftermath of a storm that occurred in October 1977. The road and recreation facility were built on an area of Hooksan sand, 0 to 5 percent slopes.

Marlboro, Manalapan, and Aberdeen Townships. The clay is also in other parts of the county, but at greater depths and is generally not excavated. Contact the local office of the Soil Conservation Service (SCS) for information about the probable locations of this material. SCS can also provide information about the management practices needed to establish vegetation where pyritic clay has been excavated.

Permeability of this Keyport soil is slow in the subsoil and the substratum. The available water capacity is high. The high water table is at a depth of 1 1/2 to 4 feet from November to May. Runoff is slow. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, and vegetables. The main limitation for crops is the seasonal high water table. The main management concern is providing drainage. In some areas the clayey subsoil and substratum limit the efficiency of subsurface drainage. The seasonal high water table limits the soil for certain crops and restricts the time when the soil can be worked. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In some wetter areas improved drainage is needed.

This soil is well suited to commercial woodland production. Potential productivity for yellow poplar is high. The common species are yellow poplar, northern red oak, and American beech.

The main limitation to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, shrinking and swelling, slow percolation, and the high frost action potential. If pyritic clay that is exposed during excavation is used as topsoil, it will become extremely acid and will not support vegetation.

This soil is in capability subclass IIw; the woodland ordination symbol is 6A.

KeB—Keyport sandy loam, 2 to 5 percent slopes. This is a gently sloping, moderately well drained soil on low divides. Areas of the soil are irregular in shape and typically range from 5 to 35 acres in size.

Typically, the surface layer is brown sandy loam 8 inches thick. The subsoil is 34 inches thick. It is yellowish brown silty clay loam to a depth of 18 inches. Below that, it is mottled, dark yellowish brown silty clay loam to a depth of 42 inches. The substratum is gray silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Keyport soils that have a loam surface layer and Woodstown soils. Also included are areas of Keyport soils that have a loamy sand surface layer less than 20 inches thick. These soils, which make up about 40 percent of the map unit, are similar to the Keyport sandy loam in use and management. Also included are areas of Elkton soils and Klej soils that have a clayey substratum. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Keyport sandy loam in use and management.

Some areas of this Keyport soil have pyritic clay in the substratum. If the pyritic clay that is exposed during excavation is used as topsoil, it will become extremely acid (pH about 2.5-3.0) and will not support vegetation. Pyritic clay is mainly in the vicinity of Keyport, Hazlet, Marlboro, Manalapan, and Aberdeen Townships. The clay is also in other parts of the county but at greater depths and is generally not excavated. Contact the local office of the Soil Conservation Service for information about the management practices needed to establish vegetation where pyritic clay has been excavated.

Permeability of this Keyport soil is slow in the subsoil and the substratum. The available water capacity is high. The high water table is at a depth of 1 1/2 to 4 feet from November to May. Runoff is medium. Erosion is a moderate hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, and vegetables. Erosion is a hazard. The major limitation is the seasonal high water table. The main management concern is providing drainage and reducing runoff to control erosion. In some areas the clayey subsoil and substratum limit the efficiency of subsurface drainage. The seasonal high water table limits the soil for certain crops and restricts the time when the soil can be worked. Contour farming, stripcropping, grassed waterways, and cropland terraces or diversion terraces help to reduce runoff and to control erosion. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In some wetter areas improved drainage is needed.

This soil is well suited to commercial woodland production. Potential productivity for yellow poplar is high. The common species are yellow poplar, northern red oak, and American beech.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, shrinking and swelling, slow percolation, and the high frost action potential. If pyritic clay that is exposed during excavation is used as topsoil, it will become extremely acid and will not support vegetation.

This soil is in capability subclass IIe; the woodland ordination symbol is 6A.

KeC—Keyport sandy loam, 5 to 10 percent slopes. This is a moderately sloping, moderately well drained soil on side slopes. Areas of the soil are long and narrow in shape and typically range from 5 to 10 acres in size.

Typically, the surface layer is brown sandy loam 8 inches thick. The subsoil is 34 inches thick. It is yellowish brown silty clay loam to a depth of 18 inches. Below that, it is mottled, dark yellowish brown silty clay loam to a depth of 42 inches. The substratum is gray silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Keyport soils that have a loam surface layer. Also included are areas of Keyport soils that have a loamy sand surface layer less than 20 inches thick. These soils, which make up about 35 percent of the map unit, are similar to the Keyport sandy loam in use and management. Also included are areas of Klej soils that have a clayey substratum. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Keyport sandy loam in use and management.

Some areas of this Keyport soil have pyritic clay in the substratum. If the pyritic clay that is exposed during excavation is used as topsoil, it will become extremely acid (pH about 2.5-3.0) and will not support vegetation. Pyritic clay is mainly in the vicinity of Keyport, Hazlet, Marlboro, Manalapan, and Aberdeen Townships. The clay is also in other parts of the county, but at greater depths and is generally not excavated. Contact the local office of the Soil Conservation Service for information about the management practices needed to establish vegetation where pyritic clay has been excavated.

Permeability of this Keyport soil is slow in the subsoil and the substratum. The available water capacity is high. The high water table is at a depth of 1 1/2 to 4 feet from November to May. Runoff is rapid. Erosion is a severe hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid.

Some areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, and vegetables. Erosion is a hazard. The main management concern is reducing runoff and controlling erosion. Contour farming, stripcropping, grassed waterways, and cropland terraces or diversion terraces help to reduce runoff and to control erosion. The seasonal high water table limits the soil for certain crops and restricts the time when the soil can be worked. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is well suited to commercial woodland production. Potential productivity for yellow poplar is high. The common species are yellow poplar, northern red oak, and American beech.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, shrinking and swelling, slow percolation, slope, and the high frost action potential. If the pyritic clay that is exposed during excavation is used as topsoil, it will become extremely acid and will not support vegetation.

This soil is in capability subclass IIIe; the woodland ordination symbol is 6A.

KeD—Keyport sandy loam, 10 to 15 percent slopes. This is a strongly sloping, moderately well drained soil on side slopes. Areas of the soil are long and narrow in shape and typically range from 5 to 25 acres in size.

Typically, the surface layer is brown sandy loam 8 inches thick. The subsoil is 34 inches thick. It is yellowish brown silty clay loam to a depth of 18 inches. Below that, it is mottled, dark yellowish brown silty clay loam to a depth of 42 inches. The substratum is gray silty clay loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of moderately steep and steep Keyport soils. These soils, which make up about 25 percent of the map unit, are similar to the strongly sloping Keyport sandy loam in use and management.

Some areas of this Keyport soil have pyritic clay in the substratum. If the pyritic clay that is exposed during excavation is used as topsoil, it will become extremely acid (pH about 2.5-3.0) and will not support vegetation. Pyritic clay is mainly in the vicinity of Keyport, Hazlet, Marlboro, Manalapan, and Aberdeen Townships. The clay is also in other parts of the county but at greater depths and is generally not excavated. Contact the local office of the Soil Conservation Service for information about the management practices needed to establish vegetation where pyritic clay has been excavated.

Permeability of this Keyport soil is slow in the subsoil and the substratum. The available water capacity is high. The high water table is at a depth of 1 1/2 to 4 feet from November to May. Runoff is very rapid. Erosion is a severe hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid.

Almost all of the acreage of this soil is woodland.

This soil is poorly suited to common field crops, hay, and vegetables. Erosion is a hazard. The main limitation is slope. The main management concern is controlling erosion.

This soil is suited to pasture. Proper seeding, proper stocking, liming and fertilizing, and rotation grazing help to maintain plant cover and to control erosion.

This soil is well suited to commercial woodland production. Potential productivity for yellow poplar is high. The common species are yellow poplar, northern red oak, and American beech.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, shrinking and swelling, slow percolation, slope, and the high frost action potential. If the pyritic clay exposed during excavation is used as topsoil, it will become extremely acid and will not support vegetation (fig. 11).

This soil is in capability subclass IVe; the woodland ordination symbol is 6A.

KGB—Keyport sandy loam-Urban land complex, 0 to 10 percent slopes. This map unit consists of nearly level to moderately sloping, moderately well drained Keyport sandy loam and Urban land. The areas of each are in such an intricate pattern that it was not practical to map them separately. The mapped areas are irregular in shape and typically range from 50 to 250 acres in size.

Typically, the surface layer of the Keyport soil is brown sandy loam 8 inches thick. The subsoil is 34 inches thick. It is yellowish brown silty clay loam to a depth of 18 inches. Below that, it is mottled, dark yellowish brown silty clay loam to a depth of 42 inches. The substratum is gray silty clay loam to a depth of 60 inches or more.

Urban land consists of areas covered by impermeable surfaces, such as dwellings, roads and streets, shopping centers, parking lots, and industrial parks.

Included with this complex in mapping are areas of Keyport soils that have a loam surface layer. Also included are areas of Keyport soils that have a loamy sand surface layer less than 20 inches thick. These soils are similar to the Keyport sandy loam in use and management. Also included are areas of Udorthents, Elkton soils, and Klej soils that have a clayey substratum. These soils are dissimilar to the Keyport sandy loam in use and management. The similar and

Figure 11.—Excavated areas of Keyport sandy loam, 10 to 15 percent slopes, are extremely acid and, thus, very difficult to revegetate and stabilize.

dissimilar soils make up as much as 30 percent of the complex.

Some areas of these Keyport soils have pyritic clay in the substratum. If the pyritic clay that is exposed during excavation is used as topsoil, it will become extremely acid (pH about 2.5-3.0) and will not support vegetation. Pyritic clay is mainly in the vicinity of Keyport, Hazlet, Marlboro, Manalapan, and Aberdeen Townships. The clay is also in other parts of the county but at greater depths and is generally not excavated. Contact the local office of the Soil Conservation Service for information about the management practices needed to establish vegetation where pyritic clay has been excavated.

Permeability of this Keyport soil is slow in the subsoil and the substratum. The available water capacity is high. The high water table is at a depth of 1 1/2 to 4 feet from November to May.

The open areas of this map unit are used for lawns, gardens, and small parks or are vacant wooded lots.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, shrinking and swelling, slow percolation, and the high frost action potential. If pyritic clay exposed during excavation is used as topsoil, it will become extremely acid and will not support vegetation.

This soil is not assigned to a capability subclass; the woodland ordination symbol is 6A.

KlA—Klej loamy sand, 0 to 3 percent slopes. This is a nearly level and moderately well drained and somewhat poorly drained soil in depressional areas and on low divides. Areas of this soil are irregular in shape and typically range from 5 to 25 acres in size.

Typically, the surface layer is 11 inches thick. In the uppermost inch it is matted organic matter, and below that, it is very dark grayish brown loamy sand. The subsoil is mottled, brownish yellow loamy sand 26 inches thick. The substratum is yellowish brown gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Lakehurst soils. These soils, which make up about 15 percent of the map unit, are similar to the Klej loamy sand in use and management. Also included are Evesboro, Atsion, Downer, and Hammonton soils. Also included, in the vicinity of Hazlet, Marlboro, and Aberdeen Townships, are small areas of Klej soils that have a clayey substratum at a depth of 40 to 60 inches and Klej soils that have a clayey substratum below a depth of 60 inches. In some areas the clayey substratum of Klej soils have pyritic clay which, when oxidized, becomes extremely acid. See the KmB map unit description for the limitations to management caused by oxidized pyritic clay. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Klej loamy sand in use and management.

Permeability of this Klej soil is rapid in the subsoil and moderate in the substratum. The available water capacity is low. The apparent seasonal high water table is at a depth of 1 1/2 to 4 feet from December to April. Runoff is very slow. Water erosion is a slight hazard. Wind erosion is a moderate hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are wooded. A few acres is used for farming and pasture.

This soil is poorly suited to common field crops, hay, and vegetables. The main limitations are the low available water capacity, the seasonal high water table, and rapid permeability. If the soil is farmed, in wet areas improved drainage is needed for certain crops. Other management concerns are irrigation and frequent applications of lime and fertilizer. Cover crops and crop residue management help to improve soil tilth and to increase organic matter content.

This soil is poorly suited to pasture. If the soil is used for pasture, the suitable management practices are proper seeding, proper stocking, frequent liming and fertilizing, and rotation grazing. In the wetter areas improved drainage is needed.

This soil is poorly suited to commercial woodland production. Potential productivity for pitch pine is high. The common species are pitch pine, white oak, and Virginia pine.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, cutbanks caving, and sandiness.

This soil is in capability subclass IIIw; the woodland ordination symbol is 7S.

KmB—Klej loamy sand, clayey substratum, 0 to 5 percent slopes. This is a nearly level and gently sloping, moderately well drained and somewhat poorly drained soil on low divides and in depressional areas. Areas of this soil are irregular in shape and typically range from 5 to 20 acres in size.

Typically, the surface layer is dark yellowish brown loamy sand 4 inches thick. The subsoil is 32 inches thick. It is yellowish brown loamy sand to a depth of 17 inches. Below that, it is mottled, light yellowish brown and pale brown loamy sand to a depth of 36 inches. The substratum extends to a depth of 60 inches or more. It is mottled, strong brown, stratified loamy sand and sandy loam to a depth of 50 inches. Below that, it is mottled, gray clay to a depth of 60 inches or more.

Included with this unit in mapping are areas of moderately sloping soils. These soils make up about 5 percent of the map unit.

Also included are areas of Klej and Keyport soils that have a surface layer of loamy sand less than 20 inches thick. Also included are areas of Klej soils that have a clayey substratum below a depth of 60 inches. In some

areas the clayey substratum is discontinuous or at differing depths within short distances. These soils are in the vicinity of Keyport, Hazlet, Marlboro, and Aberdeen Townships. Small areas of these soils in the vicinity of Allaire State Park and Howell Park have very fine sand in the substratum. These soils are dissimilar in use and management. They make up as much as 25 percent of the map unit.

Some areas of the included soils have pyritic clay in the substratum. If the pyritic clay that is exposed during excavations is used as topsoil, it will become extremely acid (pH about 2.5-3.0) and will not support vegetation. Pyritic clay is mainly in the vicinity of Keyport, Hazlet, Marlboro, Manalapan, and Aberdeen Townships. The clay is also in other parts of the county but at greater depths and is generally not excavated. Contact the local office of the Soil Conservation Service (SCS) about the probable locations of this material. SCS can also provide information on the management practices needed to establish vegetation where pyritic clay has been excavated.

Permeability of the Klej soil is rapid in the subsoil and slow or moderately slow in the lower part of the substratum. The available water capacity is low. The high water table is at a depth of 1 1/2 to 4 feet from December to April. Runoff is very slow. Water erosion is a slight hazard. Wind erosion is a moderate hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are wooded. A few acres is used for farming and pasture.

This soil is poorly suited to common field crops, hay, and vegetables. The main limitations are the low available water capacity, the seasonal high water table, and rapid permeability. If the soil is farmed, in wet areas improved drainage is needed for certain crops. Other management concerns are irrigation and frequent applications of lime and fertilizer. Cover crops and crop residue management help to improve soil tilth and to increase organic matter content.

This soil is poorly suited to pasture. Proper seeding, proper stocking, liming and fertilizing, and rotation grazing are suitable management practices. In the wetter areas improved drainage is needed.

This soil is poorly suited to commercial woodland production. Potential productivity for pitch pine is high. The common species are pitch pine, sweetgum, and white oak.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, slow percolation, cutbanks caving, and sandiness. If pyritic clay that is exposed during excavation is used as topsoil, it will become extremely acid and will not support vegetation.

This soil is in capability subclass IIIw; the woodland ordination symbol is 7S.

KUA—Klej loamy sand-Urban land complex, 0 to 3 percent slopes. This map unit consists of nearly level, moderately well drained and somewhat poorly drained Klej loamy sand and Urban land. The areas of each are in such an intricate pattern that it was not practical to map them separately. The mapped areas are irregular in shape and typically range from 100 to 300 acres in size.

Klej loamy sand makes up about 40 percent of each mapped area. Urban land makes up 30 percent, and other soils make up 30 percent.

Typically, the surface layer of the Klej soil is very dark grayish brown loamy sand 10 inches thick. The subsoil is mottled, brownish yellow loamy sand 26 inches thick. The substratum is yellowish brown gravelly loamy sand to a depth of 60 inches or more.

Urban land consists of areas covered by impermeable surfaces, such as dwellings, roads and streets, shopping centers, parking lots, and industrial parks.

Included with this complex in mapping are areas of Udorthents and Evesboro, Atsion, Downer, and Hammonton soils. Also included, in the vicinity of Hazlet, Marlboro, and Aberdeen Townships, are small areas of Klej soils that have a clayey substratum at a depth of 40 to 60 inches and Klej soils that have a clayey substratum below a depth of 60 inches. In some areas the substratum of the Klej soils has pyritic clay that, when oxidized, becomes extremely acid. See the KmB map unit description for the limitations to use and management caused by oxidized pyritic clay. These soils, which make up as much as 30 percent of the complex, are dissimilar to the Klej loamy sand in use and management.

Permeability of the Klej soil is rapid in the subsoil and moderate in the substratum. The available water capacity is low. The apparent seasonal high water table is at a depth of 1 1/2 to 4 feet from December to April.

The open areas of this map unit are used for lawns, gardens, and small parks or are vacant wooded lots.

The main limitations to use of the Klej soil as sites for dwellings and some other types of community development are the seasonal high water table, cutbanks caving, poor filter, and sandiness.

This soil is not assigned to a capability subclass; the woodland ordination symbol is 7S.

KvA—Kresson loam, 0 to 5 percent slopes. This is a nearly level and gently sloping, somewhat poorly drained soil on low divides and in depressional areas. Areas of the soil are irregular in shape and typically range from 5 to 20 acres in size.

Typically, the surface layer is dark brown loam 9 inches thick. The subsoil is 31 inches thick. It is mottled, olive brown clay loam to a depth of 22 inches. Below that, it is mottled, olive gray clay to a depth of 40 inches. The substratum is mottled, dark grayish brown stratified sandy loam and sandy clay loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Marlton and Colemantown soils. These soils, which make up about 25 percent of the map unit, are similar to the Kresson soil in use and management. Also included are areas of Adelphia and Shrewsbury soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Kresson soil in use and management.

Permeability of this Kresson soil is slow in the subsoil and the substratum. The available water capacity is high. The perched seasonal high water table is at a depth of 1 foot to 1 1/2 feet from December to May. Runoff is slow to medium. Erosion is a slight to moderate hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, and vegetables. The main limitation for crops is the seasonal high water table. The main management concern is providing drainage. The clayey subsoil and substratum lower the efficiency of subsurface drainage. The seasonal high water table limits the soil for certain crops and restricts the time when the soil can be worked. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In some wetter areas improved drainage is needed.

This soil is suited to commercial woodland production. Potential productivity for sweetgum is high. The common species are sweetgum, white oak, pin oak, yellow poplar, and willow oak.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, slow percolation, and frost action.

This soil is in capability subclass IIIw; the woodland ordination symbol is 7W.

LaA—Lakehurst sand, 0 to 2 percent slopes. This is a nearly level, moderately well drained and somewhat poorly drained soil in depressional areas and on low divides. Areas of the soil are irregular in shape and typically range from 5 to 30 acres in size.

Typically, the surface layer is gray sand 4 inches thick. The subsurface layer is light gray sand 6 inches thick. The subsoil is 26 inches thick. It is brown loamy sand to a depth of 13 inches. In the next layer it is mottled, brownish yellow sand to a depth of 24 inches. Below that, it is mottled, pale brown sand to a depth of 36 inches. The substratum is mottled, light brownish gray sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Klej soils and soils that are similar to the Lakehurst soil but that have a bleached subsurface layer that is thinner than typical and that do not have a subsoil that in the upper part is distinct, thin, or darkened by an accumulation of organic matter. These soils, which make up about 30 percent of the map unit, are similar to the Lakehurst soil in use and management. Also included are areas of Lakewood and Atsion soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Lakehurst sand in use and management.

Permeability of this Lakehurst soil is rapid in the subsoil and the substratum. The available water capacity is low. The apparent seasonal high water table is at a depth of 1 1/2 to 3 1/2 feet from January to April. Runoff is very slow. Water erosion is a slight hazard. Wind erosion is a severe hazard. Organic matter content is low. In unlimed areas reaction is extremely acid to strongly acid.

Most areas of this soil are woodland. A very small acreage is used for pasture and farming.

This soil is poorly suited to common field crops, hay, and vegetables. The main limitations are the low available water capacity, the low organic matter content, rapid permeability, and the seasonal high water table. If the soil is farmed, in wet areas improved drainage is needed for certain crops. Other management concerns are irrigation and frequent applications of lime and fertilizer. Cover crops and crop residue management help to maintain soil tilth and organic matter content. Windbreaks and cover crops help to control wind erosion.

This soil is poorly suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In the wetter areas improved drainage is needed.

This soil is poorly suited to commercial woodland production. Potential productivity for pitch pine is high. The most common species is pitch pine.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, poor filter, cutbanks caving, and sandiness.

This soil is in capability subclass IVw; the woodland ordination symbol is 6S.

LeB—Lakewood sand, 0 to 5 percent slopes. This is a nearly level and gently sloping, excessively drained soil on divides. Areas of the soil are irregular in shape and typically range from 5 to 40 acres in size.

Typically, the surface layer is 4 inches thick. The uppermost inch is dark brown, matted, decomposed organic material, and below that it is dark grayish brown sand. The subsurface layer is light brownish gray sand 10 inches thick. The subsoil is 17 inches thick. It is dark brown loamy sand to a depth of 16 inches. Below that, it is brownish yellow sand to a depth of 31 inches. The substratum is brownish yellow gravelly sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Evesboro soils and soils that are similar to the Lakewood soil but that have a bleached subsurface layer that is thinner than typical or that does not have a dark brown subsoil. These soils, which make up as much as 30 percent of the map unit, are similar to the Lakewood soil in use and management. Also included are areas of Lakehurst, Klej, and Atsion soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Lakewood soil in use and management.

Permeability of this Lakewood soil is rapid in the subsoil and moderate to rapid in the substratum. The available water capacity is low. The seasonal high water table is at a depth of more than 6 feet. Runoff is very slow. Water erosion is a slight hazard. Wind erosion is a severe hazard. Organic matter content is low. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this Lakewood soil are woodland. A very small acreage is used for farming and pasture.

This soil is poorly suited to common field crops, hay, and vegetables. The main limitations are the low available water capacity, the low organic matter content, and rapid permeability. If the soil is farmed, the main management concerns are irrigation and frequent applications of lime and fertilizer. Cover crops and crop residue management help to maintain soil tilth and organic matter content. Windbreaks and cover crops help to control wind erosion.

This soil is poorly suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is poorly suited to commercial woodland production. Potential productivity for pitch pine is moderately high. The common species are pitch pine, shortleaf pine, chestnut oak, black oak, and Virginia pine.

The main limitations to use of this soil as sites for dwellings and some other types of community development are poor filter, cutbanks caving, and sandiness.

This soil is in capability subclass VIIs; the woodland ordination symbol is 5S.

LeC—Lakewood sand, 5 to 10 percent slopes. This is a moderately sloping, excessively drained soil on side slopes. Areas of the soil are irregular in shape and typically range from 10 to 40 acres in size.

Typically, the surface layer is 4 inches thick. The uppermost inch is dark brown, matted, decomposed organic material, and below that it is dark grayish brown sand. The subsurface layer is light brownish gray sand 10 inches thick. The subsoil is 17 inches thick. It is dark brown loamy sand to a depth of 16 inches. Below that, it is brownish yellow sand to a depth of 31 inches. The substratum is brownish yellow gravelly sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Evesboro soils and soils that are similar to the Lakewood soil but that have a bleached subsurface layer that is thinner than typical or that do not have a dark brown subsoil. These soils, which make up as much as 30 percent of the map unit, are similar to the Lakewood soil in use and management. Also included are areas of Lakehurst and Klej soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Lakewood soil in use and management.

Permeability of this Lakewood soil is rapid in the subsoil and moderate to rapid in the substratum. The available water capacity is low. The seasonal high water table is at a depth of more than 6 feet. Runoff is slow. Water erosion is a moderate hazard. Wind erosion is a severe hazard. Organic matter content is low. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are woodland. A very small acreage is used for farming and pasture.

This soil is poorly suited to common field crops, hay, and vegetables. The main limitations are the low available water capacity, the low organic matter content, and rapid permeability. If the soil is farmed, the main management concerns are irrigation and frequent applications of lime and fertilizer. Cover crops and crop residue management help to maintain soil tilth and organic matter content. Cover crops and windbreaks help to control wind erosion.

This soil is poorly suited to pasture. The suitable management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is poorly suited to commercial woodland production. Potential productivity for pitch pine is moderately high. The common species are pitch pine, shortleaf pine, chestnut oak, black oak, and Virginia pine.

The main limitations to use of this soil as sites for dwellings and some other types of community development are poor filter, cutbanks caving, sandiness, and slope.

This soil is in capability subclass VIIs; the woodland ordination symbol is 5S.

Ma—Manahawkin muck. This is a nearly level and very poorly drained soil in wide depressional areas and on broad flats. Areas of the soil are irregular in shape and typically range from 15 to 30 acres in size.

Typically, the uppermost 30 inches is black and very dark gray muck. Below the muck, the substratum is mottled, dark gray loamy sand and sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Atsion and Elkton soils and Humaquepts. Also included are soils that have a layer of muck more than 51 inches thick over mineral material. Also included are soils that have thick layers of muck and a clayey textured substratum. These soils, which make up as much as 25 percent of the map unit, are dissimilar in use and management.

Permeability of the Manahawkin soil is moderately slow to moderately rapid in the subsoil and moderately rapid in the substratum. The available water capacity is high. The apparent seasonal high water table is between the surface and 1 foot above the surface from October to July. Runoff is very slow, and ponding is common. Erosion is a slight hazard. Organic matter content is high. The soil is subject to frequent flooding. In unlimed areas reaction ranges from extremely acid to strongly acid.

Nearly all the acreage of this soil is wooded.

This soil, if properly managed, is suited to cranberry or blueberry production. If the soil is used for these crops, proper drainage and flood control measures are needed. If drained, the soil is subject to subsidence because of the high organic matter content.

This soil is poorly suited to commercial woodland production. Potential productivity for Atlantic white-cedar is moderately high. The common species are Atlantic white-cedar, red maple, sweetbay magnolia, and blackgum.

The main limitations to use of this soil for dwellings and some other types of community development are ponding, flooding, cutbanks caving, and low strength.

This soil is in capability subclass VIIw; the woodland ordination symbol is 4W.

MbC—Marlton sandy loam, 5 to 10 percent slopes. This is a moderately sloping, well drained and moderately well drained soil on side slopes. Areas of the soil are long and narrow in shape and typically range from 5 to 20 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam 8 inches thick. The subsoil is 38 inches thick. It is very dark grayish brown sandy clay loam to a depth of 18 inches. In the next layer it is mottled, dark olive gray clay loam to a depth of 34 inches. Below that, it is mottled, dark olive gray clay to a depth of 46 inches. The substratum is mottled, dark olive gray sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Marlton soils that have a loam surface layer. Also included are small areas of Marlton soils that have a loamy sand surface layer less than 20 inches thick. These soils, which make up about 30 percent of the map unit, are similar to the Marlton sandy loam in use and management. Also included are areas of Collington and Tinton soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Marlton sandy loam in use and management.

Permeability of this Marlton soil is slow in the subsoil and the substratum. The available water capacity is high. The perched seasonal high water table is at a depth of 2 to 5 feet from November to May. Runoff is rapid. Erosion is a severe hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, and vegetables. Erosion is a hazard. The main management concern is reducing runoff and controlling erosion. Contour farming, stripcropping, grassed waterways, cropland terraces or diversion terraces help to reduce runoff and to control erosion. The seasonal high water table limits the soil for certain crops and restricts the time when the soil can be worked. Cover crops and crop residue mangement help to maintain soil tilth and organic matter content.

This soil is suited to pasture. The major management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is well suited to commercial woodland production. Potential productivity for pin oak is moderately high. The common species are pin oak, sweetgum, yellow poplar, and white ash.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, slow percolation, and slope.

This soil is in capability subclass IIIe; the woodland ordination symbol is 4A.

MlB—Marlton loam, 2 to 5 percent slopes. This is a gently sloping, well drained and moderately well drained soil on divides. Areas of the soil are irregular in shape and typically range from 5 to 20 acres in size.

Typically, the surface layer is very dark grayish brown loam 8 inches thick. The subsoil is 38 inches thick. It is very dark grayish brown sandy clay loam to a depth of 18 inches. In the next layer it is mottled, dark olive gray clay loam to a depth of 34 inches. Below that, it is mottled, dark olive gray clay to a depth of 46 inches. The substratum is mottled, dark olive gray sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Marlton soils that have a sandy loam surface layer and small areas of Marlton soils that have a loamy sand surface layer less than 20 inches thick. Also included are areas of Kresson soils. These soils, which make up about 35 percent of the map unit, are similar to the Marlton loam in use and management. Also included are areas of Collington, Colemantown, Adelphia, and Shrewsbury soils. These soils, which make up as much as 20 percent of the map unit, are dissimilar to the Marlton loam in use and management.

Permeability of this Marlton soil is slow in the subsoil and the substratum. The available water capacity is high. The perched seasonal high water table is at a depth of 2 to 5 feet from November to May. Runoff is medium. Erosion is a moderate hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, and vegetables. The main limitation for crops is the seasonal high water table. The main management concerns are providing drainage and controlling erosion. In some areas the clayey subsoil and substratum lower the efficiency of subsurface drainage. The seasonal high water table limits the soil for certain crops and restricts the time when the soil can be worked. Stripcropping, grassed waterways, or diversion terraces help to reduce runoff and to control erosion. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The major management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In some wetter areas improved drainage is needed.

This soil is well suited to commercial woodland production. Potential productivity for pin oak is moderately high. The common species are pin oak, sweetgum, yellow poplar, and white ash.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table and slow percolation.

This soil is in capability subclass IIe; the woodland ordination symbol is 4A.

PeA—Pemberton loamy sand, 0 to 5 percent slopes. This is a nearly level and gently sloping, moderately well drained and somewhat poorly drained soil on low divides and in depressional areas. Areas of the soil are irregular in shape and typically range from 10 to 25 acres.

Typically, the surface layer is brown loamy sand 10 inches thick. The subsurface layer is yellowish brown loamy sand 15 inches thick. The subsoil is 20 inches thick. It is mottled, dark yellowish brown sandy clay loam to a depth of 37 inches. Below that, it is mottled, yellowish brown sandy clay loam to a depth of 45 inches. The substratum is mottled, pale olive fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of soils that are similar to the Pemberton soil except that the subsoil is clayey textured and has glauconite in higher amounts than typical. These areas are in the vicinity of the southern part of Upper Freehold Township along the Ocean County border. Also included, near Holmeson and Siloam, are small areas of soils that have a bleached subsurface layer, a subsoil that in the upper part is distinct, thin, and darkened by an accumulation of organic matter, and heavier textured subsoil that has glauconite at a depth of about 36 inches. These soils, which make up about 15 percent of the map unit, are similar to the Pemberton soil in use and management. Also included are areas of Tinton, Freehold, Holmdel, and Adelphia soils. These soils, which make up about 20 percent of the map unit, are dissimilar to the Pemberton soil in use and management.

Permeability of this Pemberton soil is moderately rapid in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is moderate. The apparent seasonal high water table is at a depth of 1 to 4 feet from December to May. Runoff is slow to medium. Water erosion is a slight hazard. Wind erosion is a moderate hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, and vegetables. The main limitation for crops is the seasonal high water table. The main management concern is providing drainage. The seasonal high water table limits the soil for certain crops. The sandier textured surface and subsurface layers require irrigation and more frequent applications of lime and fertilizer. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture (fig. 12). The major management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In some wetter areas improved drainage is needed.

This soil is suited to commercial woodland production. Potential productivity for sweetgum is high. The common species are sweetgum, northern red oak, and pin oak.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, frost action, and cutbanks caving.

This soil is in capability subclass IIIw; the woodland ordination symbol is 6S.

PhB—Phalanx loamy sand, 0 to 10 percent slopes. This is a nearly level to moderately sloping, well drained soil on divides and side slopes. Areas of the soil are irregular in shape and typically range from 10 to 50 acres in size.

Typically, the surface layer is dark brown loamy sand 2 inches thick. The subsurface layer is brown loamy sand 5 inches thick. The subsoil is strong brown and yellowish red loamy sand and sandy loam 31 inches thick. The substratum extends to a depth of 60 inches or more. It is yellowish red loamy sand that has indurated layers of iron-cemented sandstone (fig. 13).

Included with this soil in mapping are areas of Tinton, Evesboro, Colts Neck, Freehold, and Sassafras soils. Also included are soils that are similar to the Phalanx soil but that have layers of iron-cemented sandstone below a depth of 40 inches. These soils, which make up as much as 25 percent of the map unit, are dissimilar to the Phalanx soil in use and management.

Figure 12.—Thoroughbreds on a grass-legume pasture on Pemberton loamy sand, 0 to 5 percent slopes.

Permeability of this Phalanx soil is moderate or moderately rapid in the subsoil and moderately rapid in the substratum. The available water capacity is moderate. The seasonal high water table is at a depth of more than 6 feet. Runoff is slow to medium. Water erosion hazard is slight to moderate. Wind erosion is a moderate hazard. In unlimed areas reaction is extremely acid or very strongly acid in the surface layer and the upper part of the subsoil and strongly acid or very strongly acid in the lower part of the subsoil and the substratum.

Almost all areas of this soil are wooded.

This soil is poorly suited for common field crops, hay, and vegetables. The main limitations are the cemented pan, the restricted rooting depth, and iron-cemented sandstone channers and stones. If the soil is used for farming, irrigation and more frequent applications of lime and fertilizer are needed. On the steeper slopes erosion control practices are needed.

This soil is suited to pasture. The main limitation is the restricted rooting depth. The major management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is suited to commercial woodland production. Potential productivity for chestnut oak is moderately high. The common species are chestnut oak, black oak, white oak, Virginia pine, and pitch pine.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the cemented pan, cutbanks caving, and slope.

This soil is in capability subclass IVs; the woodland ordination symbol is 4S.

PhD—Phalanx loamy sand, 10 to 25 percent slopes. This is a strongly sloping to steep, well drained soil on side slopes. Areas of the soil are irregular in shape and typically range from 10 to 100 acres in size.

Typically, the surface layer is dark brown loamy sand 2 inches thick. The subsurface layer is brown loamy sand 5 inches thick. The subsoil is strong brown and yellowish red loamy sand and sandy loam 31 inches thick. The substratum extends to a depth of 60 inches or more. It is yellowish red loamy sand that has indurated layers of iron-cemented sandstone.

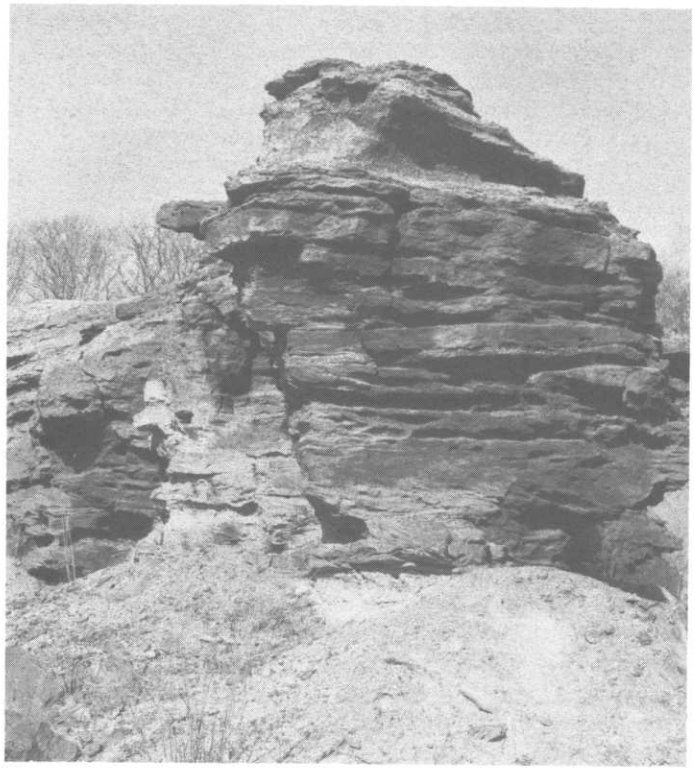


Figure 13.—An exposure of iron-cemented sandstone in an area of Phalanx loamy sand, 0 to 10 percent slopes.

Included with this soil in mapping are areas of Tinton, Evesboro, Colts Neck, Freehold, and Sassafras soils. Also included are soils that are similar to the Phalanx soil but that have layers of iron-cemented sandstone below a depth of 40 inches. These soils, which make up as much as 25 percent of the map unit, are dissimilar to the Phalanx soil in use and management.

Permeability of this Phalanx soil is moderate or moderately rapid in the subsoil and moderately rapid in the substratum. The available water capacity is moderate. The seasonal high water table is at a depth of more than 6 feet. Runoff is rapid to very rapid. Water erosion is a severe hazard. Organic matter content is low to moderate. In unlimed areas reaction is extremely acid or very strongly acid in the surface layer and in the upper part of the subsoil and strongly acid or very strongly acid in the lower part of the subsoil and the substratum.

Almost all areas of this Phalanx soil are wooded.

This soil is poorly suited to common field crops, hay, vegetables, and pasture. The main limitations are slope, the cemented pan, the restricted rooting depth, and iron-cemented sandstone channers and stones.

This soil is poorly suited to commercial woodland production. Potential productivity for chestnut oak is moderately high. The common species are chestnut oak, black oak, white oak, Virginia pine, and pitch pine.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the cemented pan, cutbanks caving, and slope.

This soil is in capability subclass VIIe; the woodland ordination symbol is 4S.

PT—Pits, sand and gravel. This map unit consists of areas that have been excavated for sand and gravel. The mapped areas are irregular in shape and typically range from 25 to 250 acres in size.

Typically, these areas consist of sandy material and differing amounts of gravel and fragments of iron-cemented sandstone. Some pits have large iron-cemented sandstone boulders that range from 2 to 15 feet in diameter. A few pits have been smoothed, and others have mounds of soil and steep escarpments. Some older pits have reverted to trees.

Included with this soil in mapping are small undisturbed areas of Evesboro, Downer, Sassafras, and Phalanx soils. A few abandoned pits have been used as dump sites.

The properties and characteristics of this map unit differ greatly from place to place. For most uses onsite investigation and evaluation are needed.

This map unit is not assigned to a capability subclass.

PW—Psamments, waste substratum. This map unit consists of reclaimed areas or areas used as sites for sanitary landfills. The mapped areas are generally rectangular in shape and typically range from 10 to 25 acres in size.

Typically, the landfills are areas where 24 to 48 inches of sandy fill material has been placed over refuse. The refuse consists of garbage, paper, plastic, glass, metal, rubber, building debris, and other materials.

Included with these soils in mapping are areas of Udorthents and soils that have not been covered with fill. Also included are small areas of sand and gravel pits.

The properties and characteristics of this map unit differ greatly from place to place. For most uses onsite investigation and evaluation are needed.

These soils are not assigned to a capability subclass.

SaB—Sassafras sandy loam, 2 to 5 percent slopes. This is a gently sloping, well drained soil on divides. Areas of the soil are irregular in shape and typically range from 5 to 35 acres in size.

Typically, the surface layer is dark brown sandy loam 11 inches thick. The subsoil is 25 inches thick. It is yellowish brown sandy loam and sandy clay loam to a depth of 30 inches. Below that, it is reddish yellow sandy loam to a depth of 36 inches. The substratum is reddish yellow stratified loamy sand and sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Sassafras soils that have a loam surface layer and Downer and Freehold soils. These soils, which make up about 35 percent of the map unit, are similar to the Sassafras sandy loam in use and management. Also included are areas of Woodstown and Fallsington soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Sassafras sandy loam in use and management.

Permeability of this Sassafras soil is moderate in the subsoil and moderate to rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is medium. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is well suited to common field crops, hay, sod, and vegetables. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The major management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is well suited to commercial woodland production. Potential productivity for white oak is moderately high. The common species are white oak, yellow poplar, and Virginia pine.

The main limitations to use of this soil as sites for dwellings and some other types of community development are cutbanks caving and frost action.

This soil is in capability subclass IIe; the woodland ordination symbol is 5A.

SaC—Sassafras sandy loam, 5 to 10 percent slopes. This is a moderately sloping, well drained soil on side slopes. Areas of this soil are long and narrow in shape and typically range from 5 to 25 acres in size.

Typically, the surface layer is dark brown sandy loam 11 inches thick. The subsoil is 25 inches thick. It is yellowish brown sandy loam and sandy clay loam to a depth of 30 inches. Below that, it is reddish yellow sandy loam to a depth of 36 inches. The substratum is reddish yellow stratified loamy sand and sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Downer and Freehold soils. These soils, which make up about 25 percent of the map unit, are similar to the Sassafras soil in use and management. Also included are areas of Tinton soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Sassafras soil in use and management.

Permeability of this Sassafras soil is moderate in the subsoil and moderate to rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is medium. Erosion is a moderate hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is well suited to common field crops, hay, and vegetables. Erosion is a hazard. The main management concern is reducing runoff and controlling erosion. Contour farming, stripcropping, grassed waterways, and cropland terraces or diversion terraces help to reduce runoff and to control erosion. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. Proper seeding, proper stocking, liming and fertilizing, and rotation grazing help to maintain plant cover.

This soil is well suited to commercial woodland production. Potential productivity for white oak is moderately high. The common species are white oak, yellow poplar, and Virginia pine.

The main limitations to use of this soil as sites for dwellings and some other types of community development are cutbanks caving, frost action, and slope.

This soil is in capability subclass IIIe; the woodland ordination symbol is 5A.

SaD—Sassafras sandy loam, 10 to 15 percent slopes. This is a strongly sloping, well drained soil on side slopes. Areas of the soil are long and narrow in shape and typically range from 10 to 20 acres in size.

Typically, the surface layer is dark brown sandy loam 11 inches thick. The subsoil is 25 inches thick. It is yellowish brown sandy loam and sandy clay loam to a depth of 30 inches. Below that, it is reddish yellow sandy loam to a depth of 36 inches. The substratum is reddish yellow stratified loamy sand and sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Freehold soils. These soils, which make up about 20 percent of the map unit, are similar to the Sassafras soil in use and management. Also included are areas of Tinton and Evesboro soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Sassafras soil in use and management.

Permeability of this Sassafras soil is moderate in the subsoil and moderate to rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is rapid. Erosion is a severe hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

A few areas of this soil are farmed. A small acreage is used for pasture. A small acreage is woodland.

This soil is poorly suited to common field crops, hay, and vegetables. Erosion is a hazard. The main management concern is reducing runoff and controlling

erosion. Contour farming, stripcropping, grassed waterways, and cropland terraces or diversion terraces help to reduce runoff and to control erosion. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. Proper seeding, proper stocking, liming and fertilizing, and rotation grazing help to control erosion and to maintain plant cover.

This soil is well suited to commercial woodland production. Potential productivity for white oak is moderately high. The common species are white oak, yellow poplar, and Virginia pine.

The main limitations to use of this soil as sites for dwellings and some other types of community development are cutbanks caving, frost action, and slope.

This soil is in capability subclass IVe; the woodland ordination symbol is 5A.

SaE—Sassafras sandy loam, 15 to 25 percent slopes. This is a moderately steep to steep, well drained soil on side slopes. Areas of the soil are long and narrow in shape and typically range from 5 to 50 acres in size.

Typically, the surface layer is dark brown sandy loam 11 inches thick. The subsoil is 25 inches thick. It is yellowish brown sandy loam and sandy clay loam to a depth of 30 inches. Below that, it is reddish yellow sandy loam to a depth of 36 inches. The substratum is reddish yellow stratified loamy sand and sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Freehold soils. These soils, which make up about 20 percent of the map unit, are similar to the Sassafras soil in use and management. Also included are areas of Tinton and Evesboro soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Sassafras soil in use and management.

Permeability of this Sassafras soil is moderate in the subsoil and moderate to rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is very rapid. Erosion is a severe hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

Almost all the acreage of this soil is wooded.

This soil is poorly suited to common field crops, hay, vegetables, and pasture. The main limitations are slope and runoff. The main management concern is controlling erosion.

This soil is suited to commercial woodland production. Potential productivity for white oak is moderately high. The common species are white oak, yellow poplar, and Virginia pine.

The main limitations to use of this soil as sites for dwellings and some other types of community development are cutbanks caving and slope.

This soil is in capability subclass VIIe; the woodland ordination symbol is 5R.

SgB—Sassafras gravelly sandy loam, 2 to 5 percent slopes. This is a gently sloping, well drained soil on divides. Areas of the soil are irregular in shape and typically range from 5 to 30 acres in size.

Typically, the surface layer is dark brown gravelly sandy loam 11 inches thick. The subsoil is 25 inches thick. It is yellowish brown sandy loam and sandy clay loam to a depth of 30 inches. Below that, it is reddish yellow sandy loam to a depth of 36 inches. The substratum is reddish yellow stratified loamy sand and sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Downer and Freehold soils and Sassafras soils that do not have gravel in the surface layer. These soils, which make up about 30 percent of the map unit, are similar to the Sassafras gravelly sandy loam in use and management. Also included are Woodstown and Fallsington soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Sassafras gravelly sandy loam in use and management.

Permeability of this Sassafras soil is moderate in the subsoil and moderate to rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is medium. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is well suited to common field crops, hay, and vegetables (fig. 14). Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The major management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is well suited to commercial woodland production. Potential productivity for white oak is moderately high. The common species are white oak, yellow poplar, and Virginia pine.

The only limitations to use of this soil as sites for dwellings and some other types of community development are cutbanks caving and frost action.

This soil is in capability subclass IIe; the woodland ordination symbol is 5A.

SgC—Sassafras gravelly sandy loam, 5 to 10 percent slopes. This is a moderately sloping, well drained soil on side slopes. Areas of the soil are long and narrow in shape and typically range from 5 to 30 acres in size.

Typically, the surface layer is dark brown gravelly sandy loam 11 inches thick. The subsoil is 25 inches thick. It is yellowish brown sandy loam and sandy clay

Figure 14.—An area of Sassafras gravelly sandy loam, 2 to 5 percent slopes. The corn is ready for harvesting.

loam to a depth of 30 inches. Below that, it is reddish yellow sandy loam to a depth of 36 inches. The substratum is reddish yellow stratified loamy sand and sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Downer and Freehold soils and Sassafras soils that do not have gravel in the surface layer. These soils, which make up about 30 percent of the map unit, are similar to the Sassafras gravelly sandy loam in use and management. Also included are areas of Tinton soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Sassafras gravelly sandy loam in use and management.

Permeability of this Sassafras soil is moderate in the subsoil and moderate to rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is medium. Erosion is a moderate hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, and vegetables. Erosion is a hazard. The main management concerns are reducing runoff and controlling erosion. Contour farming, stripcropping, grassed waterways, and cropland terraces or diversion terraces generally help to

reduce runoff and to control erosion. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. Proper seeding, proper stocking, liming and fertilizing, and rotation grazing help to maintain plant cover.

This soil is suited to commercial woodland production. Potential productivity for white oak is moderately high. The common species are white oak, yellow poplar, and Virginia pine.

The main limitations to use of this soil as sites for dwellings and some other types of community development are cutbanks caving, frost action, and slope.

This soil is in capability subclass IIIe; the woodland ordination symbol is 5A.

SlA—Sassafras loam, 0 to 2 percent slopes. This is a nearly level, well drained soil on divides. Areas of the soil are irregular in shape and typically range from 10 to 50 acres in size.

Typically, the surface layer is dark brown loam 11 inches thick. The subsoil is 25 inches thick. It is yellowish brown sandy loam and sandy clay loam to a depth of 30 inches. Below that, it is reddish yellow sandy loam to a depth of 36 inches. The substratum is reddish yellow stratified loamy sand and sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of Downer and Freehold soils. These soils, which make up about 25 percent of the map unit, are similar to the Sassafras soil in use and management. Also included are areas of Woodstown and Fallsington soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Sassafras soil in use and management.

Permeability of this Sassafras soil is moderate in the subsoil and moderate to rapid in the substratum. The available water capacity is high. The seasonal high water table is at a depth of more than 6 feet. Runoff is slow. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is strongly acid to extremely acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is well suited to common field crops, hay, sod, and vegetables. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. The major management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is well suited to commercial woodland production. Potential productivity for white oak is moderately high. The common species are white oak, yellow poplar, and Virginia pine.

The main limitations to use of this soil as sites for dwellings and some other types of community development are cutbanks caving and frost action.

This soil is in capability class I; the woodland ordination symbol is 5A.

Sn—Shrewsbury sandy loam. This is a nearly level, poorly drained soil in depressional areas, along drainageways, and on broad flats. Areas of the soil are long and narrow in shape and typically range from 5 to 50 acres in size.

Typically, the surface layer is 9 inches thick. In the uppermost inch it is dark reddish brown, matted, partly decomposed organic material and roots, and below that, it is black sandy loam. The subsurface layer is mottled, dark gray sandy loam 4 inches thick. The subsoil is 18 inches thick. It is mottled, grayish brown sandy clay loam to a depth of 22 inches. Below that, it is mottled, olive gray sandy clay loam to a depth of 31 inches. The substratum is mottled, dark greenish gray loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Shrewsbury soils that have a loam surface layer and Fallsington and Colemantown soils. These soils, which make up about 55 percent of the map unit, are similar to the Shrewsbury sandy loam in use and management. Also included are Holmdel and Adelphia soils. These soils, which make up as much as 15 percent of the map unit, are dissimilar to the Shrewsbury sandy loam in use and management.

Permeability of this Shrewsbury soil is moderately slow or moderate in the subsoil and moderately rapid or rapid in the substratum. The available water capacity is high. The apparent seasonal high water table is between the surface and a depth of 1 foot from October to June. Runoff is slow, and water ponds on the surface. Erosion is a slight hazard. Organic matter content is moderate or high. In unlimed areas reaction is extremely acid or very strongly acid.

About half of the acreage of this soil is woodland. Some areas have been cleared and drained and are farmed. A small acreage is used for pasture.

This soil is suited to common field crops, hay, and vegetables. The main limitation for crops is the seasonal high water table. The main management concern is providing drainage. The seasonal high water table limits the soil for certain crops and restricts the time when the soil can be worked. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. The major management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In some wetter areas improved drainage is needed.

This soil is suited to commercial woodland production. Potential productivity for pin oak is moderately high. The common species are pin oak, sweetgum, and red maple.

During wet periods the seasonal high water table is the major limitation for harvesting trees.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, slow percolation, cutbanks caving, and frost action.

This soil is in capability subclass IIIw; the woodland ordination symbol is 4W.

SS—Sulfaquents and Sulfihemists, frequently flooded. This map unit consists of poorly drained and very poorly drained soils in tidal marshes and estuaries that are subject to tidal flooding. Areas of these soils are irregular in shape and typically range from 20 to 100 acres in size. Some areas are mostly Sulfaquents, some are mostly Sulfihemists, and some consist of both. Sulfaquents and Sulfihemists were mapped together because they are similar in use and management. The map unit is about 40 percent Sulfaquents, 30 percent Sulfihemists, and 30 percent other soils.

Included with these soils in mapping are areas of Hooksan and Manahawkin soils and Humaquepts. Also included are areas of narrow beaches and sand bars and, in urban areas, Udorthents and other land fills. These areas make up about 30 percent of the map unit.

Permeability of these soils is moderate or moderately rapid in the substratum. The available water capacity is high. The water table fluctuates with the tides. Runoff is very slow. Organic matter content is high. These soils are subject to frequent flooding. When wet they are slightly acid to mildly alkaline, and when dry become extremely acid.

Most areas of these soils are used as habitat for wildlife and are in recreation use. A few areas have been filled in and are used as sites for marinas and other community buildings.

The main limitations to use of these soils as sites for dwellings and some other types of community development are tidal flooding and the seasonal high water table. The properties and characteristics of these soils differ so greatly that onsite investigation and evaluation are needed for most uses.

These soils are in capability subclass VIIIw; a woodland ordination symbol has not been assigned.

ToA—Tinton loamy sand, 0 to 5 percent slopes. This is a nearly level to gently sloping, well drained soil on divides. Areas of the soil are irregular in shape and typically range from 5 to 75 acres in size.

Typically, the surface layer is dark brown loamy sand 7 inches thick. The subsurface layer is yellowish brown loamy sand 25 inches thick. The subsoil is dark yellowish brown sandy clay loam 14 inches thick. The substratum is dark yellowish brown loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Collington, Freehold, Evesboro, Pemberton, and Holmdel soils. Also included are small areas of soils that are similar to the Tinton soil except that they have sandy surface and subsurface layers that are 36 to 60 inches deep over loamy subsoil. These soils, which make up as much as 25 percent of the map unit, are dissimilar to the Tinton soil in use and management.

Permeability of this Tinton soil is moderately rapid in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is moderate. The seasonal high water table is at a depth of more than 6 feet. Runoff is slow to medium. Water erosion is a slight hazard. Wind erosion is a moderate hazard. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, and vegetables. Frequent applications of lime and fertilizer and irrigation are needed. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. The major management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is suited to commercial woodland production. Potential productivity for northern red oak is moderately high. The common species are northern red oak, Virginia pine, shortleaf pine, white oak, and black oak.

The main limitation to use of this soil as sites for dwellings and some other types of community development is cutbanks caving.

This soil is in capability subclass IIIs; the woodland ordination symbol is 4S.

ToC—Tinton loamy sand, 5 to 10 percent slopes. This is a moderately sloping, well drained soil on side slopes. Areas of the soil are irregular in shape and typically range from 5 to 50 acres in size.

Typically, the surface layer is dark brown loamy sand 7 inches thick. The subsurface layer is yellowish brown loamy sand 25 inches thick. The subsoil is dark yellowish brown sandy clay loam 14 inches thick. The substratum is dark yellowish brown loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Collington, Freehold, and Evesboro soils. Also included are small areas of soils that are similar to the Tinton soil except that they have sandy surface and subsurface layers that are 36 to 60 inches deep over loamy subsoil. These soils, which make up as much as 25 percent of the map unit, are dissimilar to the Tinton soil in use and management.

Permeability of this Tinton soil is moderately rapid in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is moderate. The seasonal high water table is at a depth of more than 6 feet. Runoff is medium. Water erosion is a moderate

hazard. Wind erosion is also a moderate hazard. In unlimed areas reaction is extremely acid or very strongly acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, and vegetables. Frequent applications of lime and fertilizer and irrigation are needed. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is suited to pasture. The major management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing.

This soil is suited to commercial woodland production. Potential productivity for northern red oak is moderately high. The common species are northern red oak, Virginia pine, shortleaf pine, white oak, and black oak.

The main limitations to use of this soil as sites for dwellings and some other types of community development are cutbanks caving and slope.

This soil is in capability subclass IVs; the woodland ordination symbol is 4S.

ToD—Tinton loamy sand, 10 to 25 percent slopes. This is a strongly sloping to steep, well drained soil on side slopes. Areas of the soil are long and narrow in shape and typically range from 5 to 20 acres in size.

Typically, the surface layer is dark brown loamy sand 7 inches thick. The subsurface layer is yellowish brown loamy sand 25 inches thick. The subsoil is dark yellowish brown sandy clay loam 14 inches thick. The substratum is dark yellowish brown loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Collington, Freehold, and Evesboro soils. Also included are small areas of soils that are similar to the Tinton soil except that they have sandy surface and subsurface layers that are 36 to 60 inches deep over loamy subsoil. These soils, which make up as much as 25 percent of the map unit, are dissimilar to the Tinton soil in use and management.

Permeability of this Tinton soil is moderately rapid in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is moderate. The seasonal high water table is at a depth of more than 6 feet. Runoff is rapid to very rapid. Water erosion is a severe hazard. Wind erosion is a moderate hazard. In unlimed areas reaction is extremely acid or very strongly acid.

Most of the acreage of this soil is woodland. A few areas are farmed. A small acreage is used for pasture.

This soil is poorly suited to common field crops, hay, and vegetables. Erosion is a hazard. The main limitation is slope. The main management concerns are reducing runoff and controlling erosion. Frequent applications of lime and fertilizer and irrigation are needed. Cover crops and crop residue management help to improve and maintain soil tilth and organic matter content.

This soil is poorly suited to pasture. Proper seeding, proper stocking, liming and fertilizing, and rotation grazing help to control erosion and to maintain plant cover.

This soil is poorly suited to commercial woodland production. Potential productivity for northern red oak is moderately high. The common species are northern red oak, Virginia pine, shortleaf pine, white oak, and black oak. The main limitation is slope.

The main limitations to use of this soil as sites for dwellings and some other types of community development are cutbanks caving and slope.

This soil is in capability subclass VIe; the woodland ordination symbol is 4S.

TUB—Tinton loamy sand-Urban land complex, 0 to 5 percent slopes. This map unit consists of nearly level to moderately sloping, well drained Tinton loamy sand and Urban land. The areas of each are in such an intricate pattern that it was not practical to map them separately. The mapped areas are irregular in shape and typically range from 25 to 150 acres in size.

Tinton loamy sand makes up about 45 percent of each mapped area. Urban land makes up 30 percent, and other soils make up 25 percent.

Typically, the surface layer of the Tinton soil is dark brown loamy sand 7 inches thick. The subsurface layer is yellowish brown loamy sand 25 inches thick. The subsoil is dark yellowish brown sandy clay loam 14 inches thick. The substratum is dark yellowish brown loamy sand to a depth of 60 inches or more.

Urban land consists of areas covered by impermeable surfaces, such as dwellings, roads and steeets, shopping centers, parking lots, and industrial parks (fig. 15).

Included with this complex in mapping are areas of Udorthents and Collington, Freehold, Evesboro, Pemberton, and Holmdel soils. Also included are small areas of soils that are similar to the Tinton soil except that they have sandy surface and subsurface layers that are 36 to 60 inches deep over a loamy subsoil. These soils, which make up as much as 25 percent of the map unit, are dissimilar to the Tinton soil in use and management.

Permeability of this Tinton soil is moderately rapid in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is moderate. The seasonal high water table is at a depth of more than 6 feet.

The open areas of this map unit are used for lawns, gardens, and small parks or are vacant wooded lots.

The main limitation to use of this soil as sites for dwellings and some other types of community development are cutbanks caving (fig. 16).

This map unit is not assigned to a capability subclass; the woodland ordination symbol is 4S.

Figure 15.—Erosion in a housing development on an area of Tinton loamy sand-Urban land complex, 0 to 5 percent slopes.

UA—Udorthents, smoothed. This map unit consists of areas of soils that have been altered by excavating or filling. The areas are scattered throughout the county but are mainly in the larger urban areas. The areas of the unit are irregular in shape and typically range from 10 to 100 acres in size.

In filled areas these soils typically consist of loamy material that is more than 20 inches thick. The filled areas are on flood plains, in tidal marshes, and on areas of moderately well drained to very poorly drained soils. Other areas consist of soils that have similar textures and that have been excavated.

Included with these soils in mapping are soils that contain such materials as concrete, asphalt, metal, and glass. Also included are areas of soils that have not been disturbed. Impermeable surfaces cover as much as 15 percent of some areas. Also included are old sand and gravel pits that have been smoothed. These included areas make up about 35 percent of the map unit.

The properties and characteristics of these soils differ greatly from place to place. Onsite investigation and evaluation are needed for most uses.

This map unit is not assigned to a capability subclass.

UD—Udorthents-Urban land complex, 0 to 3 percent slopes. This map unit consists of nearly level and gently sloping soils that have been altered by excavation or filling and Urban land. The areas of each are in such an intricate pattern that it was not practical to map them separately. The mapped areas are irregular in shape and typically range from 25 to 250 acres in size.

Udorthents make up about 40 percent of each mapped area. Urban land makes up 30 percent, and other soils make up 30 percent.

Typically, in filled areas Udorthents consist of loamy material more than 20 inches thick. The filled areas are on flood plains, tidal marshes, and on areas of moderately well drained to very poorly drained soils. Other areas consist of soils that have been excavated.

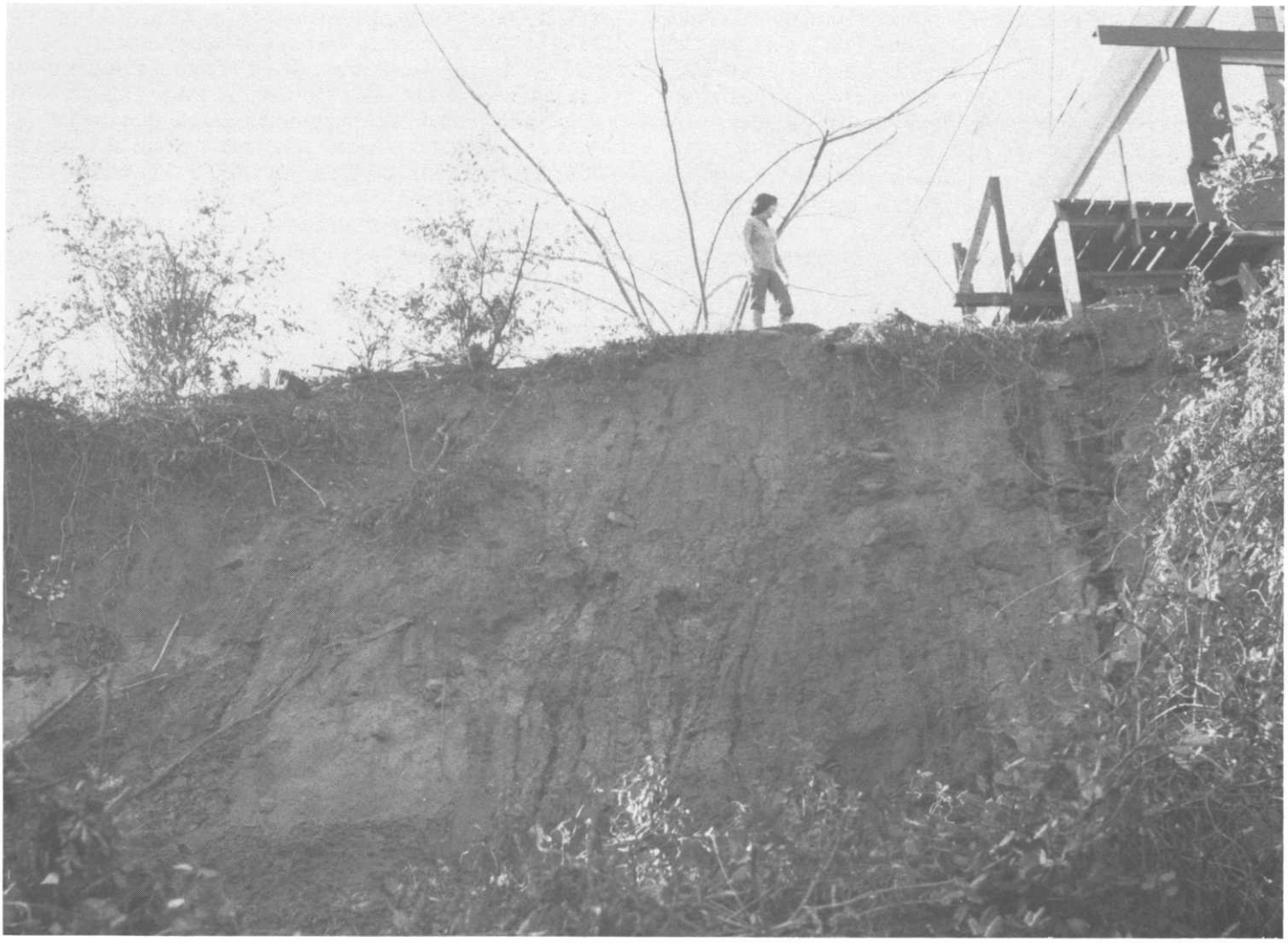


Figure 16.—Slippage in a moderately sloping area of Tinton loamy sand-Urban land complex, 0 to 5 percent slopes.

Urban land consists of areas covered by impermeable surfaces, such as dwellings, roads and streets, shopping centers, parking lots, and industrial parks.

Included with this complex in mapping are soils that contain such materials as concrete, asphalt, metal, and glass. Also included are areas of soils that have not been disturbed. These included areas make up about 30 percent of the complex.

The properties and characteristics of Udorthents differ greatly from place to place. Consequently, onsite investigation and evaluation are needed for most uses.

The open areas of this map unit are used for lawns, gardens, and small parks or are vacant wooded lots.

Onsite investigation and evaluation are needed to determine the limitations to use of Udorthents as sites for dwellings and some other types of community development.

This map unit is not assigned to a capability subclass.

UL—Urban land. This map unit consists of areas more than 85 percent of which are covered by impermeable surfaces. The areas are in the larger urban sections of the county. Areas of Urban land are generally rectangular in shape and typically range from 50 to 200 acres in size.

Typically, the areas of Urban land are covered by dwellings, roads and streets, shopping centers, parking lots, and industrial parks. The natural drainage in these areas ranges from excessively drained to very poorly drained.

Included with this unit in mapping are areas of Udorthents and small areas of soils that have not been disturbed. Also included are areas less than 85 percent of which are covered by impermeable surfaces. These included areas make up about 30 percent of the map unit.

The properties and characteristics of this map unit differ greatly from area to area. Thus, onsite investigation and evaluation are needed for most uses.

This map unit is not assigned to a capability subclass.

WnB—Woodstown sandy loam, 2 to 5 percent slopes. This is a gently sloping, moderately well drained soil in depressional areas, in swales, and on low divides. Areas of the soil are irregular in shape and typically range from 10 to 50 acres in size.

Typically, the surface layer is brown sandy loam 9 inches thick. The subsoil is 26 inches thick. It is yellowish brown sandy clay loam to a depth of 24 inches. Below that, it is mottled, yellowish brown and light olive brown sandy clay loam and fine sandy loam to a depth of 35 inches. The substratum extends to a depth of 60 inches or more. It is mottled, light yellowish brown loamy fine sand to a depth of 44 inches. Below that, it is yellowish brown gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are areas of Woodstown soils that have a loam surface layer. Also included are areas of Hammonton, Holmdel, and Keyport soils. Also included are small areas of soils that are similar to the Woodstown sandy loam but that have mottles in the upper part of the subsoil and are somewhat poorly drained. These soils, which make up about 40 percent of the map unit, are similar to the Woodstown sandy loam in use and management. Also included are areas of Fallsington and Sassafras soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Woodstown sandy loam in use and management.

Permeability of this Woodstown soil is moderate in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is high. The high water table is at a depth of 1 1/2 to 2 1/2 feet from February to April. Runoff is medium. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid to strongly acid.

Most areas of this soil are farmed. A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, sod, and vegetables. The main limitation for crops is the seasonal high water table. The main management concern is providing drainage. The seasonal high water table limits the soil for certain crops and restricts the time when the soil can be worked. Cover crops and crop residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The major management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In some wetter areas improved drainage is needed.

This soil is well suited to commercial woodland production. Potential productivity for white oak is moderately high. The common species are white oak, yellow poplar, sweetgum, and northern red oak.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, frost action, and cutbanks caving.

This soil is in capability subclass IIw; the woodland ordination symbol is 5A.

WoA—Woodstown loam, 0 to 2 percent slopes. This is a nearly level, moderately well drained soil in depressional areas, in swales, and on low divides. Areas of the soil are irregular in shape and typically range from 10 to 40 acres in size.

Typically, the surface layer is brown loam 9 inches thick. The subsoil is 26 inches thick. It is yellowish brown sandy clay loam to a depth of 24 inches. Below that, it is mottled, yellowish brown and light olive brown sandy clay loam and fine sandy loam to a depth of 35 inches. The substratum extends to a depth of 60 inches or more. It is mottled, light yellowish brown loamy fine sand to a depth of 44 inches. Below that, it is yellowish brown gravelly loamy sand.

Included with this soil in mapping are areas of Woodstown soils that have a sandy loam surface layer. Also included are areas of Hammonton, Holmdel, and Keyport soils. Also included are small areas of soils that are similar to the Woodstown loam but that have mottles in the upper part of the subsoil and that are somewhat poorly drained. These soils, which make up about 45 percent of the map unit, are similar to the Woodstown loam in use and management. Also included are areas of Fallsington and Sassafras soils. These soils, which make up as much as 10 percent of the map unit, are dissimilar to the Woodstown loam in use and management.

Permeability of this Woodstown soil is moderate in the subsoil and moderate or moderately rapid in the substratum. The available water capacity is high. The high water table is at a depth of 1 1/2 to 2 1/2 feet from February to April. Runoff is slow. Erosion is a slight hazard. Organic matter content is moderate. In unlimed areas reaction is extremely acid to strongly acid.

Most areas of this soil are farmed (fig. 17). A small acreage is used for pasture. A few acres is woodland.

This soil is suited to common field crops, hay, sod, and vegetables. The main limitation for crops is the seasonal high water table. The main management concern is providing drainage. The seasonal high water table limits the soil for certain crops and restricts the time when the soil can be worked. Cover crops and crop

Figure 17.—Irrigated corn on Woodstown loam, 0 to 2 percent slopes.

residue management help to maintain soil tilth and organic matter content.

This soil is well suited to pasture. The major management practices are proper seeding, proper stocking, liming and fertilizing, and rotation grazing. In wetter areas improved drainage is needed.

This soil is well suited to commercial woodland production. Potential productivity for white oak is moderately high. The common species are white oak, yellow poplar, sweetgum, and northern red oak.

The main limitations to use of this soil as sites for dwellings and some other types of community development are the seasonal high water table, frost action, and cutbanks caving.

This soil is in capability subclass IIw; the woodland ordination symbol is 5A.

Prime Farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. Identification of prime farmland is a major step in meeting the Nation's needs for food and fiber.

The U.S. Department of Agriculture defines prime farmland as the land that is best suited to producing food, feed, forage, fiber, and oilseed crops (fig. 18). It has the soil quality, growing season, and moisture supply needed to produce a sustained high yield of crops while using acceptable farming methods. Prime farmland produces the highest yields and requires minimal amounts of energy and economic resources, and farming it results in the least damage to the environment.

An area identified as prime farmland must be used for producing food or fiber or must be available for those uses. Thus, urban and built-up land and water areas are not classified as prime farmland.

The general criteria for prime farmland are as follows: a generally adequate and dependable supply of moisture from precipitation or irrigation, favorable temperature and growing-season length, acceptable levels of acidity or alkalinity, few or no rocks, and permeability to air and water. Prime farmland is not excessively erodible, is not saturated with water for long periods, and is not flooded during the growing season. The slope range is mainly from 0 to 6 percent. For more detailed information on the criteria for prime farmland, consult the local staff of the Soil Conservation Service.

The survey area contains about 55,380 acres of prime farmland. That acreage makes up about 18 percent of the total acreage in the survey area. It is mainly in units 1, 2, and 6 of the general soil map. Approximately 43,500 acres of prime farmland is used for crops, mainly corn, soybeans, and potatoes.

Figure 18.—A center-pivot irrigation system in a cornfield on prime farmland.

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

The map units that meet the criteria for prime farmland are as follows.

AeA Adelphia loam, 0 to 2 percent slopes
AeB Adelphia loam, 2 to 5 percent slopes
CnB Collington sandy loam, 2 to 5 percent slopes
CoA Collington loam, 0 to 2 percent slopes
CtB Colts Neck sandy loam, 2 to 5 percent slopes
DoA Downer sandy loam, 0 to 2 percent slopes
DoB Downer sandy loam, 2 to 5 percent slopes
FnA Freehold loamy sand, 0 to 5 percent slopes
FrB Freehold sandy loam, 2 to 5 percent slopes
FsA Freehold loam, 0 to 2 percent slopes
HbA Hammonton sandy loam, 0 to 2 percent slopes
HbB Hammonton sandy loam, 2 to 5 percent slopes
HnA Holmdel sandy loam, 0 to 2 percent slopes
HnB Holmdel sandy loam, 2 to 5 percent slopes
KeA Keyport sandy loam, 0 to 2 percent slopes
KeB Keyport sandy loam, 2 to 5 percent slopes
MlB Marlton loam, 2 to 5 percent slopes
SaB Sassafras sandy loam, 2 to 5 percent slopes
SgB Sassafras gravelly sandy loam, 2 to 5 percent slopes
SlA Sassafras loam, 0 to 2 percent slopes
WnB Woodstown sandy loam, 2 to 5 percent slopes
WoA Woodstown loam, 0 to 2 percent slopes

Use and Management of the Soils

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

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

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

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

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

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

Crops and Pasture

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

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

The common field crops in Monmouth County are corn, wheat, potatoes, and soybeans. The common pasture or hay plants are bluegrass, orchard grass, red clover, and Kentucky 31 tall fescue.

These crops can be grown on many soils in the county, but management practices are needed on all soils. The important considerations are soil fertility, soil wetness, organic matter content, soil tilth, erosion control, and irrigation needs.

All the soils in the county in their natural state range from strongly acid to extremely acid. Lime and fertilizer help to maintain soil reaction and fertility at levels necessary for maximum nutrient intake by plants. Information about soil testing and lime and fertilizer applications is available at the local office of the Soil Conservation Service or of the Agricultural Extension Service or at the Agricultural Experiment Station at Rutgers University.

The seasonal high water table in some soils is a major problem for some crops. During the growing season, rooting depth and soil aeration must be adequate for crop production. High yields are obtainable on many of the moderately well drained, somewhat poorly drained, and poorly drained soils if they are properly drained. Wet soils take longer to warm up in early spring and limit the use of farm machinery.

When planning drainage the position of the soils on the landscape is an important factor to consider. Some soils receive runoff from adjacent, upland areas and in some areas are ponded during wet periods. Other soils have a fluctuating seasonal high water table. Other important factors to consider are permeability, soil texture, soil structure, and the availability of adequate outlets. Either subsurface drainage or open drainage is needed, depending on all of these factors. More detailed information and assistance can be obtained by contacting the local office of the Soil Conservation Service.

Organic matter content and soil tilth need to be maintained if crops are grown. Most of the soils used for crops have a surface layer of loamy sand or sandy loam.

Maintaining soil structure and the organic matter content also helps to maintain good soil tilth. Excessive tillage breaks down soil structure and increases surface compaction. A good granular structure is needed for proper water infiltration. The organic matter content in most of the cultivated soils is moderate. Plowing under crop residue, cover crops, and manure helps to improve soil structure and to increase organic matter content and available water capacity.

Wind and water erosion are prevalent in the county. Wind erosion is most severe on soils that have a surface layer of sand or loamy sand and that are disturbed, are unvegetated, or are in crops. Cover crops, windbreaks, and crop residue management help to control wind erosion. Controlling water erosion on the gently sloping to steep soils under cultivation is an important management concern. Conservation tillage, cover crops, and crop residue management after the harvest are suitable management practices. Contour farming, stripcropping, grassed waterways, and cropland or diversion terraces also help to control water erosion.

Irrigation is also a management concern when rainfall is inadequate for plant growth. During prolonged dry periods and during critical growth periods, in some areas additional water is needed to maintain high yields on high-value crops. Drought conditions most severely affect soils that have a moderate or low available water capacity. Such soils include, for example, Downer, Hammonton, Pemberton, and Tinton soils. These soils generally need irrigation for crop production. Other soils, which have a high available water capacity but a loamy sand surface texture, also need irrigation. An example of these soils is Freehold loamy sand, 0 to 5 percent slopes. Sometimes, high-value crops are irrigated, regardless of the available water capacity of the soil, to increase yields. Additional information about the recommended ways to improve irrigation can be obtained by contacting the local office of the Soil Conservation Service, the Agricultural Extension Service or the Agricultural Experiment Station at Rutgers University.

Specialty crops

The main specialty crops in commercial production are fruits and berries, vegetables, Chinese vegetables, nursery stock, and sod.

In 1979 the county ranked second in the state in the production of apples and sixth in peaches. The vegetables grown are cabbage, lettuce, green peppers, and sweet corn. The Chinese vegetables commonly grown include bok toy, ong toy, mustard, bitter squash, and okra. Other Chinese vegetables grown are long beans, turnips, broccoli, leafy cabbage, and winter melon.

The soils, location, and climate are favorable for the production of nursery stock. The county is the largest producer of nursery stock in the state. There are approximately 3,341 acres in nursery stock in the county and 133 certified nurseries. This acreage makes up about one third of the total acreage of nurseries in the state (*9*).

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, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

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

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

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops (*12*). 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 or 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. The levels are defined in the following paragraphs.

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

Class I soils have 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 limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

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

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

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

Thomas M. Taylor, Area Forester for Monmouth and Middlesex Counties, New Jersey, Bureau of Forestry, helped to prepare this section.

Approximately 29 percent, or 89,400 acres, of Monmouth County is commercial forest land (*14*). About 97 percent of commercial forest land is under private ownership. Most of the private holdings are less than 50 acres, but a few publicly owned forests, in the state or the county park system, are large.

The forest land is diverse, and the tree species are varied. The major forest types are oak-hickory, oak-pine, pitch pine, gum-maple, and cove hardwoods. Most woodland is in the early stages of development. Many old fields have reverted to forest land. They generally support a variety of species, including black locust, black cherry, red maple, sweetgum, eastern red cedar, and sassafras.

The woodland in the county is mostly poorly stocked and consists mainly of low quality trees. Productivity on much of the commercial forest land can be increased. Under good management and wise ownership, the productivity of all county forest land can be raised to full potential.

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

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, that the indicator species can produce. The larger the number, the greater the potential productivity. The number 1 indicates low productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 through 8, high; 9 through 11, very high; and 12 or more, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation for use and management. The letter *R* indicates steep slopes; *W*, excessive water in or on the soil; *D*, restricted rooting depth caused by bedrock, hardpan, or other restrictive layer; and *S*, sandy texture. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, W, D, and S.

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

Erosion hazard is the probability that erosion can occur as a result of site preparation or following cutting

operations and where the soil is exposed, for example, roads, skid trails, fire lanes, and log handling areas. Forests that are abused by fire or overgrazing are also subject to erosion. The ratings for the erosion hazard are based on the percent of the slope and on the erosion factor K shown in table 15. A rating of *slight* indicates that no particular measures to prevent erosion are needed under ordinary conditions. A rating of *moderate* indicates that erosion control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

The proper construction and maintenance of roads, trails, landings, and fire lanes will help overcome the erosion hazard.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that equipment use normally is not restricted either in kind of equipment that can be used or time of year because of soil factors. If soil wetness is a factor, equipment use can be restricted for a period not to exceed 2 months. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If soil wetness is a factor, equipment use is restricted for 2 to 6 months. A rating of *severe* indicates that equipment use is severely restricted either in kind of equipment or season of use. If soil wetness is a factor, equipment use is restricted for more than 6 months.

Choosing the most suitable equipment and timing harvesting and other management operations to avoid seasonal limitations help overcome the equipment limitation.

Seedling mortality refers to the probability of death of naturally occuring or planted tree seedlings as influenced by kinds of soil or topographic conditions. The factors considered in rating the soils for seedling mortality are texture of the surface layer, depth and duration of the water table, rock fragments in the surface layer, rooting depth, and aspect of the slope. A rating of *slight* indicates that under usual conditions the expected mortality is less than 25 percent. A rating of *moderate* indicates that the expected mortality is 25 to 50 percent. Extra precautions are advisable. A rating of *severe* indicates that the expected mortality is more than 50 percent. Extra precautions are important. Replanting may be necessary.

The use of special planting stock and special site preparation, such as bedding, furrowing, or surface drainage, can help reduce seedling mortality.

Windthrow hazard is the likelihood of trees being uprooted (tipped over) by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions are a seasonal high water table, bedrock, or a fragipan or other limiting layer. A rating of *slight* indicates that normally no trees are blown down by the wind. Strong winds may break trees but do not uproot them. A rating of *moderate* indicates that moderate or strong winds occasionally blow down a few trees during periods of soil wetness. A rating of *severe* indicates that moderate or strong winds may blow down many trees during periods of soil wetness.

The use of specialized equipment that does not damage surficial root systems during partial cutting operations can help reduce windthrow. Care in thinning or no thinning also can help reduce windthrow.

Adequate site preparation before planting the new crop can help reduce plant competition.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Common trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. Other common tree species are also listed, regardless of potential value or growth (*4, 5, 10*).

The *productivity class*, a number, represents an expected volume produced by the most important trees. This number, expressed as cubic meters per hectare per year, indicates the amount of fiber produced on a fully stocked, even-aged, unmanaged stand. One cubic meter per hectare equals 14.3 cubic feet per acre.

The first tree species listed under common trees for a soil is the indicator species for that soil. The indicator species is the species that is common in the area and is generally the most productive on the soil. The productivity class of the indicator species is the number used for the ordination symbol.

Trees to plant are those that are suited to the soil and are planted for commercial wood production.

Recreation

The Monmouth County Parks system was established in 1960 (*8*). County parks cover 4,228 acres. The parks offer picnic facilities, playgrounds, baseball fields, lakes and streams for fishing, hiking trails, camping facilities, and hunting areas. Four golf courses, included in this acreage, are county operated. In addition, many privately owned golf courses are located throughout the county.

Besides these facilities, parkland and open areas cover 4,614 acres. They are administered by the New Jersey Department of Environmental Protection, Division of Parks and Forestry. They offer a variety of recreation activities. The Leonardo State Marina, included in this acreage, is in Middletown Township. The Assunpink Wildlife Management Area, operated by the Division of

Fish, Game and Wildlife, consists of 5,400 acres of open land. Four manmade lakes in this management area, built mainly for flood control, are on the Assunpink Creek Watershed. The lakes offer excellent opportunities for fishing and sailing. The rest of the management area is used for wildlife management and hunting.

The Gateway National Recreational Area, Sandy Hook Unit, which is federally-owned, offers beaches for swimming, surfing, fishing, and boating.

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

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

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

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

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

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

Paths and trails for hiking 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

David L. Smart, biologist, Soil Conservation Service, helped to prepare this section.

The three basic ecological areas in Monmouth County are the coastal area, the Pine Barrens area, and the upland innercoastal area. These areas support many different wildlife species.

The coastal area lies to the east in the county. It has a large population of migratory and shore birds. In fall and in spring, hawks, falcons, eagles, and innumerable songbirds follow the shore to their wintering and breeding range. One of the state's few remaining great blue heron rookeries is on Sandy Hook. In 1984 some endangered or threatened species listed by the State of New Jersey nested in the coastal area. They were the roseate tern, least tern, black skimmer, osprey, and short-billed marsh wren.

The Pine Barrens area lies to the south in the county. Some of its wildlife, particularly reptiles and amphibians, is rare. One inhabitant, the Pine Barrens tree frog, lives in only a few small localities in the county. Other inhabitants are the pine snake and the timber rattlesnake. Upland game species, such as white-tailed deer, rabbit, squirrel, and quail, are uncommon because of the poor soil condition of the area.

The innercoastal zone lies to the north and west in the county. It can support an abundant wildlife population because of its rich soils. Rabbit, deer, pheasant, dove, and other wildlife species are plentiful in the farmland of this area. Songbirds and other nongame species are also plentiful. Migratory waterfowl can find food in the many grain fields. The most popular hunting area in the

state, the Assunpink Wildlife Management Area, is located predominantly in the western part of the county.

The most critical element in determining wildlife populations in Monmouth County is the spread of urbanization. Once productive farmland and environmentally sensitive areas, such as the coastal zone, have been converted to urban use.

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 (*1*).

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

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

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

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, timothy, bromegrass, red clover, and alfalfa.

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

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, birch, cherry, maple, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are gray dogwood, autumn-olive, and silky dogwood.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, and slope. Examples of wetland plants are smartweed, arrowhead, burreed, pickerel weed, cordgrass, rushes, sedges, and reeds.

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

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

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

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

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 (*16*). The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

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

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require

cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized 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 a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost-action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills (*16*). The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to a cemented pan, and flooding affect absorption of the effluent. Large stones or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

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

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

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

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil (*16*). The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

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

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation 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.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

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

Water Management

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for embankments, dikes, and levees; and aquifer-fed excavated ponds (*16*). The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

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

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. The content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to a cemented pan or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

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

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind 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 a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

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

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed (*11*). 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 characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

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

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

Texture is given in the standard terms used by the U.S. Department of Agriculture (*11*). These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*3*) and the system adopted by the American Association of State Highway and Transportation Officials (*2*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

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

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

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an 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 (*13*).

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

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

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

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

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

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

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

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

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

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

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the

susceptibility of soil to wind erosion and the amount of soil lost. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.
2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.
3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

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 of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

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

A few soils are assigned to two hydrologic soil groups. These soils are poorly drained in their natural condition and are in hydrologic group D. If these soils are drained, they will be in either hydrologic group B or C, depending on the soil characteristics and infiltration rate. For example, a soil assigned to groups B/D would be in group B, if drained, and in group D, in its natural, poorly drained state.

Some soils in table 16 are assigned to two hydrologic soil groups. Dual grouping is used for one of two reasons: (1) Some soils have a seasonal high water table but can be drained. In this instance the first letter applies to the drained condition of the soil and the second letter to the undrained condition. (2) In some soils that are less than 20 inches deep to bedrock, the first letter applies to areas where the bedrock is cracked and pervious and the second letter to areas where the bedrock is impervious or where exposed bedrock makes up more than 25 percent of the surface of the soil.

The four hydrologic soil groups are:

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

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

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

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

Flooding, the temporary 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 period of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional, common,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (there is a near 0 to 5 percent chance of flooding in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (there is a 5 to 50 percent chance of flooding in any year). *Frequent* means that flooding occurs often under normal weather conditions (there is more than a 50 percent chance of flooding in any year). *Common* is used when classification as occasional or frequent does not affect interpretations. Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. November-May, for example, means that flooding can occur during the period November through May. 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 absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely, grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table, that is, *perched, artesian,* or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An *artesian* water table is under hydrostatic head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

The two numbers in the "High water table-Depth" column 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 the water table exists for less than a month.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*15*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 17 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

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

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplaquents (*Hapl*, meaning minimal horizonation, plus *aquent*, the suborder of the Entisols that has an aquic moisture regime).

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

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, nonacid, mesic Typic Haplaquents.

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

Soil Series and Their Morphology

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

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*11*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*15*). 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."

Adelphia Series

The Adelphia series consists of moderately well drained and somewhat poorly drained soils on uplands. These soils formed in acid, loamy, Coastal Plain sediments that are, by volume, 10 to 40 percent glauconite. Slope ranges from 0 to 5 percent.

Adelphia soils are near Collington, Holmdel, Kresson, Marlton, and Shrewsbury soils. Collington soils do not have mottles in the subsoil and the substratum. Holmdel soils are, by volume, as much as 10 percent glauconite. Kresson soils are, by volume, more than 40 percent glauconite and have more clay in the subsoil.

Shrewsbury soils are, by volume, as much as 10 percent glauconite. They have a dark surface layer and a dominantly gray subsurface layer and subsoil.

Typical pedon of Adelphia loam, 0 to 2 percent slopes, in Upper Freehold Township, 1.3 miles east of Route 539 on Davis Station-Imlaystown Road, 350 feet north of road along hedgerow, in a field:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loam; moderate medium granular structure; friable; many fine roots; 5 percent glauconite; strongly acid; abrupt smooth boundary.

Bt1—8 to 22 inches; strong brown (7.5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable; common fine roots; common, moderately thick clay films lining interstitial pores; 20 percent glauconite; very strongly acid; gradual wavy boundary.

Bt2—22 to 31 inches; strong brown (7.5YR 4/6) sandy clay loam; few medium distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; few fine roots; common, moderately thick clay films lining interstitial pores; 25 percent glauconite; very strongly acid; gradual wavy boundary.

BC—31 to 38 inches; strong brown (7.5YR 4/6) sandy loam; few fine prominent light brownish gray (2.5Y 6/2) mottles; weak medium granular structure; friable; 25 percent glauconite; very strongly acid; clear wavy boundary.

C—38 to 60 inches; strong brown (7.5YR 4/6) sandy loam that has thin lenses of sandy clay loam; many coarse prominent light olive gray (5Y 6/2) mottles; massive; friable; 40 percent glauconite; extremely acid.

The solum ranges from 30 to 40 inches in thickness. Rounded quartzose pebbles make up less than 10 percent of the volume throughout. In unlimed areas reaction is extremely acid or very strongly acid.

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

The B horizon has hue of 7.5YR to 5Y, value of 4 or 5, and chroma of 4 to 6. It is sandy loam or sandy clay loam.

The C horizon has hue of 7.5YR to 5Y, value of 3 to 5, and chroma of 2 to 6. It is loamy sand or sandy loam, but includes thin strata or lenses of sandy clay loam or clay loam. Some pedons have thin, weakly cemented, iron-cemented sandstone sheets in the C horizon below a depth of 40 inches.

Atsion Series

The Atsion series consists of poorly drained soils on upland flats. These soils formed in acid, sandy, Coastal Plain sediments. Slope ranges from 0 to 2 percent.

Atsion soils are near Lakehurst, Klej, and Manahawkin soils. Lakehurst soils do not have a thick, dark surface layer. Klej soils do not have a thick, dark surface layer and a spodic horizon. Manahawkin soils are organic soils that have a muck layer more than 16 inches thick.

Typical pedon of Atsion sand, in Freehold Township, 100 feet northeast from Ely Harmony Road, 1 mile southeast from intersection of Ely Harmony Road and Siloam Road (Route 527), in woods:

Oa—2 inches to 0; dark reddish brown (5YR 3/4) matted, partly decomposed organic material; many fine and medium roots; extremely acid; abrupt smooth boundary.

A—0 to 6 inches; black (10YR 2/1) sand; single grain; loose; few to common fine to coarse roots; extremely acid; abrupt smooth boundary.

E—6 to 20 inches; grayish brown (10YR 5/2) sand; single grain; loose; extremely acid; clear smooth boundary.

Bh—20 to 28 inches; dark reddish brown (5YR 3/2) loamy sand; massive; very friable; extremely acid; some tonguing, gradual irregular boundary.

BC—28 to 38 inches; brown (10YR 4/3) sand; many large prominent dark brown (7.5YR 4/2) mottles; single grain; loose; few quartz pebbles; extremely acid; clear smooth boundary.

C—38 to 60 inches; yellowish brown (10YR 5/4) fine sand; common medium distinct light brownish gray (10YR 6/2) mottles; single grain; loose; extremely acid.

The solum ranges from 20 to 40 inches in thickness. Rounded quartzose pebbles range from 0 to 5 percent, by volume, in the solum and from 0 to 20 percent in the C horizon. In unlimed areas reaction is extremely acid or very strongly acid.

The A horizon is neutral or has hue of 10YR; value is 2 or 3, and chroma is 0 or 1. The E horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2.

The Bh horizon has hue of 7.5YR or 5YR, value of 2 or 3, and chroma of 2 to 4. Its consistence is mostly loose but ranges to extremely firm. The BC horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The B horizon is loamy sand or sand.

The C horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 to 8. It is sand, fine sand, or loamy sand. In some pedons, below a depth of 40 inches it has strata ranging from sand to sandy clay.

Colemantown Series

The Colemantown series consists of poorly drained soils on upland flats. These soils formed in acid, clayey, Coastal Plain sediments that are, by volume, more than 40 percent glauconite. Slope ranges from 0 to 2 percent.

Colemantown soils are near Kresson and Shrewsbury soils. Kresson soils do not have a dominantly gray layer under the A1, or Ap, horizon. Shrewsbury soils are as much as 10 percent glauconite, by volume, and have less clay in the subsoil.

Typical pedon of Colemantown loam, in Upper Freehold Township, 0.25 mile east of the intersection of Yellow Meeting House Road and Route 526, on Route 526 to a lane on the south side of Route 526, south on lane 2,000 feet past house, in a field:

Ap—0 to 9 inches; very dark brown (10YR 2/2) loam; strong fine granular structure; firm; many roots; slightly acid; abrupt smooth boundary.

Btg—9 to 36 inches; dark greenish gray (5G 4/1) clay loam; many medium prominent strong brown (7.5YR 5/8) mottles; strong medium and coarse angular blocky structure; firm, sticky and plastic; many thick clay films on faces of peds; more than 40 percent glauconite; very strongly acid; clear smooth boundary.

Cg1—36 to 48 inches; stratified alternating layers of dark greenish gray (5G 4/1) sandy clay loam, sandy loam, and sandy clay; many coarse prominent reddish brown (5YR 4/3) and yellowish brown (10YR 5/8) mottles; massive; slightly sticky; more than 40 percent glauconite; very strongly acid; abrupt wavy boundary.

Cg2—48 to 60 inches; dark greenish gray (5G 4/1) sandy clay; massive; slightly sticky; more than 40 percent glauconite; very strongly acid.

The solum ranges from 26 to 40 inches in thickness. Rounded quartzose pebbles range from 0 to 5 percent, by volume, throughout. In unlimed areas reaction is extremely acid or very strongly acid.

The A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2. Some pedons have an E horizon that has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2.

The Bt horizon has hue of 5Y or 5G, value of 4, and chroma of 1 or 2. It ranges from sandy clay loam to clay.

The C horizon has hue of 5Y or 5G, value of 3 or 4, and chroma of 1 or 2. It ranges from sandy loam to clay.

Collington Series

The Collington series consists of well drained soils on uplands. These soils formed in acid, loamy, Coastal Plain sediments that are, by volume, 10 to 40 percent glauconite. Slope ranges from 0 to 15 percent.

Collington soils are near Adelphia, Colts Neck, Freehold, Holmdel, and Marlton soils. Adelphia and Holmdel soils have mottles in the subsoil and the substratum. Colts Neck soils are as much as 10 percent glauconite, by volume, and are red in color. Freehold soils are as much as 10 percent glauconite, by volume. Marlton soils are as much as 40 percent glauconite, by volume, and have more clay in the subsoil.

Typical pedon of Collington sandy loam, 2 to 5 percent slopes, in Upper Freehold Township, 1.3 miles by road, southeast of Cream Ridge, along Smith Mill Road, 75 feet east of road, in a cultivated field:

Ap—0 to 11 inches; dark brown (7.5YR 3/2) sandy loam; weak fine granular structure in the upper part, massive in the lower several inches; friable in the upper part, firm in place but friable if removed in the lower part, slightly sticky; few dark green grains of glauconite; strongly acid; abrupt smooth boundary.

BA—11 to 13 inches; dark brown (7.5YR 4/4) sandy loam; weak fine subangular blocky structure; friable, slightly sticky; 30 to 40 percent mainly vertical worm holes filled with dark brown (7.5YR 3/2) material; few to common grains of glauconite; strongly acid; clear smooth boundary.

Bt—13 to 29 inches; dark brown (7.5YR 3/4) sandy clay loam; moderate medium subangular blocky structure parting to weak fine subangular blocky; friable, slightly sticky; common distinct clay films on faces of peds, darker and redder than interiors of peds; common worm holes in the upper part and few in the lower part, and many are filled with material from overlying horizons; common glauconite grains; strongly acid; clear smooth boundary.

BC—29 to 32 inches; dark brown (7.5YR 3/4) sandy loam; massive; friable, slightly sticky; few brown (7.5YR 5/4) and common very dark green sand- and silt-sized aggregates; 25 percent glauconite; very strongly acid; clear smooth boundary.

C1—32 to 44 inches; dark brown (7.5YR 3/4) sandy loam; massive; very friable, nonsticky; common brown (7.5YR 4/4) and common dark green sand- and silt-sized aggregates; about 25 percent glauconite; very strongly acid; diffuse irregular boundary.

C2—44 to 80 inches; dark brown and brown (7.5YR 3/4, 4/4) coarse sandy loam; variegated with yellowish brown (10YR 5/6), yellowish red (5YR 4/6), and dark green grains; single grained; loose; 30 percent glauconite; very strongly acid.

The solum ranges from 28 to 44 inches in thickness. In unlimed areas reaction ranges from strongly acid to extremely acid.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 or 3. It is loam or sandy loam.

The B horizon has hue of 7.5YR to 2.5Y, value of 3 or 4, and chroma of 4. It is dominantly sandy loam and sandy clay loam but ranges to clay loam.

The C horizon has hue of 7.5YR to 5Y, value of 3 to 5, and chroma of 4 or 6. It is loamy sand, coarse sandy loam, and sandy loam and includes thin strata that ranges from sand to clay.

Colts Neck Series

The Colts Neck series consists of well drained soils on uplands. These soils formed in acid, loamy, Coastal Plain sediments that are, by volume, as much as 10 percent glauconite. Slope ranges from 2 to 25 percent.

Colts Neck soils are near Collington, Freehold, Holmdel, and Phalanx soils. Collington and Freehold soils are not as red as Colts Neck soils. Holmdel soils are mottled in the subsoil and the substratum. Phalanx soils have an indurated layer of iron-cemented sandstone above a depth of 40 inches and have less clay in the subsoil.

Typical pedon of Colts Neck sandy loam, 2 to 5 percent slopes, in Colts Neck Township, 100 feet west of the intersection of Hyers Mill Road and Prothero Road, 25 feet south of Prothero Road:

Ap—0 to 10 inches; dark reddish brown (5YR 3/2) sandy loam, dark brown (7.5YR 4/2) dry; weak fine granular structure; friable, firm when dry; many fine roots; moderately acid; abrupt smooth boundary.

BA—10 to 15 inches; dark reddish brown (5YR 3/4) sandy loam, yellowish red (5YR 4/6) dry; discontinuous weak thick plates in the upper 2 inches and weak fine granular structure in the lower 3 inches; friable, firm and brittle when dry; many fine roots; strongly acid; clear smooth boundary.

Bt1—15 to 24 inches; reddish brown (5YR 4/4) sandy clay loam, yellowish red (5YR 4/6) dry; weak fine and medium subangular blocky structure parting to weak medium granular structure; slightly firm in place, friable when removed; common fine and coarse roots; common faint clay films on faces of peds and bridging sand grains; strongly acid; gradual wavy boundary.

Bt2—24 to 35 inches; reddish brown (5YR 4/4) sandy loam, yellowish red (5YR 4/8) dry; weak medium subangular blocky structure; slightly firm in place, friable when removed; few fine and coarse roots; few faint clay films on faces of peds and bridging sand grains; moderately acid; gradual wavy boundary.

BC—35 to 42 inches; reddish brown (5YR 4/4) loamy sand, yellowish red (5YR 4/6) dry; weak fine granular structure; slightly firm in place, friable when removed; few roots; very few faint clay films bridging some sand grains; slightly acid; gradual wavy boundary.

C—42 to 60 inches; reddish brown (5YR 4/4) loamy coarse sand, yellowish red (5YR 4/6) dry; single grain; loose; discontinuous thin (1/8 to 1/2 inch) iron-cemented sheets and fragments of sandstone scattered throughout; very strongly acid.

The solum ranges from 30 to 45 inches in thickness. Coarse fragments of iron-cemented sandstone, less than 2 inches in diameter, range from 0 to 25 percent, by volume, in the upper part of the solum and from 0 to 35 percent in the lower part of the solum and in the substratum. In some pedons thin, iron-cemented layers are in the B and C horizons and thin to thick, iron-cemented layers are below a depth of 48 inches. In unlimed areas reaction ranges from strongly acid to very strongly acid.

The A horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 2 to 4.

The B horizon has hue of 2.5YR or 5YR, value of 3 or 4, and chroma of 4 or 6. The BA and Bt horizons are sandy loam or sandy clay loam. The BC horizon is loamy sand or sandy loam.

The C horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. It ranges from sand to sandy loam.

Downer Series

The Downer series consists of well drained soils on uplands and terraces. These soils formed in acid, loamy, Coastal Plain sediments. Slope ranges from 0 to 10 percent.

Downer soils are near Evesboro, Hammonton, Sassafras, and Woodstown soils. Evesboro soils have less clay in the subsoil. They are sandy throughout. Hammonton soils have mottles in the subsoil and the substratum. Sassafras soils have more clay in the subsoil. Woodstown soils have more clay in the subsoil and are mottled in the subsoil and the substratum.

Typical pedon of Downer sandy loam, 0 to 2 percent slopes, in Wall Township, 0.15 mile east of intersection of Ocean Road and Bayles Corner Road, 80 feet north of Ocean Road, in an idle field:

Ap—0 to 10 inches; dark brown (10YR 4/3) sandy loam; weak medium granular structure; very friable; many fine and few medium roots; 2 percent pebbles; strongly acid; clear smooth boundary.

Bt—10 to 26 inches; strong brown (7.5YR 4/6) sandy loam; weak medium subangular blocky structure; friable; common fine and few medium roots; common faint clay in bridges between mineral grains; 10 percent pebbles; strongly acid; gradual wavy boundary.

C—26 to 60 inches; strong brown (7.5YR 5/6) gravelly loamy sand; single grain; loose; 35 percent pebbles; strongly acid.

The solum ranges from 20 to 30 inches in thickness. Rounded quartzose pebbles range from 0 to 10 percent in the solum and from 0 to 40 percent in the substratum. In unlimed areas reaction ranges from extremely acid to strongly acid.

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

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 6 or 8. It is sandy loam, and some pedons have thin horizons of sandy clay loam or loamy sand.

The C horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 6 or 8. It is sand or loamy sand, and some pedons have thin strata of sandy loam. Below a depth of 40 inches it ranges from sand to sandy clay loam.

Elkton Series

The Elkton series consists of poorly drained soils on upland flats. These soils formed in acid, clayey, Coastal Plain sediments. Slope ranges from 0 to 2 percent.

Elkton soils are near Keyport soils, Humaquepts, and Manahawkin and Fallsington soils. Keyport soils do not have a dark surface layer or a dominantly gray subsurface layer and subsoil. Humaquepts have very little profile development and are subject to frequent flooding. Manahawkin soils are organic soils that have a muck layer more than 16 inches thick. Fallsington soils have less clay in the subsoil.

Typical pedon of Elkton loam, in Hazlet Township, approximately 700 feet south of the southern edge of Natco Lake, on the south side of Route 36, in a wooded area:

Oi—4 to 2 inches; leaves, twigs, and roots.
Oa—2 inches to 0; matted, decomposed organic material; many fine and medium roots; abrupt smooth boundary.
A—0 to 2 inches; very dark gray (10YR 3/1) loam; weak medium granular structure; very friable; many fine to coarse roots; extremely acid; clear smooth boundary.
E—2 to 7 inches; dark gray (10YR 4/1) loam; moderate medium granular structure; friable; many fine and medium and common coarse roots; extremely acid; clear smooth boundary.
Btg1—7 to 19 inches; grayish brown (10YR 5/2) silty clay; many medium prominent reddish yellow (7.5YR 6/8) and brownish yellow (10YR 6/8) mottles; moderate medium angular blocky structure; firm; common fine and medium roots; few moderately thick clay films lining interstitial pores; extremely acid; gradual wavy boundary.
Btg2—19 to 31 inches; dark gray (10YR 4/1) silty clay; common medium prominent reddish yellow (7.5YR 6/8) and brownish yellow (10YR 6/8) mottles; moderate medium angular blocky structure; firm; common fine and medium roots; few moderately thick clay films lining interstitial pores; extremely acid; gradual wavy boundary.
Btg3—31 to 39 inches; dark gray (10YR 4/1) silty clay; common medium prominent brown (7.5YR 4/4) mottles and few medium prominent reddish yellow (7.5YR 6/8) mottles; moderate medium angular blocky structure; firm; common fine and medium roots; few moderately thick clay films lining interstitial pores; extremely acid; gradual wavy boundary.
Cg1—39 to 54 inches; dark gray (10YR 4/1) silty clay; common coarse prominent strong brown (7.5YR 4/6) mottles; massive; firm; few fine roots; extremely acid; gradual wavy boundary.
Cg2—54 to 60 inches; dark gray (10YR 4/1) silty clay; common medium distinct dark grayish brown (2.5Y 4/2) mottles; massive; firm; very strongly acid.

The solum ranges from 30 to 50 inches in thickness. Rounded quartzose pebbles range from 0 to 2 percent, by volume, throughout. In unlimed areas reaction ranges from strongly acid to extremely acid.

The A and E horizons have hue of 10YR, value of 3 or 4, and chroma of 1 or 2.

The B horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. It is silty clay loam to clay.

The C horizon is neutral or has hue of 10YR or 2.5Y; value is 4 to 6, and chroma is 0 to 2. It is fine sandy clay loam, clay loam, silty clay, or clay. Some pedons have a 2C horizon below a depth of 40 inches that ranges from sand to sandy loam.

Evesboro Series

The Evesboro series consists of excessively drained soils on uplands. These soils formed in acid, sandy, Coastal Plain sediments. Slope ranges from 0 to 25 percent.

Evesboro soils are near Klej, Downer, Lakewood, Lakehurst, Tinton, and Phalanx soils. Klej and Lakehurst soils have mottles in the subsoil and the substratum. Downer soils have more clay in the subsoil. Lakewood soils have a bleached subsurface layer 8 inches thick or more. Tinton soils have more clay in the subsoil and have glauconite. Phalanx soils have more clay in the subsoil and an indurated layer of iron-cemented sandstone within a depth of 40 inches.

Typical pedon of Evesboro sand, 2 to 5 percent slopes, in Howell Township, 250 feet south of Locust Avenue and 800 feet east of the intersection of Route 9 and Locust Avenue, in a woods:

Oa—2 inches to 0; dark brown (7.5YR 3/2) matted, decomposed organic matter; many fine roots; extremely acid; abrupt smooth boundary.
A—0 to 2 inches; grayish brown (10YR 5/2) sand; single grain; loose; many fine roots; extremely acid; abrupt smooth boundary.
E—2 to 7 inches; yellowish brown (10YR 5/4) sand; single grain; loose; many fine and medium roots; extremely acid; clear smooth boundary.
Bw—7 to 32 inches; yellowish brown (10YR 5/6) sand; single grain; loose; few medium roots; 3 percent

quartz pebbles; coatings on sand grains; very strongly acid; gradual smooth boundary.
C—32 to 60 inches; yellowish brown (10YR 5/6) sand; single grain; loose; strongly acid.

The solum ranges from 28 to 40 inches in thickness. Rounded quartzose pebbles range from 0 to 20 percent, by volume, throughout. In unlimed areas reaction ranges from strongly acid to extremely acid.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. The E horizon has hue of 10YR, value of 5, and chroma of 3 or 4. Some pedons have an Ap horizon that has hue of 10YR, value of 4 or 5, and chroma of 2. The A horizon is sand or loamy sand.

The B horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 or 8. It is sand or loamy sand.

The C horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 4 or 6.

Fallsington Series

The Fallsington series consists of poorly drained soils on upland flats. These soils formed in acid, loamy, Coastal Plain sediments. Slope ranges from 0 to 2 percent.

Fallsington soils are near Woodstown, Hammonton, Sassafras, and Elkton soils. Woodstown soils do not have a dark surface layer or a dominantly gray subsurface layer and subsoil. Hammonton soils have less clay in the subsoil and do not have a dark surface layer or a dominantly gray subsurface layer and subsoil. Sassafras soils do not have mottles in the subsoil and the substratum. Elkton soils have more clay in the subsoil.

Typical pedon of Fallsington loam, in Upper Freehold Township, approximately 1,700 feet south of intersection of Clarksburg-Robbinsville Road and Imlaystown-Hightstown Road and approximately 800 feet east from Imlaystown-Hightstown Road, in woods:

Oa—2 inches to 0; dark brown decomposed organic material; many fine and medium roots; extremely acid; abrupt smooth boundary.
Ap—0 to 8 inches; dark gray (10YR 4/1) loam; common medium prominent brown (7.5YR 4/4) mottles; weak coarse granular structure; very friable; common medium roots; very strongly acid; clear smooth boundary.
Btg1—8 to 21 inches; grayish brown (10YR 5/2) fine sandy clay loam; many coarse prominent strong brown (7.5YR 5/8) mottles; weak coarse subangular blocky structure; friable; few medium roots; common thick clay films on faces of peds; very strongly acid; gradual wavy boundary.
Btg2—21 to 30 inches; grayish brown (10YR 5/2) fine sandy clay loam; many coarse prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) mottles; moderate coarse subangular blocky structure; friable; few medium roots; few moderately thick clay films on faces of peds; very strongly acid; gradual wavy boundary.
BCg—30 to 36 inches; grayish brown (2.5Y 5/2) sandy clay loam; many coarse prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; 5 percent quartz pebbles; very strongly acid; abrupt smooth boundary.
Cg—36 to 42 inches; olive gray (5Y 5/2) fine sandy loam; few medium prominent yellowish brown (10YR 5/8) mottles; weak medium granular structure; very friable; very strongly acid; abrupt smooth boundary.
C—42 to 60 inches; dark yellowish brown (10YR 4/4) loamy sand; single grain; loose; 10 percent quartz pebbles; thin lenses of olive gray (5Y 5/2) fine sandy clay loam; very strongly acid.

The solum ranges from 24 to 40 inches in thickness. Rounded quartzose pebbles range from 0 to 5 percent, by volume, in the subsoil and from 0 to 20 percent in the substratum. In unlimed areas reaction ranges from extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 or 2. Some pedons have an E horizon that has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The A and E horizons are loam or sandy loam.

The B horizon is neutral or has hue of 10YR or 2.5Y; value is 4 to 6, and chroma is 0 to 2 in the upper part. It is neutral or has hue of 10YR or 2.5Y; value is 4 to 6, and chroma is 0 to 4 in the lower part. The horizon is sandy loam, fine sandy clay loam, or sandy clay loam.

The C horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 2 to 4. It is dominantly sand to sandy loam, and some pedons have thin, stratified layers of sandy clay loam.

Freehold Series

The Freehold series consists of well drained soils on uplands. These soils formed in acid, loamy, Coastal Plain sediments that are, by volume, 1 to 10 percent glauconite. Slope ranges from 0 to 25 percent.

Freehold soils are near Holmdel, Collington, Colts Neck, Tinton, and Phalanx soils. Holmdel soils have mottles in the subsoil and the substratum. Collington soils have 10 to 40 percent glauconite. Colts Neck soils are red in color. Tinton soils have loamy sand surface and subsurface layers more than 20 inches thick. Phalanx soils have less clay in the subsoil and an indurated layer of ironstone within a depth of 40 inches.

Typical pedon of Freehold sandy loam, 2 to 5 percent slopes, in Freehold Township, 0.25 mile northwest of West Freehold, along the road to Wemrock, 200 feet west of the road and 200 feet south of a farm lane, in a cultivated field:

Ap—0 to 9 inches; dark yellowish brown (10YR 4/4) sandy loam; weak subangular blocky structure, parting to weak fine granular structure; friable; strongly acid; clear smooth boundary.
BA—9 to 12 inches; dark brown (7.5YR 4/4) sandy loam; weak medium subangular blocky structure; friable; some dark yellowish brown (10YR 4/4) materials from the A horizon; strongly acid; clear wavy boundary.
Bt1—12 to 18 inches; dark brown (7.5YR 4/4) sandy loam; moderate medium subangular blocky structure parting to weak fine granular; friable and firm in place, slightly plastic; few faint clay films on faces of peds redder than centers of peds; few glauconite grains; strongly acid; gradual wavy boundary.
Bt2—18 to 25 inches; dark brown (7.5YR 4/4) sandy clay loam, greener and redder variegations associated with pockets higher in glauconite grains; weak coarse subangular blocky structure parting to fine or medium subangular blocky; friable and firm in place, slightly plastic; common clay bridging between sand grains; common glauconite grains; strongly acid; diffuse wavy boundary.
BC—25 to 35 inches; brown (7.5YR 5/4) sandy loam; massive; friable; common fine to medium sand-sized grains of glauconite; very strongly acid; gradual wavy boundary.
C—35 to 70 inches; yellowish brown (10YR 5/8) loamy sand; single grain; loose; many dark glauconite grains; very strongly acid.

The solum ranges from 30 to 45 inches in thickness. Rounded quartzose pebbles range from 0 to 5 percent, by volume, throughout. In unlimed areas reaction ranges from strongly acid to extremely acid.

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

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is sandy loam to sandy clay loam.

The C horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is dominantly sand or loamy sand, and some pedons have thin, stratified layers of sandy loam. Some pedons, below a depth of 40 inches, have iron-cemented layers, as much as 1 inch thick, that range from weakly cemented to indurated.

Hammonton Series

The Hammonton series consists of moderately well drained or somewhat poorly drained soils on uplands. These soils formed in acid, loamy, Coastal Plain sediments. Slope ranges from 0 to 5 percent.

Hammonton soils are near Woodstown, Downer, and Fallsington soils. Woodstown soils have more clay in the subsoil. Downer soils do not have mottles in the subsoil and the substratum. Fallsington soils have more clay in the subsoil and have a dark surface layer and a dominantly gray subsurface layer and subsoil.

Typical pedon of Hammonton sandy loam, 2 to 5 percent slopes, in Howell Township, southeast of Oak Glen, 0.4 mile west of intersection of Lakewood-Farmingdale Road and Maxim Road, 25 feet north of Maxim Road, in a cultivated field:

Ap—0 to 10 inches; dark brown (10YR 4/3) sandy loam; weak fine and medium granular structure; very friable; common fine roots; moderately acid; abrupt smooth boundary.
BA—10 to 19 inches; brownish yellow (10YR 6/6) sandy loam; weak medium subangular blocky structure; friable; strongly acid; gradual wavy boundary.
Bt1—19 to 24 inches; yellowish brown (10YR 5/6) sandy loam; moderate medium subangular blocky structure; friable; few thin patchy clay bridges between mineral grains; strongly acid; gradual wavy boundary.
Bt2—24 to 31 inches; brownish yellow (10YR 6/6) sandy loam; common medium distinct light gray (10YR 7/1) and strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; few thin patchy clay bridges between mineral grains; very strongly acid; abrupt wavy boundary.
C—31 to 60 inches; light yellowish brown (10YR 6/4) stratified loamy sand and gravelly sandy loam; single grain; loose; 15 to 20 percent quartz pebbles; very strongly acid.

The solum ranges from 24 to 40 inches in thickness. Rounded quartzose pebbles range from 0 to 5 percent, by volume, in the solum and from 0 to 25 percent in the substratum. In unlimed areas reaction ranges from strongly acid to extremely acid.

The A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. Some pedons have an E horizon that has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 4 or 6. It is dominantly loamy sand or sandy loam.

The B horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 to 6. It is dominantly loamy sand or sandy loam, and some pedons have thin horizons of sandy clay loam.

The C horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 2 to 8. It ranges dominantly from stratified sand to sandy loam, and some pedons have thin horizons of sandy clay loam.

Holmdel Series

The Holmdel series consists of moderately well drained or somewhat poorly drained soils on uplands. These soils formed in acid, loamy, Coastal Plain sediments that have 2 to 10 percent glauconite, by volume. Slope ranges from 0 to 5 percent.

Holmdel soils are near Freehold, Adelphia, Collington, Colts Neck, Pemberton, and Shrewsbury soils. Freehold, Collington, and Colts Neck soils do not have mottles in the subsoil and the substratum. Adelphia soils are 10 to 40 percent glauconite, by volume. Pemberton soils have sandy textured surface and subsurface layers more than 20 inches thick. Shrewsbury soils have a dark surface layer and a dominantly gray subsurface layer and subsoil.

Typical pedon of Holmdel sandy loam, 2 to 5 percent slopes, in Millstone Township, 0.1 mile west of Rochdale Road and Nurko Road, 50 feet north of Nurko Road, in a cultivated field:

Ap—0 to 12 inches; dark grayish brown (10YR 4/2) sandy loam; moderate coarse and medium granular structure; friable; many roots; less than 2 percent glauconite; very strongly acid; abrupt smooth boundary.

Bt1—12 to 20 inches; yellowish brown (10YR 5/4) sandy loam; weak medium and coarse subangular blocky structure; friable; many roots; few faint clay films on faces of peds; less than 2 percent glauconite; very strongly acid; gradual wavy boundary.

Bt2—20 to 38 inches; yellowish brown (10YR 5/6) sandy clay loam; few fine distinct light olive gray (5Y 6/2) and common fine and medium faint light olive brown (2.5Y 5/4) mottles; moderate medium and coarse subangular blocky structure; firm, slightly plastic; common roots; common faint clay films on faces of peds; about 5 percent glauconite; very strongly acid; gradual wavy boundary.

C1—38 to 42 inches; yellowish brown (10YR 5/6) sandy loam; few medium distinct yellowish red (5YR 5/8) mottles; single grain; loose; few fine roots; about 5 percent glauconite; extremely acid; abrupt smooth boundary.

C2—42 to 60 inches; light olive brown (2.5Y 5/4) sand; common medium distinct light olive gray (5Y 6/2) mottles; single grain; loose; about 10 percent glauconite; one-eighth to one-fourth inch, weakly iron-cemented, sand, stone sheets; extremely acid.

The solum ranges from 30 to 45 inches in thickness. Rounded quartzose pebbles range from 0 to 10 percent, by volume, throughout. In unlimed areas reaction is extremely acid or very strongly acid.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 or 3. Some pedons have an E horizon that has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 6.

The B horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 to 8. It is sandy loam to clay loam.

The C horizon has hue of 10YR to 5Y, value of 4 or 5, and chroma of 2 to 6. It ranges dominantly from sand to sandy loam. Some pedons have thin, stratified clayey layers. Thin, weakly iron-cemented sandstone, sheets are common in this horizon.

Hooksan Series

The Hooksan series consists of excessively drained soils on coastal dunes. These soils formed in sandy, coastal dune sediments. Slope ranges from 0 to 5 percent.

Hooksan soils are near Sulfaquents, Sulfihemists, and Hooksan Variant soils. Sulfaquents and Sulfihemists are tidal marsh soils that are flooded twice daily. Hooksan Variant soils have a dark surface layer and a mottled substratum.

Typical pedon of Hooksan sand, 0 to 5 percent slopes, on Sandy Hook, 500 feet east of road to North Beach, 0.5 mile from intersection with the main road, 1.2 miles north of checkpoint building, in a vegetated dune area:

A—0 to 6 inches; grayish brown (10YR 5/2) sand; single grain; loose; few fine and medium roots; 5 percent black sand grains; strongly acid; clear smooth boundary.

C1—6 to 36 inches; pale yellow (2.5Y 7/4) sand; single grain; loose; few fine roots; 5 percent black sand grains; strongly acid; gradual smooth boundary.

C2—36 to 50 inches; light yellowish brown (2.5Y 6/4) sand; single grain; loose; 20 percent black sand grains; slightly acid; gradual smooth boundary.

C3—50 to 60 inches; pale yellow (2.5Y 7/4) sand; single grain; loose; 15 percent black sand grains; neutral.

The reaction ranges from strongly acid to neutral.

The A horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2.

The C horizon has hue of 10YR or 2.5Y, value of 6 or 7, chroma of 3 or 4. It is sand or fine sand.

Hooksan Variant

Hooksan Variant consists of poorly drained soils on low-lying coastal dunes. These soils formed in sandy, coastal dune sediments. Slope ranges from 0 to 2 percent.

Hooksan Variant soils are near Sulfaquents, Sulfihemists, and Hooksan soils. Sulfaquents and Sulfihemists are tidal marsh soils that are flooded twice daily. Hooksan soils do not have a dark surface layer or mottles in the substratum.

Typical pedon of Hooksan Variant sand, 0 to 2 percent slopes, on Sandy Hook, 300 feet west of the main road, 0.5 mile from checkpoint building, in a vegetated dune area:

A—0 to 5 inches; very dark brown (10YR 2/2) sand; single grain; loose; many fine and medium roots; 15 percent white sand grains; very strongly acid; abrupt smooth boundary.

C1—5 to 14 inches; light brownish gray (10YR 6/2) fine sand; single grain; loose; common fine and medium

roots; 5 percent black sand grains; very strongly acid; clear smooth boundary.
C2—14 to 28 inches; pale brown (10YR 6/3) sand; single grain; loose; few medium roots; 15 percent black sand grains; very strongly acid; abrupt smooth boundary.
C3—28 to 40 inches; pale brown (10YR 6/3) coarse sand; common medium distinct grayish brown (10YR 5/2) mottles; single grain; loose; few medium and coarse roots; medium acid; clear smooth boundary.
C4—40 to 60 inches; pale brown (10YR 6/3) sand; few coarse prominent brownish yellow (10YR 6/8) mottles; single grain; loose; 3 percent pebbles; medium acid.

Reaction ranges from very strongly acid to medium acid. Rounded quartzose pebbles range from 0 to 5 percent, by volume, in the substratum.

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

The C horizon has hue of 10YR, value of 6, and chroma of 2 or 3. It is stratified and ranges from coarse sand to loamy sand.

Humaquepts

Humaquepts consist of somewhat poorly drained to very poorly drained soils on flood plains. These soils are subject to flooding several times each year. They formed in stratified, sandy or loamy sediments of fluvial origin. Slope ranges from 0 to 2 percent.

Humaquepts differ in stratification from place to place. Consequently, a typical pedon is not given. The solum ranges from 24 to 48 inches thick. The soils are extremely acid to slightly acid. Pebbles make up 0 to 20 percent of the B and C horizons.

The A horizon has hue of 5YR to 2.5Y, value of 2 or 3, and chroma of 1 to 3. It is sandy loam or silt loam. Organic matter content ranges from low to very high. The stratified layers range from 3 to 18 inches thick.

The B horizon has hue of 5YR to 10YR, value of 2 to 5, and chroma of 1. It ranges from sandy loam to silt loam. Organic matter content ranges from low to very high. The stratified layers range from 14 to 26 inches thick.

The C horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 1 to 6. Some profiles have brown or dark reddish brown mottles. The horizon ranges from loamy sand to silt loam and includes their gravelly analog. Organic matter content ranges from low to very high. The stratified layers range from 12 to more than 36 inches thick.

Keyport Series

The Keyport series consists of moderately well drained soils on uplands. These soils formed in acid, clayey, Coastal Plain sediments. Slope ranges from 0 to 15 percent.

Keyport soils are near Elkton, Woodstown, and Klej soils that have a clayey substratum. Elkton soils have a dark surface layer and a dominantly gray subsurface layer and subsoil. Woodstown soils have less clay in the subsoil. Klej soils that have a clayey substratum have a sandy texture at least 40 inches thick over the clayey substratum.

Typical pedon of Keyport sandy loam, 2 to 5 percent slopes, in Marlboro Township, 300 yards east of Route 18 and Texas Road overpass, 100 feet south of Texas Road:

Ap—0 to 8 inches; brown (10YR 4/3) sandy loam; weak fine and medium granular structure; friable, sticky; common fine and medium roots; medium acid; abrupt smooth boundary.
Bt1—8 to 18 inches; yellowish brown (10YR 5/4) silty clay loam; strong medium angular blocky structure; firm, slightly sticky; few thin clay films on faces of peds; few fine roots; very strongly acid; gradual wavy boundary.
Bt2—18 to 42 inches; dark yellowish brown (10YR 4/4) silty clay loam; common fine and medium distinct gray (10YR 5/1) and strong brown (7.5YR 5/8) mottles; strong medium angular blocky and subangular blocky structure; firm, sticky and plastic; common thick clay films on faces of peds; very strongly acid; gradual smooth boundary.
Cg—42 to 60 inches; gray (10YR 5/1) silty clay loam; massive; firm, sticky and plastic; strongly acid.

The solum ranges from 40 to 60 inches in thickness. Pebbles range from 0 to 3 percent, by volume, throughout. In unlimed areas reaction is extremely acid or very strongly acid.

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

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. It is silty clay loam to clay.

The C horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 8. It ranges from silty clay loam to loamy sand.

Klej Series

The Klej series consists of moderately well drained or somewhat poorly drained soils on uplands. These soils formed in acid, sandy, Coastal Plain sediments. Slope ranges from 0 to 5 percent.

Klej soils are near Evesboro, Lakehurst, and Atsion soils and Klej soils that have a clayey substratum. Evesboro soils do not have mottles in the subsoil and the substratum. Lakehurst soils have a bleached subsurface layer 6 inches thick or more. Atsion soils have a dark surface layer and a dominantly gray

subsurface layer and subsoil. Klej soils that have a clayey substratum have clay below a depth of 40 inches.

Typical pedon of Klej loamy sand, 0 to 3 percent slopes, in Wall Township, 50 feet northwest of Martin Road and 0.6 mile west from the intersection of Martin Road and Belmar Boulevard, in a wooded area:

Oi—4 inches to 1 inch; pine needles and leaves.
Oe—1 inch to 0; matted organic matter; many fine to coarse roots; abrupt smooth boundary.
A—0 to 10 inches; very dark grayish brown (10YR 3/2) loamy sand; single grain; loose; common fine to coarse roots; very strongly acid; abrupt smooth boundary.
Bw1—10 to 21 inches; brownish yellow (10YR 6/6) loamy sand; few fine faint strong brown (7.5YR 5/6) mottles; single grain; loose; common medium and coarse roots; very strongly acid; clear smooth boundary.
Bw2—21 to 36 inches; brownish yellow (10YR 6/6) loamy sand; many coarse prominent light gray (10YR 7/2) and strong brown (7.5YR 5/8) mottles; single grain; loose; very strongly acid; abrupt smooth boundary.
C—36 to 60 inches; yellowish brown (10YR 5/4) gravelly loamy sand; single grain; loose; 15 to 20 percent quartz pebbles; very strongly acid.

The solum ranges from 20 to 40 inches in thickness. Rounded quartzose pebbles range from 0 to 5 percent, by volume, in the solum and from 0 to 25 percent in the substratum. In unlimed areas reaction is extremely acid or very strongly acid.

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

Some pedons have an E horizon that has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4.

The B horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 8. It is loamy sand or sand.

The C horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 4 to 6. It is sand, loamy sand, or their gravelly analog above a depth of 40 inches, and it ranges from sand to clay and includes their gravelly analog below that depth.

Kresson Series

The Kresson series consists of somewhat poorly drained soils on uplands. These soils formed in acid, clayey, Coastal Plain sediments that have more than 40 percent glauconite, by volume. Slope ranges from 0 to 5 percent.

Kresson soils are near Marlton, Colemantown, Adelphia, and Shrewsbury soils. Marlton soils do not have distinct or prominent mottles in the subsurface layer or in the upper part of the subsoil. Colemantown soils have a dark surface layer and distinct or prominent mottles in the subsurface layer. Adelphia soils have less glauconite and less clay in the subsoil. Shrewsbury soils have a dark surface layer and a dominantly gray subsurface layer and subsoil. They have less clay in the subsoil and are less than 10 percent glauconite, by volume.

Typical pedon of Kresson loam, 0 to 5 percent slopes, in Upper Freehold Township, 40 feet west of hedgerow and 600 feet north from Holmes Road, 0.5 mile east of intersection of Holmes and Smith Mill Roads, in a field:

Ap—0 to 9 inches; dark brown (10YR 3/3) loam; moderate medium granular structure; friable; common fine roots; 5 percent glauconite; strongly acid; abrupt smooth boundary.
Bt1—9 to 22 inches; olive brown (2.5Y 4/4) clay loam; common medium and coarse prominent strong brown (7.5YR 5/8) mottles; moderate medium angular blocky structure; firm; few fine roots; many distinct clay films on faces of peds; 50 percent glauconite; very strongly acid; gradual wavy boundary.
Bt2—22 to 34 inches; olive gray (5Y 4/2) clay; many medium and coarse prominent strong brown (7.5YR 5/6) and brown (7.5YR 4/4) mottles; strong medium angular blocky structure; firm; many moderately thick clay films on faces of peds; 60 percent glauconite; very strongly acid; gradual wavy boundary.
Bt3—34 to 40 inches; olive gray (5Y 4/2) clay; common medium prominent brown (7.5YR 4/4) mottles; strong medium angular blocky structure; very firm; many moderately thick clay films on faces of peds; 70 percent glauconite; less than 3 percent quartz gravel; very strongly acid; clear smooth boundary.
C—40 to 60 inches; dark grayish brown (2.5Y 4/2) sandy loam; common coarse prominent brown (7.5YR 4/4) mottles; massive; friable; 50 percent glauconite; dark yellowish brown (10YR 4/6) sand grains; stratified layers of sandy clay loam; extremely acid.

The solum ranges from 30 to 40 inches in thickness. Quartzose pebbles and iron-cemented sandstone fragments range from 0 to 5 percent, by volume, throughout. In unlimed areas reaction is extremely acid or very strongly acid.

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

The B horizon has hue of 2.5Y, 5Y, 5G, and 5GY, value of 4, and chroma of 2 to 4. It is clay loam, sandy clay, or clay.

The C horizon has hue of 2.5Y to 5GY, value of 4, and chroma of 1 or 2. It is dominantly sandy loam, but includes stratified layers of sandy clay loam to clay.

Lakehurst Series

The Lakehurst series consists of moderately well drained and somewhat poorly drained soils on uplands.

These soils formed in acid, sandy, Coastal Plain sediments. Slope ranges from 0 to 2 percent.

Lakehurst soils are near Lakewood, Atsion, Klej, and Evesboro soils. Lakewood soils do not have mottles in the subsoil and the substratum. Atsion soils have a dark surface layer and a dominantly gray subsurface layer and subsoil. Klej soils do not have a Bh horizon and a bleached subsurface layer 6 inches thick or more. Evesboro soils do not have a Bh horizon, a bleached subsurface layer 6 inches thick or more, and mottles in the subsoil and the substratum.

Typical pedon of Lakehurst sand, 0 to 2 percent slopes, in Wall Township, 30 feet west of Route 34 and 800 feet south of the intersection of Route 34 and Belmar Boulevard, in a wooded area:

Oi—2 inches to 0; dark reddish brown (5YR 3/2) undecomposed organic material; many fine and medium roots; extremely acid; abrupt smooth boundary.
A—0 to 4 inches; gray (10YR 5/1) sand; single grain; loose; few fine and coarse and common medium roots; extremely acid; abrupt smooth boundary.
E—4 to 10 inches; light gray (10YR 7/2) sand; single grain; loose; few medium roots; very strongly acid; abrupt irregular boundary.
Bh—10 to 13 inches; brown (7.5YR 4/4) loamy sand; single grain; loose; common medium roots; firm nodules 1/2 inch thick in the lower part; extremely acid; clear irregular boundary.
Bw—13 to 24 inches; brownish yellow (10YR 6/6) sand; common medium faint yellowish brown (10YR 5/8) mottles; single grain; loose; few medium roots; very strongly acid; gradual smooth boundary.
BC—24 to 36 inches; pale brown (10YR 6/3) sand; common medium prominent brownish yellow (10YR 6/6) mottles; single grain; loose; few medium roots; very strongly acid; clear smooth boundary.
C—36 to 60 inches; light brownish gray (10YR 6/2) sand; common coarse prominent strong brown (7.5YR 5/8) mottles; single grain; loose; very strongly acid.

The solum ranges from 30 to 45 inches in thickness. Rounded quartzose pebbles range from 0 to 15 percent, by volume, throughout. In unlimed areas reaction ranges from strongly acid to extremely acid.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 1. The E horizon has hue of 10YR, value of 6 or 7, and chroma of 1 or 2.

The Bh horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. The Bw and BC horizons have hue of 10YR, value of 6, and chroma of 3 to 6. The B horizon is loamy sand or sand.

The C horizon has hue of 10YR, value of 6 or 7, and chroma of 2 to 6. It is sand above a depth of 40 inches, and is dominantly sand but ranges to clay below that depth.

Lakewood Series

The Lakewood series consists of excessively drained soils on uplands. These soils formed in acid, sandy, Coastal Plain sediments. Slope ranges from 0 to 10 percent.

Lakewood soils are near Lakehurst and Evesboro soils. Lakehurst soils are mottled in the subsoil. Evesboro soils do not have a Bh horizon or a bleached subsurface layer 8 inches thick or more.

Typical pedon of Lakewood sand, 0 to 5 percent slopes, in Howell Township, 300 feet south of Locust Avenue and approximately 1,000 feet east of the intersection of Route 9 and Locust Avenue, in woods:

Oe—1 inch to 0; dark brown (7.5YR 3/2) matted, decomposed organic material; many fine roots; extremely acid; abrupt smooth boundary.
A—0 to 3 inches; dark grayish brown (10YR 3/2) sand; single grain; loose; common fine and medium roots; very strongly acid; gradual wavy boundary.
E—3 to 13 inches; light brownish gray (10YR 6/2) sand; single grain; loose; many fine roots; very strongly acid; abrupt smooth boundary.
Bh—13 to 15 inches; dark brown (7.5YR 4/4) loamy sand; single grain; loose; firm concretionary nodules; very strongly acid; clear wavy boundary.
BC—15 to 30 inches; brownish yellow (10YR 6/6) sand; single grain; loose; 10 percent quartz pebbles; coated sand grains; very strongly acid; clear smooth boundary.
C—30 to 60 inches; brownish yellow (10YR 6/6) gravelly sand; single grain; loose; 15 percent quartz pebbles; some coated sand grains; very strongly acid.

The solum ranges from 30 to 45 inches in thickness. Rounded quartzose pebbles range from 0 to 15 percent, by volume, throughout. In unlimed areas reaction is extremely acid or very strongly acid.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. The E horizon has hue of 10YR, value of 6 or 7, and chroma of 1 or 2.

The Bh horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 or 4. The BC horizon has hue of 10YR, value of 5 or 6, and chroma of 4 to 8. The B horizon is loamy sand or sand.

The C horizon has hue of 10YR, value of 6 or 7, and chroma of 4 or 6. It is loamy sand or sand or their gravelly analog. Some pedons have thin horizons of sandy loam below a depth of 40 inches.

Manahawkin Series

The Manahawkin series consists of very poorly drained soils on lowlands and back swamps. These soils formed in acid, organic material from woody plants. Slope ranges from 0 to 2 percent.

Manahawkin soils are near Atsion and Elkton soils and Humaquepts. Atsion and Elkton soils and Humaquepts do not have an organic muck layer 16 inches thick or more.

Typical pedon of Manahawkin muck, in Aberdeen Township, between two schools approximately 600 feet south-southwest from the intersection of Chilton and Courtland Lanes, in a wooded area:

Oa1—0 to 12 inches; black (10YR 2/1) muck; 20 percent fiber, 5 percent rubbed; moderate medium granular structure; many fine and medium roots; extremely acid; clear smooth boundary.
Oa2—12 to 26 inches; black (5YR 2/1) muck; 30 percent fiber, 10 percent rubbed; massive; many fine and medium roots; 5 percent woody fragments; extremely acid; abrupt smooth boundary.
Oa3—26 to 30 inches; very dark gray (10YR 3/1) muck; 30 percent fiber, 10 percent rubbed; massive; common fine roots; extremely acid; abrupt smooth boundary.
2C1—30 to 34 inches; dark gray (10YR 4/1) loamy sand; single grain; loose; very strongly acid; abrupt smooth boundary.
2C2—34 to 48 inches; dark gray (N 4/0) sand; many coarse distinct light gray (10YR 6/1) mottles; single grain; loose; very strongly acid; clear smooth boundary.
2C3—48 to 60 inches; dark gray (10YR 4/1) loamy sand; single grain; loose; thin clay layers; very strongly acid.

The organic horizons range from 16 to 51 inches in thickness. The organic material consists mainly of decayed woody branches, twigs, and roots and includes material derived from herbaceous plants. These horizons are dominantly sapric material. Fiber content ranges from 5 to 30 percent, before rubbing, and from 0 to 10 percent, after rubbing. The mineral content ranges from 5 to 80 percent. Reaction ranges from extremely acid to strongly acid.

The Oa horizon is neutral or has hue of 5YR to 2.5Y; value is 2 to 3, and chroma is 0 or 1.

The 2C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 0 or 1. It is sand or loamy sand. Some profiles have thin horizons of finer textures. Rounded quartzose pebbles range from 0 to 15 percent, by volume, in the 2C horizon.

Marlton Series

The Marlton series consists of well drained and moderately well drained soils on uplands. These soils formed in acid, clayey, Coastal Plain sediments that are more than 40 percent glauconite, by volume. Slope ranges from 2 to 10 percent.

Marlton soils are near Kresson, Collington, and Adelphia soils. Kresson soils have distinct or prominent mottles in the upper subsoil. Collington soils have less clay in the subsoil, have less glauconite, and do not have mottles in the subsoil and the substratum. Adelphia soils have less glauconite and less clay in the subsoil.

Typical pedon of Marlton loam, 2 to 5 percent slopes, in Upper Freehold Township, 0.3 mile north of the intersection of Route 537 and Holmes Mill Road, 80 feet east of Holmes Mill Road, in a field:

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loam; moderate medium granular structure; friable; few fine roots; 30 percent glauconite; very strongly acid; clear wavy boundary.
Bt1—8 to 18 inches; very dark grayish brown (2.5Y 3/2) sandy clay loam; moderate medium subangular blocky structure; friable; common distinct clay films lining interstitial pores; 40 percent glauconite; few quartz pebbles; very strongly acid; gradual wavy boundary.
Bt2—18 to 34 inches; dark olive gray (5Y 3/2) clay loam; few medium prominent strong brown (7.5YR 4/6) mottles; moderate medium subangular blocky structure; friable; common distinct clay films lining interstitial pores; 60 percent glauconite; very strongly acid; clear wavy boundary.
Bt3—34 to 46 inches; dark olive gray (5Y 3/2) clay; common medium prominent strong brown (7.5YR 4/6) and dark reddish brown (5YR 3/4) mottles; strong medium subangular blocky structure; firm; many distinct clay films lining interstitial pores; 80 percent glauconite; very strongly acid; clear smooth boundary.
C—46 to 60 inches; dark olive gray (5Y 3/2) sandy loam; common medium prominent strong brown (7.5YR 4/6) mottles; weak medium granular structure; friable; 80 percent glauconite; few clay loam lenses; very strongly acid.

The solum ranges from 30 to 48 inches in thickness. Rounded quartzose pebbles or ironstone fragments range from 0 to 5 percent, by volume, throughout. In unlimed areas reaction is extremely acid or very strongly acid.

The Ap horizon has hue of 10YR to 5Y, value of 3 or 4, and chroma of 2 or 3. Some pedons have an E horizon that has hue of 2.5Y, value of 3 or 4, and chroma of 2 to 4. It is sandy loam or loam.

The B horizon has hue of 2.5Y, 5Y, or 5G, value of 3 or 4, and chroma of 2. It ranges from sandy clay loam to clay.

The C horizon has hue of 2.5Y, 5Y, or 5G, value of 3 or 4, and chroma of 2. It is dominantly sandy loam and sandy clay loam, and some pedons have stratified layers that range from sandy loam to clay. Some pedons have thin, iron-cemented material.

Pemberton Series

The Pemberton series consists of moderately well drained and somewhat poorly drained soils on uplands. These soils formed in acid, loamy, Coastal Plain sediments that are as much as 30 percent glauconite, by volume. Slope ranges from 0 to 5 percent.

Pemberton soils are near Tinton, Holmdel, and Shrewsbury soils. Tinton soils do not have mottles in the subsoil and the substratum. Holmdel soils do not have sandy surface and subsurface layers 20 inches thick or more. Shrewsbury soils have a dark surface layer and a dominantly gray subsurface layer and subsoil.

Typical pedon of Pemberton loamy sand, 0 to 5 percent slopes, in Upper Freehold Township, 900 feet north of the intersection of Eldridge Road and Clarksburg-Robbinsville Road, 400 feet west of Eldridge Road, 30 feet west of hedgerow, in a field:

Ap—0 to 10 inches; brown (10YR 4/3) loamy sand; single grain; loose; many fine roots; very strongly acid; abrupt smooth boundary.

E—10 to 25 inches; yellowish brown (10YR 5/4) loamy sand; single grain; loose; strongly acid; abrupt smooth boundary.

2Bt1—25 to 37 inches; dark yellowish brown (10YR 4/6) sandy clay loam; common coarse distinct yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; friable; many moderately thick clay films lining interstitial pores; 5 percent glauconite; strongly acid; clear smooth boundary.

2Bt2—37 to 45 inches; yellowish brown (10YR 5/6) sandy clay loam; many coarse faint strong brown (7.5YR 4/6) and common coarse prominent light olive gray (5Y 6/2) mottles; strong medium subangular blocky structure; friable; many moderately thick clay films lining interstitial pores; 5 percent glauconite; medium acid; clear smooth boundary.

2C—45 to 60 inches; pale olive (5Y 6/3) fine sandy loam; many coarse prominent reddish brown (5YR 4/4) mottles; massive; friable; 3 to 5 percent glauconite; strongly acid; clear smooth boundary.

The solum ranges from 30 to 48 inches in thickness. Rounded quartzose pebbles or iron-cemented sandstone fragments range from 0 to 5 percent, by volume, in the B and C horizons. The A horizon ranges from 20 to 36 inches in thickness. In unlimed areas reaction is extremely acid or very strongly acid.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 or 3. The E horizon has hue of 10YR to 5Y, value of 5 or 6, and chroma of 3 or 4. Some pedons have an E horizon that has mottles with chroma of 2. The A and E horizons are loamy sand or sand.

The Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 or 6. It is sandy loam or sandy clay loam.

The C horizon has hue of 5Y, value of 6, and chroma of 3 or 4. It is dominantly sand to fine sandy loam. Below a depth of 40 inches it ranges from sand to clay.

Phalanx Series

The Phalanx series consists of well drained soils on uplands. These soils formed in acid, loamy, Coastal Plain sediments. Slope ranges from 0 to 25 percent.

Phalanx soils are near Evesboro, Colts Neck, Freehold, and Tinton soils. Evesboro soils have a sandy texture throughout and do not have an indurated layer of iron-cemented sandstone. Colts Neck and Freehold soils have more clay in the subsoil, have glauconite, and do not have an indurated layer of iron-cemented sandstone within a depth of 40 inches. Tinton soils have sandy textured surface and subsurface layers 20 inches thick or more, have glauconite, and do not have indurated, iron-cemented sandstone.

Typical pedon of Phalanx loamy sand, 0 to 10 percent slopes, in Middletown Township, 660 feet north-northeast of jughandle on Route 36, 0.8 mile east of the intersection of Route 36 and Navesink Avenue, on the edge of a sand pit:

A—0 to 2 inches; dark brown (7.5YR 4/2) loamy sand; single grain; loose; common medium and coarse roots; extremely acid; clear smooth boundary.

E—2 to 7 inches; brown (7.5YR 5/4) loamy sand; single grained; loose; few fine and medium roots; 14 percent ironstone channers; very strongly acid; gradual wavy boundary.

BA—7 to 17 inches; strong brown (7.5YR 5/6) loamy sand; single grain; loose; few fine and medium roots; 14 percent ironstone channers; very strongly acid; clear wavy boundary.

Bt1—17 to 23 inches; yellowish red (5YR 5/6) sandy loam; moderate medium subangular blocky structure; friable; few fine roots; few distinct clay films in bridges between mineral grains; very strongly acid; clear wavy boundary.

BC—23 to 38 inches; yellowish red (5YR 5/6) sandy loam; massive; firm; very strongly acid; abrupt irregular boundary.

C—38 to 60 inches; yellowish red (5YR 5/8) loamy sand; loose; multiple 1- to 2-inch indurated horizons of iron-cemented sandstone; very strongly acid.

The solum ranges from 30 to 60 inches in thickness. The uppermost iron-cemented sandstone layer is at a depth of 20 to 40 inches. The iron-cemented sandstone layers range from weakly cemented to indurated and from an eighth-inch to several feet in thickness. In some pedons the iron-cemented sandstone sheets are

fractured or continuous in the B horizon. In some pedons the C horizon has thick, massive beds of iron-cemented sandstone below a depth of 48 inches. Coarse fragments of iron-cemented sandstone chips or channers and rounded quartzose pebbles range from 0 to 15 percent, by volume, in the A horizon and in the upper part of the B horizon, from 20 to 75 percent in thin layers in the Bt horizon, and from 0 to 75 percent in layers in the C horizon. In unlimed areas reaction is extremely acid or very strongly acid in the upper part of the solum and is strongly acid or very strongly acid in the lower part of the solum and the substratum.

The A horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3. The E horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. It is sand or loamy sand.

The B horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is loamy sand or sandy loam. Some pedons have thin horizons of sandy clay loam.

The C horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 6 or 8. It is dominantly sand or loamy sand. Below a depth of 40 inches it includes thin horizons of sandy loam or sandy clay loam.

Psamments

Psamments consist of excessively drained to somewhat poorly drained soils that have no horizonation. These soils formed in stratified or graded, sandy fill material. Slope ranges from 0 to 2 percent.

These soils differ greatly from area to area. Thus, a typical pedon is not given. Typically, the soils are 20 to 60 inches deep or more to the original soil material or to waste fill. They are extremely acid or very strongly acid.

Sassafras Series

The Sassafras series consists of well drained soils on uplands. These soils formed in acid, loamy, Coastal Plain sediments. Slope ranges from 0 to 25 percent.

Sassafras soils are near Woodstown, Downer, and Fallsington soils. Woodstown soils are mottled in the subsoil. Downer soils have less clay in the subsoil. Fallsington soils have a dark surface layer and a dominantly gray subsurface layer and subsoil.

Typical pedon of Sassafras sandy loam, 2 to 5 percent slopes, in Wall Township, 0.8 mile east on 18th Avenue from the intersection with Allenwood Road, 15 feet south of 18th Avenue, in a cultivated field:

Ap—0 to 11 inches; dark brown (10YR 3/3) sandy loam; weak medium granular structure; very friable; common fine roots; medium acid; abrupt wavy boundary.

BA—11 to 17 inches; yellowish brown (10YR 5/6) sandy loam; moderate medium subangular blocky structure; friable; few fine roots; medium acid; gradual wavy boundary.

Bt—17 to 30 inches; yellowish brown (10YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable; few fine roots; few faint clay films on faces of some peds; 2 to 3 percent fine rounded pebbles; medium acid; gradual wavy boundary.

BC—30 to 36 inches; reddish yellow (7.5YR 6/6) sandy loam; weak medium subangular blocky structure; friable; 2 to 3 percent rounded pebbles; strongly acid; gradual wavy boundary.

C—36 to 60 inches; stratified reddish yellow (7.5YR 6/6) loamy sand and sandy loam; single grain; loose; very strongly acid.

The solum ranges from 30 to 45 inches in thickness. Rounded quartzose pebbles or iron-cemented sandstone fragments range from 0 to 20 percent, by volume, in the solum and from 0 to 30 percent in the substratum. In unlimed areas reaction ranges from strongly acid to extremely acid.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 or 3. It is sandy loam, loam, or gravelly sandy loam.

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

The C horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 6 or 8. It ranges dominantly from stratified sand to sandy loam.

Shrewsbury Series

The Shrewsbury series consists of poorly drained soils on upland flats. These soils formed in acid, loamy, Coastal Plain sediments that are as much as 10 percent glauconite, by volume. Slope ranges from 0 to 2 percent.

Shrewsbury soils are near Adelphia, Holmdel, Pemberton, Colemantown, and Kresson soils. Adelphia, Pemberton, and Holmdel soils do not have a dark surface layer and a dominantly gray subsurface layer and subsoil. Colemantown and Kresson soils have more clay in the subsoil and are more than 40 percent glauconite, by volume.

Typical pedon of Shrewsbury sandy loam, in Tinton Falls Township, 250 feet east from far end of parking lot in a park, 0.2 mile north along Hockhockson Road from intersection of Hockhockson Road and Squankum Road, in woods:

Oe—1 inch to 0; dark reddish brown (5YR 3/3) matted, partly decomposed organic material; many fine to coarse roots; extremely acid; abrupt smooth boundary.

A—0 to 8 inches; black (10YR 2/1) sandy loam; moderate medium granular structure; friable; many

fine and medium roots; very strongly acid; abrupt smooth boundary.
E—8 to 12 inches; dark gray (10YR 4/1) sandy loam; common fine prominent dark yellowish brown (10YR 3/4) and yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; many fine and common medium roots; less than 3 percent glauconite; very strongly acid; abrupt smooth boundary.
Btg1—12 to 21 inches; grayish brown (2.5Y 5/2) sandy clay loam; many medium distinct olive brown (2.5Y 4/4) mottles; weak medium subangular blocky structure; friable; few fine and medium roots; few distinct clay films lining interstitial pores; less than 5 percent glauconite; very strongly acid; clear smooth boundary.
Btg2—21 to 30 inches; olive gray (5Y 5/2) sandy clay loam; many coarse prominent reddish yellow (7.5YR 6/8) and few medium prominent strong brown (7.5YR 4/6) mottles; moderate coarse subangular blocky structure; friable; few fine roots; common prominent clay films lining interstitial pores; 5 percent glauconite; very strongly acid; abrupt smooth boundary.
Cg1—30 to 42 inches; dark greenish gray (5GY 4/1) loamy sand; common medium prominent reddish yellow (7.5YR 6/8) and few medium strong brown (7.5YR 4/6) mottles; single grain; loose; 10 percent glauconite; very strongly acid; clear smooth boundary.
Cg2—42 to 60 inches; dark greenish gray (5G 4/1) loamy sand; single grain; loose; 10 percent glauconite; very strongly acid.

The solum ranges from 24 to 36 inches in thickness. Rounded quartzose pebbles range from 0 to 10 percent, by volume, throughout. In unlimed areas reaction is extremely acid or very strongly acid.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 1 or 2, and chroma of 1. Either horizon is sandy loam or loam.

The E horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2. It is sandy loam or loam.

The B horizon has hue of 2.5Y or 5Y, value of 5 or 6, and chroma of 1 or 2. It is dominantly sandy clay loam, but some pedons have thin strata of sandy loam and clay loam.

The C horizon has hue of 2.5Y to 5G, value of 4 or 5, and chroma of 1 or 2. It ranges from sand to sandy loam.

Sulfaquents

Sulfaquents consist of poorly drained and very poorly drained, nearly level, mineral soils. These soils are subject to tidal flooding. They are on tidal flats adjacent to bays and tidal streams. Slope ranges from 0 to 1 percent.

These soils differ greatly from area to area; thus, a typical pedon is not given. The soils are slightly acid or neutral when wet and become extremely acid when dry.

The surface horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2. It is dominantly muck. Reaction is dominantly slightly acid. The surface horizon differs in thickness, but generally is 10 to 16 inches thick.

The substratum has hue of 10YR or 5Y, value of 3 to 5, and chroma of 1 or 2. It is mainly loamy sand or sand but includes mucky lenses. Reaction is dominantly neutral. In some pedons dark yellowish brown mottles are in the substratum.

Sulfihemists

Sulfihemists consist of deep, poorly drained and very poorly drained, nearly level, organic soils. These soils are subject to tidal flooding. They formed in 16 to 51 inches or more of organic material over stratified silty and sandy, fluviomarine sediments. They are on tidal flats adjacent to bays and tidal streams. Slope ranges from 0 to 1 percent.

These soils differ greatly from area to area; thus a typical pedon is not given. The soils are slightly acid to mildly alkaline when wet and become extremely acid when dry.

The surface and subsurface tiers dominantly have hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 0 to 2. The upper organic tier is generally more than 16 inches thick. The lower mineral tier ranges from silt loam to silty clay. The sandy substratum generally is at a depth of more than 51 inches.

Tinton Series

The Tinton series consists of well drained soils on uplands and terraces. These soils formed in acid, loamy, Coastal Plain sediments that are 10 to 40 percent glauconite, by volume. Slope ranges from 0 to 25 percent.

Tinton soils are near Pemberton, Freehold, Evesboro, and Phalanx soils. Pemberton soils are mottled in the subsoil and the substratum. Freehold and Phalanx soils do not have sandy surface and subsurface layers 20 inches thick or more. Evesboro soils have less clay in the subsoil and do not have glauconite.

Typical pedon of Tinton loamy sand, 0 to 5 percent slopes, in Manalapan Township, 0.4 mile southeast along Smithburg Road from Route 33 and 1,300 feet east from Smithburg Road, in a cultivated field:

Ap—0 to 7 inches; dark brown (10YR 4/3) loamy sand; single grain; loose; many fine and few medium roots; slightly acid; gradual wavy boundary.
E—7 to 32 inches; yellowish brown (10YR 5/6) loamy sand; single grain; loose; few fine roots; few

glauconite grains; medium acid; clear smooth boundary.
2Bt—32 to 46 inches; dark yellowish brown (10YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable; few prominent clay films in bridges between mineral grains; 10 percent glauconite grains; strongly acid; clear smooth boundary.
2C—46 to 60 inches; dark yellowish brown (10YR 4/6) loamy sand; single grain; loose; 20 percent glauconite grains; very strongly acid.

The solum ranges from 36 to 50 inches in thickness. Rounded quartzose pebbles or iron-cemented sandstone fragments range from 0 to 20 percent, by volume, in the lower part of the B horizon and in the C horizon. In unlimed areas reaction is extremely acid or very strongly acid.

The Ap horizon has hue of 10YR, value of 4, and chroma of 3 or 4. Some pedons have an A horizon that has hue of 10YR and value and chroma of 3 or 4. The E horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. It is sand or loamy sand. The total thickness of the A and E horizons ranges from 20 to 36 inches.

The B horizon has hue of 5YR to 2.5Y, value of 4 or 5, and chroma of 4 to 8. It is sandy loam or sandy clay loam.

The C horizon has hue of 5YR to 2.5Y, value of 4 or 5, and chroma of 6 or 8. It is dominantly loamy sand or sand, but some pedons have thin horizons of sandy loam or sandy clay loam.

Udorthents

Udorthents consist of well drained to somewhat poorly drained soils that have no horizonation. These soils formed in stratified or graded, sandy or loamy fill material that has as much as 35 percent gravel, by volume. Slope ranges from 0 to 3 percent. These soils have been altered in some way. In some areas the altering was filling over or excavating excessively drained to very poorly drained areas.

These soils differ greatly from place to place; thus, a typical pedon is not given. In filled areas the soils are more than 20 inches deep to undisturbed material or soil. They are strongly acid to extremely acid.

Woodstown Series

The Woodstown series consists of moderately well drained soils on uplands and terraces. These soils formed in acid, loamy, Coastal Plain sediments. Slope ranges from 0 to 5 percent.

Woodstown soils are near Sassafras, Downer, Hammonton, Fallsington, and Keyport soils. Sassafras and Downer soils do not have mottles in the subsoil and the substratum. Hammonton soils have less clay in the subsoil. Fallsington soils have a dark surface layer and a dominantly gray subsurface layer and subsoil. Keyport soils have more silt and clay in the subsoil.

Typical pedon of Woodstown loam, 0 to 2 percent slopes, in Howell Township, 50 feet east from Howell Road, 0.1 mile southwest from intersection of Howell Road and Bennett Road, in a field:

Ap—0 to 9 inches; brown (10YR 4/3) loam; moderate medium and coarse granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.
Bt1—9 to 24 inches; yellowish brown (10YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable; common moderately thick clay films lining interstitial pores; medium acid; gradual wavy boundary.
Bt2—24 to 29 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium prominent light gray (10YR 7/1) and few medium distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; few moderately thick clay films lining interstitial pores; strongly acid; clear smooth boundary.
BC—29 to 35 inches; light olive brown (2.5Y 5/4) fine sandy loam; common coarse prominent yellowish brown (10YR 5/8) and common coarse distinct light brownish gray (2.5Y 6/2) mottles; weak medium subangular blocky structure; very friable; very strongly acid; gradual smooth boundary.
C1—35 to 44 inches; light yellowish brown (2.5Y 6/4) loamy fine sand; common coarse distinct light gray (2.5Y 7/2) and few medium prominent yellowish brown (10YR 5/8) mottles; single grain; loose; very strongly acid; abrupt smooth boundary.
C2—44 to 60 inches; yellowish brown (10YR 5/6) gravelly loamy sand; single grain; loose; 25 percent rounded quartz pebbles; very strongly acid.

The solum ranges from 30 to 45 inches in thickness. Rounded quartzose pebbles range from 0 to 10 percent, by volume, in the solum and from 0 to 30 percent in the C horizon. In unlimed areas reaction ranges from extremely acid to strongly acid.

The Ap horizon has hue of 10YR, value of 4, and chroma of 3. The E horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 or 4. It is sandy loam or loam.

The B horizon has hue of 10YR or 2.5Y, value of 5, and chroma of 4 to 8. It is sandy loam, fine sandy loam, or sandy clay loam.

The C horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 to 6. It ranges from sand to fine sandy loam and includes their gravelly analog. Some pedons have thin strata of silt loam, silty clay loam, and sandy clay loam below a depth of 40 inches.

Formation of the Soils

In this section the factors of soil formation are discussed and related to the soils in the county, and the processes of soil formation are described.

Factors of Soil Formation

The five factors that influence soil development are parent material, climate, plant and animal life, topography, and time. The factors function interdependently in soil formation; consequently, changes in one factor can vary the effects of the others. The relationship among composition, dominant texture of the subsoil, distinctive characteristics, and drainage of the soils is shown in table 18.

Parent Material

Monmouth County lies within the Atlantic Coastal Plain physiographic province. The parent material of the soils is unconsolidated sediments of Mesozoic and Cenozoic age. The sediments are of marine and continental origin and consist mainly of sand, clay, and greensand (glauconite) and interspaced gravel beds. Strata of iron-cemented sandstone are in some areas. A thin layer of sand, clay, and gravel deposits of Quaternary age overlie the Coastal Plain sediments. This layer was deposited by outwash or melt water from the glacier that once covered the northern part of New Jersey (*7*).

Quaternary beds are the most recent deposits and are generally surficial. They consist of Pennsauken deposits and Cape May deposits (*6*). Pennsauken deposits, which have gravel, are a thin mantle on scattered hilltops in the county. Sassafras, Downer, Hammonton, Fallsington, and Woodstown soils formed in this material. Cape May deposits, which are very sandy, are along the eastern edge of the county and along some of the larger streams. Evesboro, Klej, and Downer soils formed in these deposits.

Lakewood, Lakehurst, Atsion, Evesboro, and Klej soils formed in the Kirkwood and Cohansey Formations, which are of Tertiary age. Tinton, Pemberton, Freehold, Collington, Holmdel, and Adelphia soils formed mainly in materials of Cretaceous age.

Climate

The present climate of Monmouth County is considered to be mainly marine, rather than continental. The climatic factors of rainfall, temperature, and wind have influenced soil formation processes throughout geologic time. The rather high rainfall and moderate temperatures have increased the weathering of the soils. Bases in the soil, such as calcium, magnesium, sodium, and potassium, have been leached from the profile. Consequently, all the soils, under natural conditions, are strongly acid to extremely acid. The finer silt particles and clay particles, organic matter, and other minerals have been translocated by water through the soil from one layer to another. In this way diagnostic horizons, such as argillic, albic, and spodic horizons, have been formed.

Temperature affects soil formation by the simple processes of freezing and thawing, which break down the larger particles into smaller particles. It also influences the physical, chemical, and biological activity of the soil.

The wind has reworked and redeposited many of the soils. Some soils have lost the surface layer, and others have caps or have accumulated wind-blown materials.

Climate in the county has changed over geologic time. The development of some soil features or characteristics in the soil cannot be accounted for by considering the present climate.

Plant and Animal Life

Vegetation can influence the amount of runoff, erosion, and the organic matter and available water in the soil. Such vegetation as leaves, twigs, grasses, or crops adds organic matter to the soil. In forested areas, leaf litter, twigs, and decayed roots make up the organic surface horizons and darken the A horizon. In open fields or cultivated areas, grasses and crop residue darken the Ap horizon (plow layer).

Animals and other organisms also contribute to soil development. Micro-organisms, rodents, and earthworms help to decompose organic materials and to mix the soil. In the decomposition process, plant nutrients are released and become available to plants to adsorb.

Relief

The relief of the land or its topography influences drainage, erosion, plant cover, and soil temperature. Soils on flood plains, on broad flats, or in depressions are generally wetter than soils on better drained, upland positions. Soils on flood plains that are flooded

frequently are constantly being altered and, as a result, have less profile development than soils on uplands. Soils that are wet for long periods of time have a lower level of biological activity than well drained soils. Soils on uplands, which have been weathered for a long time, have much more profile development than soils on flood plains, which formed in more recently deposited material.

Relief is an important variable in erosion. The erosion hazard is much greater on the steeper, upland soils than on soils in nearly level areas or on broad flats.

Soils that have a southern aspect or are on a south-facing slope receive solar radiation more directly. These soils show greater variations in soil temperature, evaporation rates, and vegetation than soils that have a northern aspect or are on a north-facing slope.

Time

Time is required for the factors of soil formation to produce soil. The magnitude of soil-forming processes depends on time. The effects of some processes show up before those of others. For example, the rate that plants adsorb micronutrients and macronutrients and the effects of soil erosion can change in relatively short periods of time. Such processes as eluviation, illuviation, humus accumulation, and weathering occur over geologic time. The upland soils, which are older, have weathered in place for long periods of time. In comparison, the soils on flood plains, which are relatively young, have not weathered in place as long.

References

(1) Allan, P. F., L. E. Garland, and R. Dugan. 1963. Rating northeastern soils for their suitability for wildlife habitat. 28th North Am. Wildl. Nat. Resour. Conf. Wildl. Manage. Inst., pp. 247-261, illus.

(2) American Association of State Highway and Transportation Officials. 1982. Standard specifications for highway materials and methods of sampling and testing. Ed. 13, 2 vols., illus.

(3) American Society for Testing and Materials. 1985. Method for classification of soils for engineering purposes. ASTM Stand. D 2487.

(4) Beck, Donald E. 1962. Yellow-poplar site index curves. U.S. Dep. Agric., Forest Serv., Southeast. Forest Exp. Stn. Res. Note 180, 2 pp., illus.

(5) Broadfoot, W. M. 1963. Guide for evaluating water oak sites. U.S. Dep. Agric., Forest Serv., South. Forest Exp. Stn. Res. Pap. SO-1, 8 pp., illus.

(6) Kummel, Henry B. 1940. The geology of New Jersey. N. J. Dep. Conserv. Dev. Bull. 50, 203 pp., illus.

(7) Monmouth County Environmental Council. 1975. Natural features study for Monmouth County, New Jersey. 66 pp.

(8) Monmouth County Environmental Council. 1981. Monmouth County environmental quality index. 1981. 63 pp.

(9) New Jersey Department of Agriculture and United States Department of Agriculture. 1980. New Jersey crop reporting services. Circ. 493, 61 pp.

(10) Schnur, G. Luther. 1937. Yield, stand, and volume tables for even-aged upland oak forest. U.S. Dep. Agric. Tech. Bull. 560, 88 pp., illus. (Reprinted 1961)

(11) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus.

(12) United States Department of Agriculture. 1961. Land capability classification. U.S. Dep. Agric. Handb. 210, 21 pp.

(13) United States Department of Agriculture. 1974. Soil survey laboratory data and descriptions for some soils of New Jersey. 103 pp.

(14) United States Department of Agriculture. 1974. Timber resources of New Jersey. Forest Serv., Resour. Bull. NE-34, 58 pp.

(15) United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Conserv. Serv., U.S. Dep. Agric. Handb. 436, 754 pp., illus.

(16) United States Department of Agriculture. 1983. National soils handbook. Soil Conserv. Serv. Title 430.

Glossary

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

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

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

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

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

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

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	more than 5.2

Basal till. Compact glacial till deposited beneath the ice.

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

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

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

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

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

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

Blowout. A shallow depression from which all or most of the soil material has been removed by 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.

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

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

Broad-base terrace. A ridge-type terrace built to control erosion by diverting runoff along the contour at a nonscouring velocity. The terrace is 10 to 20 inches high and 15 to 30 feet wide and has gently sloping sides, a rounded crown, and a dish-shaped channel along the upper side. It may be nearly level or have a grade toward one or both ends.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds just beneath the solum, or it is exposed at the surface by erosion.

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

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

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.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Cement rock. Shaly limestone used in the manufacture of cement.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard compacted layers to a depth below normal plow depth.

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

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

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

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

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, 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 constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

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

Congeliturbate. Soil material disturbed by frost action.

Conservation tillage. A tillage and planting system in which crop residue covers at least 30 percent of the soil surface after planting. Where soil erosion by wind is the main concern, the system leaves the equivalent of at least 1,000 pounds per acre of flat small-grain residue on the surface during the critical erosion period.

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

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

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

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

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

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

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

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

Cemented.—Hard; little affected by moistening.

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

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

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

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

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

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

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

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

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

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

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

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

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

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

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

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

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

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

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

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

Esker (geology). A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Excess alkali (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

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

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

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 grains are 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 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.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

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

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

Fragile (in tables). A soil that is easily damaged by use or disturbance.

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.

Gilgai. Commonly a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of Vertisols—clayey soils having a high coefficient of expansion and contraction with changes in moisture content.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial melt water.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). 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 melt water. 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 and mottles.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

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

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

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

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

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

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

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

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

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

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be

limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants follow disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

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

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material.

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Narrow-base terrace. A terrace no more than 4 to 8 feet wide at the base. A narrow-base terrace is similar to a broad-base terrace, except for the width of the ridge and channel.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by glacial melt water.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

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.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permafrost. Layers of soil, or even bedrock, occurring in arctic or subarctic regions, in which a temperture below freezing has existed continuously for a long time.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting (in tables). Pits caused by melting ground ice. They form on the soil after plant cover is removed.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or

browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor, on the basis of how much the present plant community has departed from the potential.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

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.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

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.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salty water (in tables.) Water that is too salty for consumption by livestock.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Much has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

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, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^{+} to $Ca^{++} + Mg^{++}$. The degrees of sodicity are—

	SAR
Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period the the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

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 about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifiying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area 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.

Too arid (in tables). The soil is dry most of the time, and vegetation is difficult to establish.

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.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer of a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by melt water streams, in glacial lake or other body of still water in front of a glacier.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-73 at Freehold, New Jersey]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- 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----	39.2	22.5	30.9	64	0	29	3.03	1.62	4.26	6	6.7
February---	41.5	24.0	32.8	67	0	27	3.44	2.25	4.52	6	6.6
March------	49.1	30.4	39.8	77	11	87	4.38	2.91	5.71	7	4.9
April------	61.8	39.7	50.8	86	24	327	3.73	2.29	5.01	7	0.5
May--------	72.1	48.7	60.5	91	33	636	3.77	1.97	5.33	7	.0
June-------	81.0	58.5	69.8	96	43	894	3.38	1.94	4.65	6	.0
July-------	85.4	63.5	74.5	98	50	1,070	4.03	1.51	6.13	6	.0
August-----	83.5	62.3	72.9	95	47	1,020	4.43	1.60	6.78	6	.0
September--	77.4	55.7	66.6	94	37	798	3.54	1.46	5.29	5	.0
October----	66.9	45.1	56.0	85	26	496	3.45	1.36	5.20	5	0.1
November---	54.6	36.0	45.3	75	17	174	4.04	2.06	5.76	7	0.6
December---	43.0	26.6	35.1	68	6	67	3.96	1.92	5.72	7	5.4
Year:											
Average---	63.0	42.8	52.9	---	---	---	---	---	---	---	---
Extreme---	---	---	---	99	-2	---	---	---	---	---	---
Total-----	---	---	---	---	---	5,625	45.18	38.94	51.18	75	24.8

* 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° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-73 at Freehold, 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--	April 7	April 17	May 2
2 years in 10 later than--	April 3	April 14	April 28
5 years in 10 later than--	March 25	April 8	April 20
First freezing temperature in fall:			
1 year in 10 earlier than--	October 27	October 20	October 4
2 years in 10 earlier than--	November 3	October 25	October 9
5 years in 10 earlier than--	November 15	November 3	October 19

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-73 at Freehold, New Jersey]

Probability	Length of growing season if daily minimum temperature is--		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	211	191	162
8 years in 10	219	197	168
5 years in 10	235	208	181
2 years in 10	251	219	193
1 year in 10	259	225	200

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AeA	Adelphia loam, 0 to 2 percent slopes	2,080	0.7
AeB	Adelphia loam, 2 to 5 percent slopes	2,430	0.8
ALA	Adelphia loam-Urban land complex, 0 to 5 percent slopes	500	0.2
At	Atsion sand	18,440	6.0
Cm	Colemantown loam	2,240	0.7
CnB	Collington sandy loam, 2 to 5 percent slopes	8,940	2.9
CnC2	Collington sandy loam, 5 to 10 percent slopes, eroded	2,340	0.8
CnD3	Collington sandy loam, 10 to 15 percent slopes, severely eroded	1,260	0.4
CoA	Collington loam, 0 to 2 percent slopes	1,760	0.6
CRB	Collington sandy loam-Urban land complex, 0 to 10 percent slopes	660	0.2
CtB	Colts Neck sandy loam, 2 to 5 percent slopes	3,060	1.0
CtC	Colts Neck sandy loam, 5 to 10 percent slopes	780	0.3
CtC2	Colts Neck sandy loam, 5 to 10 percent slopes, eroded	920	0.3
CtD2	Colts Neck sandy loam, 10 to 15 percent slopes, eroded	1,130	0.4
CtE2	Colts Neck sandy loam, 15 to 25 percent slopes, eroded	1,260	0.4
DnA	Downer loamy sand, 0 to 5 percent slopes	1,550	0.5
DnC	Downer loamy sand, 5 to 10 percent slopes	1,950	0.6
DoA	Downer sandy loam, 0 to 2 percent slopes	560	0.2
DoB	Downer sandy loam, 2 to 5 percent slopes	3,910	1.3
DUB	Downer sandy loam-Urban land complex, 0 to 10 percent slopes	3,810	1.3
En	Elkton loam	3,530	1.2
EvB	Evesboro sand, 2 to 5 percent slopes	10,670	3.5
EvC	Evesboro sand, 5 to 10 percent slopes	3,770	1.2
EvD	Evesboro sand, 10 to 15 percent slopes	2,820	0.9
EvE	Evesboro sand, 15 to 25 percent slopes	1,480	0.5
EWB	Evesboro sand-Urban land complex, 0 to 10 percent slopes	11,900	3.9
Fb	Fallsington loam	3,790	1.2
FnA	Freehold loamy sand, 0 to 5 percent slopes	1,610	0.5
FnC	Freehold loamy sand, 5 to 10 percent slopes	1,200	0.4
FrB	Freehold sandy loam, 2 to 5 percent slopes	21,050	6.8
FrC	Freehold sandy loam, 5 to 10 percent slopes	4,780	1.6
FrC2	Freehold sandy loam, 5 to 10 percent slopes, eroded	1,590	0.5
FrD	Freehold sandy loam, 10 to 15 percent slopes	1,400	0.5
FrD2	Freehold sandy loam, 10 to 15 percent slopes, eroded	1,240	0.4
FrE2	Freehold sandy loam, 15 to 25 percent slopes, eroded	3,310	1.1
FsA	Freehold loam, 0 to 2 percent slopes	2,180	0.7
FUB	Freehold sandy loam-Urban land complex, 0 to 10 percent slopes	11,260	3.6
HaB	Hammonton loamy sand, 0 to 3 percent slopes	760	0.2
HbA	Hammonton sandy loam, 0 to 2 percent slopes	790	0.3
HbB	Hammonton sandy loam, 2 to 5 percent slopes	560	0.2
HLA	Hammonton sandy loam-Urban land complex, 0 to 3 percent slopes	730	0.2
HnA	Holmdel sandy loam, 0 to 2 percent slopes	4,780	1.6
HnB	Holmdel sandy loam, 2 to 5 percent slopes	2,900	1.0
HUA	Holmdel sandy loam-Urban land complex, 0 to 5 percent slopes	1,630	0.5
HV	Humaquepts, frequently flooded	14,100	4.6
HwB	Hooksan sand, 0 to 5 percent slopes	1,930	0.6
HxA	Hooksan Variant sand, 0 to 2 percent slopes	330	0.1
KeA	Keyport sandy loam, 0 to 2 percent slopes	1,230	0.4
KeB	Keyport sandy loam, 2 to 5 percent slopes	2,400	0.8
KeC	Keyport sandy loam, 5 to 10 percent slopes	390	0.1
KeD	Keyport sandy loam, 10 to 15 percent slopes	280	0.1
KGB	Keyport sandy loam-Urban land complex, 0 to 10 percent slopes	1,420	0.5
KlA	Klej loamy sand, 0 to 3 percent slopes	8,050	2.6
KmB	Klej loamy sand, clayey substratum, 0 to 5 percent slopes	1,520	0.5
KUA	Klej loamy sand-Urban land complex, 0 to 3 percent slopes	4,550	1.5
KvA	Kresson loam, 0 to 5 percent slopes	980	0.3
LaA	Lakehurst sand, 0 to 2 percent slopes	7,220	2.4
LeB	Lakewood sand, 0 to 5 percent slopes	8,540	2.8
LeC	Lakewood sand, 5 to 10 percent slopes	1,140	0.4
Ma	Manahawkin muck	2,840	0.9
MbC	Marlton sandy loam, 5 to 10 percent slopes	620	0.2
MlB	Marlton loam, 2 to 5 percent slopes	2,260	0.7
PeA	Pemberton loamy sand, 0 to 5 percent slopes	3,450	1.1
PhB	Phalanx loamy sand, 0 to 10 percent slopes	1,270	0.4
PhD	Phalanx loamy sand, 10 to 25 percent slopes	3,260	1.1

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
PT	Pits, sand and gravel	3,010	1.0
PW	Psamments, waste substratum	150	*
SaB	Sassafras sandy loam, 2 to 5 percent slopes	6,310	2.1
SaC	Sassafras sandy loam, 5 to 10 percent slopes	1,620	0.5
SaD	Sassafras sandy loam, 10 to 15 percent slopes	580	0.2
SaE	Sassafras sandy loam, 15 to 25 percent slopes	660	0.2
SgB	Sassafras gravelly sandy loam, 2 to 5 percent slopes	270	0.1
SgC	Sassafras gravelly sandy loam, 5 to 10 percent slopes	230	0.1
SlA	Sassafras loam, 0 to 2 percent slopes	1,380	0.5
Sn	Shrewsbury sandy loam	8,550	2.8
SS	Sulfaquents and Sulfihemists, frequently flooded	2,800	0.9
ToA	Tinton loamy sand, 0 to 5 percent slopes	10,300	3.3
ToC	Tinton loamy sand, 5 to 10 percent slopes	4,240	1.4
ToD	Tinton loamy sand, 10 to 25 percent slopes	2,030	0.7
TUB	Tinton loamy sand-Urban land complex, 0 to 5 percent slopes	8,790	2.9
UA	Udorthents, smoothed	6,990	2.3
UD	Udorthents-Urban land complex, 0 to 3 percent slopes	8,120	2.7
UL	Urban land	2,730	0.9
WnB	Woodstown sandy loam, 2 to 5 percent slopes	2,870	0.9
WoA	Woodstown loam, 0 to 2 percent slopes	3,280	1.1
	Water	2,640	0.9
	Total	304,640	100.0

* Less than 0.1 percent.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Field corn	Sweet corn	Wheat	Irish potatoes	Soybeans	Cabbage	Grass-legume hay
		Bu	Tons	Bu	Cwt	Bu	Crates	Tons
AeA, AeB-------- Adelphia	IIw	130	---	50	---	50	---	---
ALA---------- Adelphia-Urban land	---	---	---	---	---	---	---	---
At---------- Atsion	Vw	---	---	---	---	---	---	---
Cm---------- Colemantown	IIIw	120	---	---	---	40	---	---
CnB---------- Collington	IIe	130	---	50	235	50	---	4.5
CnC2---------- Collington	IIIe	120	---	45	225	45	---	4.0
CnD3---------- Collington	IVe	110	---	40	---	40	---	3.5
CoA---------- Collington	I	130	---	50	250	50	600	5.0
CRB---------- Collington-Urban land	---	---	---	---	---	---	---	---
CtB---------- Colts Neck	IIe	130	---	50	235	45	---	4.5
CtC, CtC2------- Colts Neck	IIIe	120	---	45	220	35	---	4.0
CtD2---------- Colts Neck	IVe	110	---	40	---	30	---	3.5
CtE2---------- Colts Neck	VIe	---	---	---	---	---	---	---
DnA---------- Downer	IIs	90	---	35	---	25	---	2.5
DnC---------- Downer	IIIe	80	---	30	---	20	---	2.0
DoA---------- Downer	I	100	---	40	225	35	---	3.5
DoB---------- Downer	IIe	100	---	40	---	35	---	3.0
DUB---------- Downer-Urban land	---	---	---	---	---	---	---	---
En---------- Elkton	IIIw	105	---	---	---	40	---	3.5

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Field corn	Sweet corn	Wheat	Irish potatoes	Soybeans	Cabbage	Grass-legume hay
		Bu	Tons	Bu	Cwt	Bu	Crates	Tons
EvB, EvC, EvD, EvE---------- Evesboro	VIIs	---	---	---	---	---	---	---
EWE---------- Evesboro-Urban land	---	---	---	---	---	---	---	---
Fb---------- Fallsington	IIIw	120	---	---	---	35	---	---
FnA---------- Freehold	IIs	110	---	40	225	---	---	3.5
FnC---------- Freehold	IIIe	110	---	35	215	---	---	3.0
FrB---------- Freehold	IIe	130	---	45	---	50	---	5.5
FrC, FrC2-------- Freehold	IIIe	120	---	45	---	45	---	5.0
FrD, FrD2-------- Freehold	IVe	110	---	40	---	---	---	4.5
FrE2---------- Freehold	VIe	---	---	---	---	---	---	---
FsA---------- Freehold	I	130	---	45	---	50	---	---
FUB---------- Freehold-Urban land	---	---	---	---	---	---	---	---
HaB---------- Hammonton	IIw	90	---	35	---	30	---	---
HbA, HbB-------- Hammonton	IIw	100	---	35	---	35	---	---
HLA---------- Hammonton-Urban land	---	---	---	---	---	---	---	---
HnA, HnB-------- Holmdel	IIw	120	---	50	---	50	---	---
HUA---------- Holmdel-Urban land	---	---	---	---	---	---	---	---
HV---------- Humaquepts	Vw	---	---	---	---	---	---	---
HwB---------- Hooksan	VIIs	---	---	---	---	---	---	---
HxA---------- Hooksan Variant	VIIw	---	---	---	---	---	---	---

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Field corn	Sweet corn	Wheat	Irish potatoes	Soybeans	Cabbage	Grass-legume hay
		Bu	Tons	Bu	Cwt	Bu	Crates	Tons
KeA---------- Keyport	IIw	110	---	40	---	50	---	4.5
KeB---------- Keyport	IIe	105	---	40	---	50	---	4.5
KeC---------- Keyport	IIIe	90	---	35	---	45	---	4.5
KeD---------- Keyport	IVe	80	---	30	---	35	---	4.0
KGB---------- Keyport-Urban land	---	---	---	---	---	---	---	---
KlA, KmB----- Klej	IIIw	110	---	---	---	30	---	---
KUA---------- Klej-Urban land	---	---	---	---	---	---	---	---
KvA---------- Kresson	IIIw	120	---	40	---	40	---	---
LaA---------- Lakehurst	IVw	---	---	---	---	---	---	---
LeB, LeC----- Lakewood	VIIs	---	---	---	---	---	---	---
Ma---------- Manahawkin	VIIw	---	---	---	---	---	---	---
MbC---------- Marlton	IIIe	100	---	40	---	38	---	4.0
MlB---------- Marlton	IIe	110	---	45	---	40	---	4.5
PeA---------- Pemberton	IIIw	70	---	35	---	30	---	---
PhB---------- Phalanx	IVs	---	---	---	---	---	---	---
PhD---------- Phalanx	VIIe	---	---	---	---	---	---	---
PT*---------- Pits	---	---	---	---	---	---	---	---
PW---------- Psamments	---	---	---	---	---	---	---	---
SaB---------- Sassafras	IIe	130	---	50	235	45	600	4.5
SaC---------- Sassafras	IIIe	120	---	45	225	40	---	4.5

See footnote at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Field corn	Sweet corn	Wheat	Irish potatoes	Soybeans	Cabbage	Grass-legume hay
		Bu	Tons	Bu	Cwt	Bu	Crates	Tons
SaD---------- Sassafras	IVe	100	---	40	---	---	---	4.0
SaE---------- Sassafras	VIIe	---	---	---	---	---	---	---
SgB---------- Sassafras	IIe	130	---	50	235	45	---	4.5
SgC---------- Sassafras	IIIe	120	---	45	225	40	---	4.5
SlA---------- Sassafras	I	130	---	50	250	45	600	4.5
Sn---------- Shrewsbury	IIIw	120	---	---	---	35	---	3.0
SS---------- Sulfaquents and Sulfihemists	VIIIw	---	---	---	---	---	---	---
ToA---------- Tinton	IIIs	---	---	25	---	25	---	---
ToC---------- Tinton	IVs	80	---	25	---	25	---	---
ToD---------- Tinton	VIe	---	---	---	---	---	---	---
TUB---------- Tinton-Urban land	---	---	---	---	---	---	---	---
UA---------- Udorthents	---	---	---	---	---	---	---	---
UD---------- Udorthents-Urban land	---	---	---	---	---	---	---	---
UL*---------- Urban land	---	---	---	---	---	---	---	---
WnB, WoA-------- Woodstown	IIw	130	---	45	---	40	---	4.5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

(Miscellaneous areas are excluded. Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	5,880	---	---	---
II	70,640	48,230	19,250	3,160
III	68,830	16,420	32,110	10,300
IV	18,620	5,890	7,220	5,510
V	32,540	---	32,540	---
VI	6,600	6,600	---	---
VII	38,710	5,190	3,170	30,350
VIII	2,800	---	2,800	---

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
AeA, AeB-------- Adelphia	4A	Slight	Slight	Slight	Slight	Northern red oak---- White oak---------- Black oak---------- Sweetgum---------- Yellow poplar-------	80 80 80 82 95	4 4 4 6 7	Northern red oak, sweetgum, yellow poplar, black walnut.
ALA**: Adelphia------- Urban land.	4A	Slight	Slight	Slight	Slight	Northern red oak---- White oak---------- Black oak---------- Sweetgum---------- Yellow poplar-------	80 80 80 82 95	4 4 4 6 7	Northern red oak, sweetgum, yellow poplar, black walnut.
At-------------- Atsion	7W	Slight	Severe	Severe	Severe	Pitch pine----------	65	7	
Cm-------------- Colemantown	4W	Slight	Severe	Severe	Slight	Pin oak------------- Sweetgum----------	85 85	4 6	Sweetgum.
CnB, CnC2, CnD3, CoA----------- Collington	4A	Slight	Slight	Slight	Slight	Northern red oak---- Black oak---------- Yellow poplar------- Scarlet oak--------- White oak----------	80 80 90 80 80	4 4 6 4 4	Yellow poplar.
CRB**: Collington----- Urban land.	4A	Slight	Slight	Slight	Slight	Northern red oak---- Black oak---------- Yellow poplar------- Scarlet oak--------- White oak----------	80 80 90 80 80	4 4 6 4 4	Yellow poplar.
CtB, CtC, CtC2, CtD2---------- Colts Neck	4A	Slight	Slight	Slight	Slight	Yellow poplar------- Virginia pine------- White oak---------- Black oak---------- Northern red oak----	70 80 80 80 80	4 8 4 4 4	Yellow poplar, eastern white pine.
CtE2------------ Colts Neck	4R	Moderate	Severe	Slight	Slight	Yellow poplar------- Virginia pine------- White oak---------- Black oak---------- Northern red oak----	70 80 80 80 80	4 8 4 4 4	Yellow poplar, eastern white pine.
DnA, DnC, DoA, DoB----------- Downer	4A	Slight	Slight	Slight	Slight	Black oak---------- White oak---------- Scarlet oak--------- Virginia pine-------	70 70 70 70	4 4 4 8	Virginia pine.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
DUB**:									
Downer	4A	Slight	Slight	Slight	Slight	Black oak	70	4	Virginia pine.
						White oak	70	4	
						Scarlet oak	70	4	
						Virginia pine	70	8	
Urban land.									
En	4W	Slight	Severe	Slight	Slight	White oak	80	4	Loblolly pine, sweetgum.
Elkton						Sweetbay magnolia	35	2	
						Red maple	55	2	
EvB, EvC, EvD	6S	Slight	Moderate	Slight	Slight	Pitch pine	60	6	Virginia pine.
Evesboro						Virginia pine	70	8	
						Black oak	70	4	
						White oak	70	4	
						Chestnut oak	70	4	
EvE	6S	Moderate	Moderate	Slight	Slight	Pitch pine	60	6	Virginia pine.
Evesboro						Virginia pine	70	8	
						Black oak	70	4	
						White oak	70	4	
						Chestnut oak	70	4	
EWB**:									
Evesboro	6S	Slight	Moderate	Slight	Slight	Pitch pine	60	6	Virginia pine.
						Virginia pine	70	8	
						Black oak	70	4	
						White oak	70	4	
						Chestnut oak	70	4	
Urban land.									
Fb	8W	Slight	Severe	Severe	Slight	Pitch pine	70	8	Loblolly pine, eastern white pine, sweetgum, yellow poplar.
Fallsington						Sweetgum	80	6	
						White oak	70	4	
						Pin oak	70	4	
FnA, FnC	4S	Slight	Moderate	Moderate	Slight	Northern red oak	80	4	Shortleaf pine, eastern white pine, yellow poplar.
Freehold						Yellow poplar	90	6	
						Shortleaf pine	75	8	
						Virginia pine	80	8	
						Pitch pine	75	8	
						White oak	80	4	
						Black oak	80	4	
						American beech	---	---	
FrB, FrC, FrC2, FrD, FrD2	4A	Slight	Slight	Slight	Slight	Northern red oak	95	4	Shortleaf pine, eastern white pine, Austrian pine, yellow poplar.
Freehold						Yellow poplar	96	7	
						Shortleaf pine	95	11	
						White oak	80	4	
						Black oak	80	4	
						American beech	80	6	
FrE2	4R	Moderate	Moderate	Moderate	Slight	Northern red oak	95	4	Shortleaf pine, eastern white pine, Austrian pine, yellow poplar.
Freehold						Yellow poplar	96	7	
						Shortleaf pine	95	11	
						White oak	80	4	
						Black oak	80	4	
						American beech	80	6	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
FsA---------- Freehold	4A	Slight	Slight	Slight	Slight	Northern red oak----	95	4	Shortleaf pine, eastern white pine, Austrian pine, yellow poplar.
						Yellow poplar-------	96	7	
						Shortleaf pine------	95	11	
						White oak----------	80	4	
						Black oak----------	80	4	
						American beech------	80	6	
FUB**: Freehold-------	4A	Slight	Slight	Slight	Slight	Northern red oak----	95	4	Shortleaf pine, eastern white pine, Austrian pine, yellow poplar.
						Yellow poplar-------	96	7	
						Shortleaf pine------	95	11	
						White oak----------	80	4	
						Black oak----------	80	4	
						American beech------	80	6	
Urban land.									
HaB, HbA, HbB--- Hammonton	4A	Slight	Slight	Slight	Slight	Black oak----------	80	4	Virginia pine.
						White oak----------	80	4	
						Virginia pine-------	80	8	
						Shortleaf pine------	80	8	
						Pitch pine----------	80	8	
						Sweetgum-----------	80	6	
HLA**: Hammonton------	4A	Slight	Slight	Slight	Slight	Black oak----------	80	4	Virginia pine.
						White oak----------	80	4	
						Virginia pine-------	80	8	
						Shortleaf pine------	80	8	
						Pitch pine----------	80	8	
						Sweetgum-----------	80	6	
Urban land.									
HnA, HnB-------- Holmdel	4A	Slight	Moderate	Slight	Slight	Yellow poplar-------	91	6	Eastern white pine, yellow poplar, sweetgum, shortleaf pine.
						Northern red oak----	80	4	
						Sweetgum-----------	80	6	
HUA**: Holmdel--------	4A	Slight	Moderate	Slight	Slight	Yellow poplar-------	91	6	Eastern white pine, yellow poplar, sweetgum, shortleaf pine.
						Northern red oak----	80	4	
						Sweetgum-----------	80	6	
Urban land.									
HwB---------- Hooksan	6S	Slight	Moderate	Moderate	Slight	Pitch pine----------	60	6	Japanese black pine, eastern redcedar, American holly, pitch pine.
						Eastern redcedar----	---	---	
						American holly------	---	---	
HxA---------- Hooksan Variant	7W	Slight	Severe	Severe	Severe	Pitch pine----------	65	7	Japanese black pine, eastern redcedar, American holly.
						American holly------	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
HV---------- Humaquepts	8W	Slight	Severe	Severe	Slight	Pitch pine---------- Sweetgum---------- White oak---------- Pin oak----------	70 80 70 70	8 6 4 4	Sweetgum.
KeA, KeB, KeC, KeD---------- Keyport	6A	Slight	Moderate	Slight	Slight	Yellow poplar------- Northern red oak---- American beech------	90 80 80	6 4 6	Yellow poplar, northern red oak.
KGB**: Keyport-------- Urban land.	6A	Slight	Moderate	Slight	Slight	Yellow poplar------- Northern red oak---- American beech------	90 80 80	6 4 6	Yellow poplar, northern red oak.
KlA---------- Klej	7S	Slight	Moderate	Slight	Slight	Pitch pine---------- Sweetgum---------- White oak---------- Virginia pine-------	65 80 70 70	7 6 4 8	Virginia pine, eastern white pine, loblolly pine, sweetgum.
KmB---------- Klej	7S	Slight	Moderate	Slight	Slight	Pitch pine---------- White oak----------	65 74	7 4	Eastern white pine, pitch pine, Virginia pine.
KUA**: Klej---------- Urban land.	7S	Slight	Moderate	Slight	Slight	Pitch pine---------- Sweetgum---------- White oak---------- Virginia pine-------	65 80 70 70	7 6 4 8	Virginia pine, eastern white pine, loblolly pine, sweetgum.
KvA---------- Kresson	7W	Slight	Moderate	Moderate	Moderate	Sweetgum---------- White oak---------- Pin oak---------- Yellow poplar------- Willow oak----------	90 80 80 90 82	7 4 4 6 4	Sweetgum, yellow poplar.
LaA---------- Lakehurst	6S	Slight	Moderate	Moderate	Slight	Pitch pine----------	60	6	Virginia pine.
LeB, LeC-------- Lakewood	5S	Slight	Slight	Moderate	Slight	Pitch pine---------- Shortleaf pine------ Virginia pine------- Chestnut oak-------- Black oak----------	50 50 60 70 70	5 5 6 4 4	Pitch pine, shortleaf pine.
Ma---------- Manahawkin	4W	Slight	Severe	Severe	Severe	Atlantic white cedar Red maple---------- Sweetbay magnolia--- Blackgum----------	60 55 35 50	4 2 2 3	Atlantic white cedar.
MbC, MlB-------- Marlton	4A	Slight	Slight	Moderate	Moderate	Pin oak---------- Sweetgum---------- Yellow poplar------- White ash----------	80 80 90 ---	4 6 6 ---	Shortleaf pine.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
PeA---------- Pemberton	6S	Slight	Slight	Moderate	Slight	Sweetgum----------	80	6	Sweetgum, shortleaf pine.
						Northern red oak----	80	4	
						Pin oak----------	80	4	
PhB, PhD-------- Phalanx	4S	Slight	Slight	Slight	Slight	Chestnut oak--------	70	4	White oak.
						Black oak----------	70	4	
						White oak----------	70	4	
						Virginia pine-------	70	8	
						Pitch pine----------	70	6	
SaB, SaC, SaD--- Sassafras	5A	Slight	Slight	Slight	Slight	White oak----------	85	5	Loblolly pine, eastern white pine, yellow poplar.
						Yellow poplar-------	90	6	
						Virginia pine-------	70	8	
SaE---------- Sassafras	5R	Moderate	Moderate	Slight	Slight	White oak----------	85	5	Loblolly pine, eastern white pine, yellow poplar.
						Yellow poplar-------	90	6	
						Virginia pine-------	70	8	
SgB, SgC, SlA--- Sassafras	5A	Slight	Slight	Slight	Slight	White oak----------	70	4	Loblolly pine, eastern white pine, yellow poplar.
						Yellow poplar-------	90	6	
						Virginia pine-------	70	8	
Sn---------- Shrewsbury	4W	Slight	Severe	Severe	Moderate	Pin oak----------	80	4	Eastern white pine, sweetgum, loblolly pine.
						Sweetgum----------	90	7	
						Red maple----------	55	2	
ToA, ToC, ToD--- Tinton	4S	Slight	Moderate	Moderate	Slight	Northern red oak----	70	4	Eastern white pine.
						Virginia pine-------	70	8	
						Shortleaf pine------	70	8	
						White oak----------	70	4	
						Black oak----------	70	4	
TUB**: Tinton---------	4S	Slight	Moderate	Moderate	Slight	Northern red oak----	70	4	Eastern white pine.
						Virginia pine-------	70	8	
						Shortleaf pine------	70	8	
						White oak----------	70	4	
						Black oak----------	70	4	
Urban land.									
WnB, WoA-------- Woodstown	5A	Slight	Slight	Slight	Slight	White oak----------	85	5	Loblolly pine, yellow poplar, eastern white pine, sweetgum.
						Yellow poplar-------	90	6	
						Sweetgum----------	85	8	
						Northern red oak----	85	5	

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 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
AeA---- Adelphia	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
AeB---- Adelphia	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
ALA*: Adelphia----	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Urban land----	Variable----	Variable----	Variable----	Variable----	Variable.
At---- Atsion	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.
Cm---- Colemantown	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
CnB---- Collington	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----	Slight.
CnC2---- Collington	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight----	Slight.
CnD3---- Collington	Moderate: percs slowly, slope.	Moderate: slope, percs slowly.	Severe: slope.	Slight----	Moderate: slope.
CoA---- Collington	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: percs slowly.	Slight----	Slight.
CRB*: Collington----	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----	Slight.
Urban land----	Variable----	Variable----	Variable----	Variable----	Variable.
CtB---- Colts Neck	Slight----	Slight----	Moderate: slope.	Slight----	Slight.
CtC, CtC2---- Colts Neck	Slight----	Slight----	Severe: slope.	Slight----	Slight.
CtD2---- Colts Neck	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----	Moderate: slope.
CtE2---- Colts Neck	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
DnA---- Downer	Slight----	Slight----	Moderate: slope, small stones.	Slight----	Moderate: droughty.
DnC---- Downer	Slight----	Slight----	Severe: slope.	Slight----	Moderate: droughty.
DoA---- Downer	Slight----	Slight----	Moderate: small stones.	Slight----	Moderate: droughty.
DoB---- Downer	Slight----	Slight----	Moderate: slope, small stones.	Slight----	Moderate: droughty.
DUB*: Downer----	Slight----	Slight----	Moderate: slope, small stones.	Slight----	Moderate: droughty.
Urban land----	Variable----	Variable----	Variable----	Variable----	Variable.
En---- Elkton	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, erodes easily.	Severe: wetness.
EvB---- Evesboro	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
EvC, EvD---- Evesboro	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
EvE---- Evesboro	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty, slope.
EWB*: Evesboro----	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
Urban land----	Variable----	Variable----	Variable----	Variable----	Variable.
Fb---- Fallsington	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
FnA---- Freehold	Slight----	Slight----	Moderate: slope.	Slight----	Moderate: droughty.
FnC---- Freehold	Slight----	Slight----	Severe: slope.	Slight----	Moderate: droughty.
FrB---- Freehold	Slight----	Slight----	Moderate: slope.	Slight----	Slight.
FrC, FrC2---- Freehold	Slight----	Slight----	Severe: slope.	Slight----	Slight.
FrD, FrD2---- Freehold	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----	Moderate: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
FrE2--- Freehold	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
FsA--- Freehold	Slight---	Slight---	Slight---	Slight---	Slight.
FUB*: Freehold---	Slight---	Slight---	Moderate: slope.	Slight---	Slight.
Urban land---	Variable---	Variable---	Variable---	Variable---	Variable.
HaB, HbA--- Hammonton	Moderate: wetness.	Moderate: wetness.	Moderate: small stones, wetness.	Moderate: wetness.	Moderate: wetness, droughty.
HbB--- Hammonton	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones, wetness.	Moderate: wetness.	Moderate: wetness, droughty.
HLA*: Hammonton---	Moderate: wetness.	Moderate: wetness.	Moderate: small stones, wetness.	Moderate: wetness.	Moderate: wetness, droughty.
Urban land---	Variable---	Variable---	Variable---	Variable---	Variable.
HnA, HnB--- Holmdel	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
HUA*: Holmdel---	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Urban land---	Variable---	Variable---	Variable---	Variable---	Variable.
HV. Humaquepts					
HwB--- Hooksan	Severe: flooding, too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
HxA--- Hooksan Variant	Severe: flooding, wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: wetness, too sandy.
KeA, KeB--- Keyport	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Severe: erodes easily.	Moderate: wetness.
KeC--- Keyport	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: wetness.
KeD--- Keyport	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: wetness, slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
KGB*:					
Keyport	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Severe: erodes easily.	Moderate: wetness.
Urban land	Variable	Variable	Variable	Variable	Variable.
KlA	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
KmB	Moderate: too sandy, wetness.	Moderate: too sandy.	Severe: too sandy, wetness.	Moderate: too sandy.	Severe: too sandy.
KUA*:					
Klej	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
Urban land	Variable	Variable	Variable	Variable	Variable.
KvA	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: wetness.
LaA	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
LeB	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
LeC	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Severe: droughty.
Ma	Severe: flooding, excess humus, ponding.	Severe: ponding, excess humus.	Severe: flooding, excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, flooding, excess humus.
MbC	Moderate: percs slowly.	Slight	Severe: slope.	Slight	Moderate: too clayey.
MlB	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight	Moderate: too clayey.
PeA	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
PhB	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight	Severe: thin layer.
PhD	Severe: cemented pan.	Severe: cemented pan.	Severe: slope, cemented pan.	Slight	Severe: thin layer.
PT*. Pits					

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
PW. Psamments					
SaB---------- Sassafras	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
SaC---------- Sassafras	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
SaD---------- Sassafras	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
SaE---------- Sassafras	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
SgB---------- Sassafras	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones.
SgC---------- Sassafras	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Slight----------	Moderate: small stones.
SlA---------- Sassafras	Slight----------	Slight----------	Moderate: small stones.	Slight----------	Slight.
Sn---------- Shrewsbury	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
SS*: Sulfaquents. Sulfihemists.					
ToA---------- Tinton	Severe: slope.	Slight----------	Moderate: slope.	Slight----------	Moderate: droughty.
ToC---------- Tinton	Severe: slope.	Slight----------	Severe: slope.	Slight----------	Moderate: droughty.
ToD---------- Tinton	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
TUB*: Tinton----------	Severe: slope.	Slight----------	Moderate: slope.	Slight----------	Moderate: droughty.
Urban land----------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
UA. Udorthents					
UD*: Udorthents.					
Urban land----------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
UL*. Urban land					

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
WnB---------- Woodstown	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness.
WoA---------- Woodstown	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.

* 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
AeA---------- Adelphia	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
AeB---------- Adelphia	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
ALA*:										
Adelphia----------	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Urban land--------	---	---	---	---	---	---	---	---	---	---
At---------- Atsion	Poor	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair.
Cm---------- Colemantown	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
CnB---------- Collington	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CnC2---------- Collington	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CnD3---------- Collington	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CoA---------- Collington	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CRB*:										
Collington--------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land--------	---	---	---	---	---	---	---	---	---	---
CtB---------- Colts Neck	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CtC, CtC2---------- Colts Neck	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CtD2---------- Colts Neck	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CtE2---------- Colts Neck	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
DnA, DnC---------- Downer	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
DoA, DoB---------- Downer	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
DUB*:										
Downer----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
DUB*: Urban land	---	---	---	---	---	---	---	---	---	---
En Elkton	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
EvB, EvC Evesboro	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
EvD, EvE Evesboro	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
EWB*: Evesboro	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Urban land	---	---	---	---	---	---	---	---	---	---
Fb. Fallsington										
FnA Freehold	Good	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
FnC Freehold	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very- poor.
FrB Freehold	Good	Good	Fair	Good	Good	Poor	Very poor.	Good	Good	Very poor.
FrC, FrC2, FrD, FrD2 Freehold	Fair	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
FrE2 Freehold	Poor	Poor	Fair	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
FsA Freehold	Good	Good	Fair	Good	Good	Poor	Very poor.	Good	Good	Very poor.
FUB*: Freehold	Good	Good	Fair	Good	Good	Poor	Very poor.	Good	Good	Good.
Urban land	---	---	---	---	---	---	---	---	---	---
HaB Hammonton	Poor	Fair	Good	Fair	Fair	Poor	Poor	Fair	Fair	Poor.
HbA, HbB Hammonton	Good	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor.
HLA*: Hammonton	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor.
Urban land	---	---	---	---	---	---	---	---	---	---
HnA Holmdel	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	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
HnB---------- Holmdel	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
HUA*:										
Holmdel----------	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Urban land--------	---	---	---	---	---	---	---	---	---	---
HV. Humaquepts										
HwB---------- Hooksan	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
HxA---------- Hooksan Variant	Poor	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair.
KeA, KeB, KeC------ Keyport	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
KeC---------- Keyport	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
KeD---------- Keyport	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
KGB*:										
Keyport----------	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Urban land--------	---	---	---	---	---	---	---	---	---	---
KlA---------- Klej	Fair	Fair	Good	Fair	Fair	Poor	Poor	Fair	Fair	Poor.
KmB---------- Klej	Poor	Fair	Good	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
KUA*:										
Klej----------	Fair	Fair	Good	Fair	Fair	Poor	Poor	Fair	Fair	Poor.
Urban land--------	---	---	---	---	---	---	---	---	---	---
KvA---------- Kresson	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
LaA---------- Lakehurst	Poor	Poor	Fair	Poor	Poor	Poor	Fair	Poor	Poor	Poor.
LeB, LeC---------- Lakewood	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Ma---------- Manahawkin	Very poor.	Poor	Poor	Poor	Poor	Good	Poor	Poor	Poor	Fair.
MbC---------- Marlton	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MlB---------- Marlton	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
PeA---------- Pemberton	Poor	Poor	Good	Good	Good	Poor	Poor	Fair	Fair	Poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
PhB---------- Phalanx	Poor	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
PhD---------- Phalanx	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
PT*. Pits										
PW. Psamments										
SaB---------- Sassafras	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SaC, SaD---------- Sassafras	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
SaE---------- Sassafras	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
SgB---------- Sassafras	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SgC---------- Sassafras	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
SlA---------- Sassafras	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Sn---------- Shrewsbury	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
SS*: Sulfaquents.										
Sulfihemists.										
ToA, ToC, ToD------ Tinton	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
TUB*: Tinton----------	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
Urban land--------	---	---	---	---	---	---	---	---	---	---
UA. Udorthents										
UD*: Udorthents.										
Urban land--------	---	---	---	---	---	---	---	---	---	---
UL*. Urban land										
WnB---------- Woodstown	Good	Good	Good	Good	Poor	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
WoA---------- Woodstown	Good	Good	Good	Good	Poor	Poor	Poor	Good	Good	Poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. 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
AeA, AeB---------- Adelphia	Severe: wetness, cutbanks cave.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: frost action.	Moderate: wetness.
ALA*: Adelphia---------	Severe: wetness, cutbanks cave.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: frost action.	Moderate: wetness.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
At---------- Atsion	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, too sandy.
Cm---------- Colemantown	Severe: wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
CnB---------- Collington	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell.	Moderate: frost action, shrink-swell.	Slight.
CnC2---------- Collington	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell, slope.	Moderate: frost action, shrink-swell.	Slight.
CnD3---------- Collington	Severe: cutbanks cave.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action, shrink-swell.	Moderate: slope.
CoA---------- Collington	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell.	Moderate: frost action, shrink-swell.	Slight.
CRB*: Collington-------	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell, slope.	Moderate: frost action, shrink-swell.	Slight.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
CtB---------- Colts Neck	Severe: cutbanks cave.	Slight---------	Moderate: cemented pan.	Slight---------	Moderate: frost action.	Slight.
CtC, CtC2--------- Colts Neck	Severe: cutbanks cave.	Slight---------	Moderate: cemented pan.	Moderate: slope.	Moderate: frost action.	Slight.
CtD2---------- Colts Neck	Severe: cutbanks cave.	Moderate: slope.	Moderate: cemented pan, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CtE2---------- Colts Neck	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
DnA---------- Downer	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: droughty.
DnC---------- Downer	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: droughty.
DoA, DoB---------- Downer	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: droughty.
DUB*: Downer----------	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: droughty.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
En---------- Elkton	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
EvB---------- Evesboro	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Severe: droughty.
EvC---------- Evesboro	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Severe: droughty.
EvD---------- Evesboro	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
EvE---------- Evesboro	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
EWB*: Evesboro---------	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Severe: droughty.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
Fb---------- Fallsington	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
FnA---------- Freehold	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Moderate: droughty.
FnC---------- Freehold	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Moderate: droughty.
FrB---------- Freehold	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Slight.
FrC, FrC2--------- Freehold	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.

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
FrD, FrD2--------- Freehold	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
FrE2--------- Freehold	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
FsA--------- Freehold	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Slight.
FUB*: Freehold---------	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Slight.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
HaB, HbA, HbB----- Hammonton	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: frost action.	Moderate: wetness, droughty.
HLA*: Hammonton--------	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: frost action.	Moderate: wetness, droughty.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
HnA, HnB---------- Holmdel	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
HUA*: Holmdel----------	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
HV. Humaquepts						
HwB--------- Hooksan	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Severe: droughty.
HxA--------- Hooksan Variant	Severe: wetness, cutbanks cave.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, too sandy.
KeA, KeB---------- Keyport	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Moderate: wetness.
KeC--------- Keyport	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Moderate: wetness.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
KeD---- Keyport	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: wetness, slope.
KGB*: Keyport----	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Moderate: wetness.
Urban land----	Variable----	Variable----	Variable----	Variable----	Variable----	Variable.
KlA---- Klej	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
KmB---- Klej	Severe: wetness, cutbanks cave.	Moderate: wetness, frost action.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, frost action.	Severe: too sandy.
KUA*: Klej----	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
Urban land----	Variable----	Variable----	Variable----	Variable----	Variable----	Variable.
KvA---- Kresson	Severe: wetness.	Severe: wetness, low strength, frost action.	Severe: wetness.	Severe: wetness, low strength, frost action.	Severe: wetness, low strength, frost action.	Severe: wetness.
LaA---- Lakehurst	Severe: wetness, cutbanks cave.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
LeB---- Lakewood	Severe: cutbanks cave.	Slight----	Slight----	Slight----	Slight----	Severe: droughty.
LeC---- Lakewood	Severe: cutbanks cave.	Slight----	Slight----	Moderate: slope.	Slight----	Severe: droughty.
Ma---- Manahawkin	Severe: cutbanks cave, excess humus, ponding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding, frost action.	Severe: ponding, flooding, excess humus.
MbC, MlB---- Marlton	Moderate: too clayey, wetness.	Severe: frost action.	Moderate: wetness.	Severe: frost action.	Severe: frost action.	Moderate: too clayey.
PeA---- Pemberton	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
PhB---- Phalanx	Severe: cemented pan, cutbanks cave.	Moderate: cemented pan.	Severe: cemented pan.	Moderate: slope, cemented pan.	Moderate: cemented pan.	Severe: thin layer.

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
PhD---------- Phalanx	Severe: cemented pan, cutbanks cave.	Moderate: slope, cemented pan.	Severe: cemented pan.	Severe: slope.	Moderate: cemented pan, slope.	Severe: thin layer.
PT*. Pits						
PW. Psamments						
SaB---------- Sassafras	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Slight.
SaC---------- Sassafras	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.
SaD---------- Sassafras	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
SaE---------- Sassafras	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
SgB---------- Sassafras	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Moderate: small stones.
SgC---------- Sassafras	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Moderate: small stones.
SlA---------- Sassafras	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Slight.
Sn---------- Shrewsbury	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
SS*: Sulfaquents.						
Sulfihemists.						
ToA---------- Tinton	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Moderate: droughty.
ToC---------- Tinton	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Moderate: droughty.
ToD---------- Tinton	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
TUB*: Tinton----------	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Moderate: droughty.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
UA. 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
UD*: Udorthents.						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
UL*. Urban land						
WnB, WoA---------- Woodstown	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: frost action.	Moderate: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition and 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
AeA, AeB---------- Adelphia	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Fair: wetness.
ALA*: Adelphia----------	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Fair: wetness.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
At---------- Atsion	Severe: wetness, poor filter.	Severe: wetness, seepage.	Severe: seepage, wetness, too sandy.	Severe: wetness, seepage.	Poor: seepage, too sandy, wetness.
Cm---------- Colemantown	Severe: percs slowly, wetness, flooding.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Poor: wetness.
CnB---------- Collington	Severe: percs slowly.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
CnC2, CnD3---------- Collington	Severe: percs slowly.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
CoA---------- Collington	Severe: percs slowly.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
CRB*: Collington---------	Severe: percs slowly.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
CtB---------- Colts Neck	Severe: poor filter.	Severe: seepage.	Severe: cemented pan, seepage.	Severe: seepage.	Poor: thin layer.
CtC, CtC2, CtD2----- Colts Neck	Severe: poor filter.	Severe: seepage, slope.	Severe: cemented pan, seepage.	Severe: seepage.	Poor: thin layer.
CtE2---------- Colts Neck	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: cemented pan, seepage, slope.	Severe: seepage, slope.	Poor: slope, thin layer.

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
DnA---------- Downer	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
DnC---------- Downer	Severe: poor filter.	Severe: slope, seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
DoA, DoB---------- Downer	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
DUB*: Downer----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Urban land----------	Variable----------	Variable----------	Variable----------	Variable----------	Variable.
En---------- Elkton	Severe: wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness, too clayey.	Severe: seepage, wetness.	Poor: too clayey, hard to pack, wetness.
EvB---------- Evesboro	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
EvC, EvD---------- Evesboro	Severe: poor filter.	Severe: slope, seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
EvE---------- Evesboro	Severe: poor filter, slope.	Severe: slope, seepage.	Severe: seepage, slope, too sandy.	Severe: slope, seepage.	Poor: seepage, too sandy, slope.
EWB*: Evesboro----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Urban land----------	Variable----------	Variable----------	Variable----------	Variable----------	Variable.
Fb---------- Fallsington	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
FnA---------- Freehold	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
FnC---------- Freehold	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
FrB---------- Freehold	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.

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
FrC, FrC2---------- Freehold	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
FrD, FrD2---------- Freehold	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: too sandy, slope.
FrE2---------- Freehold	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
FsA---------- Freehold	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
FUB*: Freehold----------	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
HaB, HbA, HbB------- Hammonton	Severe: wetness, poor filter.	Severe: wetness, seepage.	Severe: seepage, wetness, too sandy.	Severe: wetness, seepage.	Poor: seepage, too sandy, small stones.
HLA*: Hammonton----------	Severe: wetness, poor filter.	Severe: wetness, seepage.	Severe: seepage, wetness, too sandy.	Severe: wetness, seepage.	Poor: seepage, too sandy, small stones.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
HnA, HnB---------- Holmdel	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness, thin layer.
HUA*: Holmdel----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness, thin layer.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
HV. Humaquepts					
HwB---------- Hooksan	Severe: poor filter.	Severe: seepage, flooding.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
HxA---------- Hooksan Variant	Severe: wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness, too sandy, seepage.
KeA, KeB---------- Keyport	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.

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
KeC---------- Keyport	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
KeD---------- Keyport	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness, too clayey.	Moderate: wetness, slope.	Poor: too clayey, hard to pack.
KGB*: Keyport----------	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
KlA---------- Klej	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Fair: too sandy, wetness.
KmB---------- Klej	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too sandy.
KUA*: Klej----------	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Fair: too sandy, wetness.
Urban land---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
KvA---------- Kresson	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Fair: wetness, too clayey.
LaA---------- Lakehurst	Moderate: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
LeB---------- Lakewood	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
LeC---------- Lakewood	Severe: poor filter.	Severe: slope, seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Ma---------- Manahawkin	Severe: flooding, ponding.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: ponding, excess humus.
MbC---------- Marlton	Severe: percs slowly, wetness.	Severe: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
MlB---------- Marlton	Severe: percs slowly, wetness.	Moderate: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.

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
PeA---------- Pemberton	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too clayey.	Severe: seepage, wetness.	Poor: seepage, too clayey, too sandy.
PhB---------- Phalanx	Severe: cemented pan.	Severe: seepage, cemented pan.	Severe: seepage.	Severe: cemented pan, seepage.	Poor: area reclaim, small stones.
PhD---------- Phalanx	Severe: cemented pan.	Severe: seepage, cemented pan, slope.	Severe: seepage.	Severe: cemented pan, seepage.	Poor: area reclaim, small stones.
PT*. Pits					
PW. Psamments					
SaB---------- Sassafras	Slight----------	Severe: seepage.	Severe: seepage.	Slight----------	Fair: thin layer.
SaC---------- Sassafras	Slight----------	Severe: seepage, slope.	Severe: seepage.	Slight----------	Fair: thin layer.
SaD---------- Sassafras	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: slope, thin layer.
SaE---------- Sassafras	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
SgB---------- Sassafras	Slight----------	Severe: seepage.	Severe: seepage.	Slight----------	Fair: thin layer.
SgC---------- Sassafras	Slight----------	Severe: seepage, slope.	Severe: seepage.	Slight----------	Fair: thin layer.
SlA---------- Sassafras	Slight----------	Severe: seepage.	Severe: seepage.	Slight----------	Fair: thin layer.
Sn---------- Shrewsbury	Severe: wetness, percs slowly, poor filter.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness.
SS*: Sulfaquents.					
Sulfihemists.					
ToA---------- Tinton	Slight----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

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
ToC---------- Tinton	Slight----------	Severe: slope, seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
ToD---------- Tinton	Severe: slope.	Severe: slope, seepage.	Severe: seepage, too sandy, slope.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
TUB*: Tinton----------	Slight----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Urban land----------	Variable----------	Variable----------	Variable----------	Variable----------	Variable.
UA. Udorthents					
UD*: Udorthents.					
Urban land----------	Variable----------	Variable----------	Variable----------	Variable----------	Variable.
UL*. Urban land					
WnB, WoA---------- Woodstown	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.

* 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 and does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AeA, AeB---------- Adelphia	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
ALA*: Adelphia----------	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Urban land----------	Variable----------	Variable----------	Variable----------	Variable.
At---------- Atsion	Poor: wetness.	Probable----------	Improbable: too sandy.	Poor: wetness, too sandy.
Cm---------- Colemantown	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
CnB, CnC2---------- Collington	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
CnD3---------- Collington	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, slope.
CoA---------- Collington	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, slope.
CRB*: Collington----------	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
Urban land----------	Variable----------	Variable----------	Variable----------	Variable.
CtB, CtC, CtC2-------- Colts Neck	Fair: area reclaim.	Probable----------	Probable----------	Fair: small stones.
CtD2---------- Colts Neck	Fair: area reclaim.	Probable----------	Probable----------	Fair: small stones, slope.
CtE2---------- Colts Neck	Poor: slope.	Probable----------	Probable----------	Poor: slope.
DnA, DnC, DoA, DoB---- Downer	Good----------	Probable----------	Improbable: too sandy.	Poor: small stones.
DUB*: Downer----------	Good----------	Probable----------	Improbable: too sandy.	Poor: small stones.
Urban land----------	Variable----------	Variable----------	Variable----------	Variable.
En---------- Elkton	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
EvB, EvC, EvD--------- Evesboro	Good----------	Probable----------	Probable----------	Poor: too sandy.
EvE--------- Evesboro	Fair: slope.	Probable----------	Probable----------	Poor: too sandy, slope.
EWB*: Evesboro----------	Good----------	Probable----------	Probable----------	Poor: too sandy.
Urban land----------	Variable----------	Variable----------	Variable----------	Variable.
Fb--------- Fallsington	Poor: wetness.	Probable----------	Improbable: too sandy.	Poor: wetness.
FnA, FnC--------- Freehold	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
FrB, FrC, FrC2-------- Freehold	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
FrD, FrD2--------- Freehold	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
FrE2--------- Freehold	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
FsA--------- Freehold	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
FUB*: Freehold----------	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Urban land----------	Variable----------	Variable----------	Variable----------	Variable.
HaB--------- Hammonton	Fair: wetness.	Probable----------	Improbable: excess fines.	Poor: too sandy, droughty.
HbA, HbB--------- Hammonton	Fair: wetness.	Probable----------	Improbable: excess fines.	Poor: small stones, area reclaim.
HLA*: Hammonton----------	Fair: wetness.	Probable----------	Improbable: excess fines.	Poor: small stones, area reclaim.
Urban land----------	Variable----------	Variable----------	Variable----------	Variable.
HnA, HnB--------- Holmdel	Poor: wetness.	Probable----------	Improbable: too sandy.	Poor: wetness.
HUA*: Holmdel----------	Poor: wetness.	Probable----------	Improbable: too sandy.	Poor: wetness.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
HUA*: Urban land	Variable	Variable	Variable	Variable.
HV. Humaquepts				
HwB Hooksan	Good	Probable	Improbable: too sandy.	Poor: too sandy.
HxA Hooksan Variant	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness, too sandy.
KeA, KeB, KeC, KeD Keyport	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, too clayey.
KGB*: Keyport	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, too clayey.
Urban land	Variable	Variable	Variable	Variable.
KlA Klej	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
KmB Klej	Fair: frost action.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.
KUA*: Klej	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
Urban land	Variable	Variable	Variable	Variable.
KvA Kresson	Poor: low strength, frost action, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, too clayey.
LaA Lakehurst	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
LeB, LeC Lakewood	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Ma Manahawkin	Poor: wetness.	Probable	Probable	Poor: excess humus, area reclaim, wetness.
MbC, MlB Marlton	Poor: frost action, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
PeA Pemberton	Fair: wetness.	Probable	Improbable: too sandy.	Fair: too sandy.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
PhB, PhD---------- Phalanx	Good----------	Probable----------	Probable----------	Poor: area reclaim, small stones.
PT*. Pits				
PW. Psamments				
SaB, SaC---------- Sassafras	Good----------	Probable----------	Probable----------	Fair: small stones.
SaD---------- Sassafras	Good----------	Probable----------	Probable----------	Fair: small stones, slope.
SaE---------- Sassafras	Fair: slope.	Probable----------	Probable----------	Poor: slope.
SgB, SgC---------- Sassafras	Good----------	Probable----------	Probable----------	Poor: small stones.
SlA---------- Sassafras	Good----------	Probable----------	Probable----------	Fair: small stones.
Sn---------- Shrewsbury	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, wetness.
SS*: Sulfaquents.				
Sulfihemists.				
ToA, ToC---------- Tinton	Good----------	Probable----------	Improbable: too sandy.	Fair: too sandy, small stones.
ToD---------- Tinton	Fair: slope.	Probable----------	Improbable: too sandy.	Poor: slope.
TUB*: Tinton----------	Good----------	Probable----------	Improbable: too sandy.	Fair: too sandy, small stones.
Urban land----------	Variable----------	Variable----------	Variable----------	Variable.
UA. Udorthents				
UD*: Udorthents.				
Urban land----------	Variable----------	Variable----------	Variable----------	Variable.
UL*. Urban land				

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
WnB, WoA---------- Woodstown	Fair: wetness.	Probable----------	Improbable: too sandy.	Fair: small stones, area reclaim, thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
AeA---------- Adelphia	Severe: piping, wetness.	Severe: slow refill, cutbanks cave.	Frost action---	Wetness, soil blowing.	Erodes easily, wetness.	Erodes easily.
AeB---------- Adelphia	Severe: piping, wetness.	Severe: slow refill, cutbanks cave.	Frost action, slope.	Wetness, soil blowing, slope.	Erodes easily, wetness.	Erodes easily.
ALA*: Adelphia---------	Severe: piping, wetness.	Severe: slow refill, cutbanks cave.	Frost action---	Wetness, soil blowing.	Erodes easily, wetness.	Erodes easily.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
At---------- Atsion	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy.	Wetness, droughty, rooting depth.
Cm---------- Colemantown	Severe: piping, wetness.	Severe: no water.	Percs slowly, flooding, frost action.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily, percs slowly.
CnB, CnC2--------- Collington	Severe: seepage, piping.	Severe: no water.	Deep to water	Soil blowing, slope.	Too sandy, soil blowing.	Favorable.
CnD3---------- Collington	Severe: seepage, piping.	Severe: no water.	Deep to water	Soil blowing, slope.	Slope, too sandy, soil blowing.	Slope.
CoA---------- Collington	Severe: seepage, piping.	Severe: no water.	Deep to water	Favorable	Too sandy, soil blowing.	Favorable.
CRB*: Collington-------	Severe: seepage, piping.	Severe: no water.	Deep to water	Soil blowing, slope.	Too sandy, soil blowing.	Favorable.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
CtB, CtC, CtC2---- Colts Neck	Severe: piping.	Severe: no water.	Deep to water	Soil blowing, slope.	Soil blowing---	Favorable.
CtD2---------- Colts Neck	Severe: piping.	Severe: no water.	Deep to water	Soil blowing, slope.	Slope, soil blowing.	Slope.
CtE2---------- Colts Neck	Severe: piping.	Severe: no water.	Deep to water		Slope, soil blowing.	Slope.
DnA, DnC---------- Downer	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty, rooting depth.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
DoA, DoB---------- Downer	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, soil blowing.	Too sandy, soil blowing.	Droughty, rooting depth.
DUB*: Downer----------	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, soil blowing.	Too sandy, soil blowing.	Droughty, rooting depth.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
En---------- Elkton	Severe: thin layer, wetness.	Severe: slow refill.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
EvB, EvC---------- Evesboro	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
EvD, EvE---------- Evesboro	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Slope, too sandy, soil blowing.	Slope, droughty.
EWB*: Evesboro---------	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
Fb---------- Fallsington	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness--------	Erodes easily, wetness, too sandy.	Wetness, erodes easily.
FnA, FnC---------- Freehold	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Erodes easily, too sandy.	Erodes easily, droughty.
FrB, FrC, FrC2---- Freehold	Severe: seepage, piping.	Severe: no water.	Deep to water	Soil blowing---	Erodes easily, too sandy.	Erodes easily.
FrD, FrD2, FrE2--- Freehold	Severe: seepage, piping.	Severe: no water.	Deep to water	Soil blowing---	Slope, erodes easily, too sandy.	Slope, erodes easily.
FsA---------- Freehold	Severe: seepage, piping.	Severe: no water.	Deep to water	Soil blowing---	Erodes easily, too sandy.	Erodes easily.
FUB*: Freehold---------	Severe: seepage, piping.	Severe: no water.	Deep to water	Soil blowing---	Erodes easily, too sandy.	Erodes easily.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
HaB---------- Hammonton	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty, rooting depth.
HbA, HbB---------- Hammonton	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness, droughty.	Wetness, too sandy, soil blowing.	Droughty, rooting depth.
HLA*: Hammonton--------	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness, droughty.	Wetness, too sandy, soil blowing.	Droughty, rooting depth.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
HnA---------- Holmdel	Severe: piping, wetness.	Severe: cutbanks cave.	Favorable------	Wetness, soil blowing.	Wetness, soil blowing.	Severe: wetness.
HnB---------- Holmdel	Severe: piping, wetness.	Severe: cutbanks cave.	Slope----------	Wetness, soil blowing.	Wetness, soil blowing.	Severe: wetness.
HUA*: Holmdel----------	Severe: piping, wetness.	Severe: cutbanks cave.	Slope----------	Wetness, soil blowing.	Wetness, soil blowing.	Severe: wetness.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
HV. Humaquepts						
HwB---------- Hooksan	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake.	Too sandy, soil blowing.	Droughty.
HxA---------- Hooksan Variant	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy.	Wetness, too sandy.
KeA---------- Keyport	Moderate: piping, wetness.	Severe: no water.	Percs slowly, frost action.	Wetness, erodes easily.	Erodes easily, wetness.	Erodes easily, percs slowly.
KeB, KeC---------- Keyport	Moderate: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
KeD---------- Keyport	Moderate: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
KGB*: Keyport----------	Moderate: piping, wetness.	Severe: no water.	Percs slowly, frost action.	Wetness, erodes easily.	Erodes easily, wetness.	Erodes easily, percs slowly.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
KGB*: Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
KlA---- Klej	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy.	Droughty.
KmB---- Klej	Severe: seepage, piping.	Severe: no water.	Cutbanks cave	Wetness, fast intake.	Not needed	Not needed.
KUA*: Klej	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy.	Droughty.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
KvA---- Kresson	Severe: piping.	Severe: no water.	Percs slowly, wetness.	Wetness	Percs slowly, wetness, erodes easily.	Percs slowly, wetness.
LaA---- Lakehurst	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Droughty.
LeB, LeC---- Lakewood	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.	Droughty.
Ma---- Manahawkin	Severe: excess humus, ponding.	Severe: slow refill, cutbanks cave.	Ponding, flooding, frost action.	Ponding, flooding.	Ponding	Wetness.
MbC, MlB---- Marlton	Severe: hard to pack.	Severe: no water.	Percs slowly	Percs slowly	Percs slowly, erodes easily.	Percs slowly, erodes easily.
PeA---- Pemberton	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.	Wetness, droughty.
PhB---- Phalanx	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, cemented pan.	Large stones, cemented pan.	Large stones, droughty.
PhD---- Phalanx	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, cemented pan.	Slope, large stones, cemented pan.	Large stones, slope, droughty.
PT*. Pits						
PW. Psamments						
SaB, SaC---- Sassafras	Severe: piping.	Severe: no water.	Deep to water	Favorable	Erodes easily	Erodes easily.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
SaD, SaE---------- Sassafras	Severe: piping.	Severe: no water.	Deep to water	Favorable------	Slope, erodes easily.	Slope, erodes easily.
SgB, SgC---------- Sassafras	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Erodes easily	Erodes easily.
SlA---------- Sassafras	Severe: piping.	Severe: no water.	Deep to water	Favorable------	Erodes easily	Erodes easily.
Sn---------- Shrewsbury	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Frost action, cutbanks cave.	Wetness--------	Wetness, too sandy.	Wetness.
SS*: Sulfaquents. Sulfihemists.						
ToA---------- Tinton	Severe: seepage, piping.	Severe: no water.	Deep to water	Soil blowing, droughty, fast intake.	Too sandy, soil blowing.	Droughty.
ToC---------- Tinton	Severe: seepage, piping.	Severe: no water.	Deep to water	Soil blowing, slope, droughty.	Too sandy, soil blowing.	Droughty.
ToD---------- Tinton	Severe: seepage, piping.	Severe: no water.	Deep to water	Soil blowing, slope, droughty.	Slope, too sandy, soil blowing.	Slope, droughty.
TUB*: Tinton----------	Severe: seepage, piping.	Severe: no water.	Deep to water	Soil blowing, droughty, fast intake.	Too sandy, soil blowing.	Droughty.
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
UA. Udorthents						
UD*: Udorthents.						
Urban land-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable-------	Variable.
UL*. Urban land						
WnB---------- Woodstown	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Frost action, slope, cutbanks cave.	Wetness, slope.	Erodes easily, wetness.	Erodes easily, droughty.
WoA---------- Woodstown	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness--------	Erodes easily, wetness.	Erodes easily, droughty.

* 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		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AeA, AeB--------- Adelphia	0-8	Loam----------	SM, SC, ML, CL	A-2-4, A-4	0	95-100	95-100	60-95	30-90	<35	NP-10
	8-38	Sandy clay loam, loam.	SM, SC, ML, CL	A-4, A-6	0	95-100	95-100	75-95	35-75	27-40	9-18
	38-60	Stratified loamy sand to sandy loam.	SM, SC, SP-SM	A-2-4, A-4	0	95-100	95-100	50-75	15-40	<23	NP-6
ALA*: Adelphia--------	0-8	Loam----------	SM, SC, ML, CL	A-2-4, A-4	0	95-100	95-100	60-95	30-90	<35	NP-10
	8-38	Sandy clay loam, loam.	SM, SC, ML, CL	A-4, A-6	0	95-100	95-100	75-95	35-75	27-40	9-18
	38-60	Stratified loamy sand to sandy loam.	SM, SC, SP-SM	A-2-4, A-4	0	95-100	95-100	50-75	15-40	<23	NP-6
Urban land------	0-6		---	---	---	---	---	---	---	---	---
At----------	0-20	Sand----------	SP-SM, SM	A-3, A-1-B, A-2-4	0	95-100	90-100	45-80	5-35	---	NP
Atsion	20-28	Loamy sand, sand, sandy loam.	SM, SP-SM	A-2-4, A-3, A-1-B, A-4	0	95-100	85-100	40-75	5-40	---	NP
	28-38	Sand, loamy sand	SM, SM-SC, SP-SM	A-2-4, A-3, A-1-B	0	95-100	85-100	40-75	5-30	<20	NP-7
	38-60	Stratified sand to silt loam.	SM, SM-SC, SP-SM	A-2-4, A-3, A-4, A-1-B	0	95-100	70-100	35-100	5-90	<22	NP-7
Cm----------	0-9	Loam----------	SC, ML, CL	A-7, A-6	0	100	98-100	60-95	30-75	---	---
Colemantown	9-36	Sandy clay, clay, clay loam.	ML, MH, SM	A-7	0	100	98-100	80-95	45-90	45-55	15-25
	36-60	Loam, clay loam, sandy loam.	SM, SC, ML, CL	A-4, A-6, A-7, A-2	0	95-100	95-100	60-95	30-80	30-45	5-20
CnB, CnC2, CnD3-- Collington	0-13	Sandy loam-------	SM, ML, SC, CL	A-2-4, A-4	0	95-100	95-100	60-95	30-85	20-30	5-10
	13-32	Sandy clay loam, sandy loam, clay loam.	SM, SC, CL, CL-ML	A-4, A-6, A-5, A-7-6	0	95-100	95-100	75-100	35-70	20-45	5-25
	32-60	Stratified sand to sandy loam.	SM, SC, SM-SC	A-2-4, A-4, A-1-B	0	95-100	95-100	50-70	10-40	<30	NP-10
CoA----------	0-13	Loam----------	SM, ML, SC, CL	A-2-4, A-4	0	95-100	95-100	60-95	30-85	20-30	5-10
Collington	13-32	Sandy clay loam, sandy loam, clay loam.	SM, SC, CL, CL-ML	A-4, A-6, A-5, A-7-6	0	95-100	95-100	75-100	35-70	20-45	5-25
	32-60	Stratified sand to sandy loam.	SM, SC, SM-SC	A-2-4, A-4, A-1-B	0	95-100	95-100	50-70	10-40	<30	NP-10

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
CRB*:											
Collington------	0-13	Sandy loam-------	SM, ML, SC, CL	A-2-4, A-4	0	95-100	95-100	60-95	30-85	20-30	5-10
	13-32	Sandy clay loam, sandy loam, clay loam.	SM, SC, CL, CL-ML	A-4, A-6, A-5, A-7-6	0	95-100	95-100	75-100	35-70	20-45	5-25
	32-60	Stratified sand to sandy loam.	SM, SC, SM-SC	A-2-4, A-4, A-1-B	0	95-100	95-100	50-70	10-40	<30	NP-10
Urban land------	0-6		---	---	---	---	---	---	---	---	---
CtB, CtC, CtC2, CtD2----------	0-10	Sandy loam-------	SM, ML, CL, SC	A-2, A-4, A-5	0	98-100	98-100	50-100	25-90	5-25	NP-10
Colts Neck	10-35	Sandy loam, sandy clay loam, gravelly loam.	SM, ML, CL, SC	A-2, A-4, A-6	0	98-100	75-100	50-90	25-55	30-40	5-15
	35-60	Loamy sand, sand, sandy loam.	SM, SC, SP-SM	A-2, A-4, A-1, A-3	0	65-100	55-100	30-60	5-40	0-10	NP-8
CtE2----------	0-10		SM, SM-SC	A-2, A-1	0	98-100	85-100	40-75	15-30	5-20	NP-5
Colts Neck	10-35	Sandy loam, sandy clay loam, gravelly loam.	SM, ML, CL, SC	A-2, A-4, A-6	0	98-100	75-100	50-90	25-55	30-40	5-15
	35-60	Loamy sand, sand, sandy loam.	SM, SC, SP-SM	A-2, A-4, A-1, A-3	0	65-100	55-100	30-60	5-40	0-10	NP-8
DnA, DnC---------	0-10	Loamy sand-------	SM, SC, SP-SM	A-2-4, A-1-B	0	80-100	75-100	40-75	10-30	<17	NP-2
Downer	10-26	Sandy loam, gravelly sandy loam.	SM, SC	A-2-4, A-4, A-1-B	0	80-100	75-100	45-70	20-40	<25	NP-8
	26-60	Stratified gravelly sand to sandy clay loam.	SC, SM, SP-SM	A-2-4, A-1-B, A-3, A-4	0	75-100	70-100	35-90	5-55	<28	NP-10
DoA, DoB---------	0-10	Sandy loam-------	SM	A-2-4, A-1-B, A-4	0	80-100	75-100	50-70	25-45	<19	NP-4
Downer	10-26	Sandy loam, gravelly sandy loam.	SM, SC	A-2-4, A-4, A-1-B	0	80-100	75-100	45-70	20-40	<25	NP-8
	26-60	Stratified gravelly sand to sandy clay loam.	SC, SM, SP-SM	A-2-4, A-1-B, A-3, A-4	0	75-100	70-100	35-90	5-55	<28	NP-10
DUB*:											
Downer----------	0-10	Sandy loam-------	SM	A-2-4, A-1-B, A-4	0	80-100	75-100	50-70	25-45	<19	NP-4
	10-26	Sandy loam, gravelly sandy loam.	SM, SC	A-2-4, A-4, A-1-B	0	80-100	75-100	45-70	20-40	<25	NP-8
	26-60	Stratified gravelly sand to sandy clay loam.	SC, SM, SP-SM	A-2-4, A-1-B, A-3, A-4	0	75-100	70-100	35-90	5-55	<28	NP-10
Urban land------	0-6		---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
En---------- Elkton	0-7	Loam----------	SM, SC, ML, CL	A-4, A-6	0	100	100	70-100	35-95	<35	NP-12
	7-39	Silty clay, clay loam, clay.	CL, CH	A-6, A-7	0	100	100	85-100	70-95	31-62	11-33
	39-60	Silty clay loam, fine sandy loam, clay.	SM, ML, CL, CH	A-2, A-4, A-6, A-7	0	100	100	70-100	30-95	<60	NP-32
EvB, EvC, EvD, EvE---------- Evesboro	0-7	Sand----------	SP, SP-SM	A-1, A-3, A-2	0	90-100	85-100	40-90	0-12	---	NP
	7-32	Sand, loamy sand	SP, SP-SM	A-1, A-3, A-2	0	90-100	85-100	40-90	0-12	---	NP
	32-60	Sand, gravelly sand, sandy loam.	SP, SM, SC, SW	A-2, A-3	0	65-100	60-100	35-95	0-35	<30	NP-8
EWB*: Evesboro--------	0-7	Sand----------	SP, SP-SM	A-1, A-3, A-2	0	90-100	85-100	40-90	0-12	---	NP
	7-32	Sand, loamy sand	SP, SP-SM	A-1, A-3, A-2	0	90-100	85-100	40-90	0-12	---	NP
	32-60	Sand, gravelly sand, sandy loam.	SP, SM, SC, SW	A-2, A-3	0	65-100	60-100	35-95	0-35	<30	NP-8
Urban land------	0-6		---	---	---	---	---	---	---	---	---
Fb---------- Fallsington	0-8	Loam----------	SM, CL-ML, ML	A-2, A-4	0	100	100	65-90	30-70	<19	NP-5
	8-36	Sandy loam, loam, sandy clay loam.	SM, SC, CL, ML	A-2, A-4, A-6	0	100	100	65-85	30-55	<30	NP-12
	36-60	Loamy sand, sand, sandy loam.	SM, SP-SM	A-2, A-3	0	95-100	90-100	50-65	5-35	---	NP
FnA, FnC--------- Freehold	0-12	Loamy sand-------	SM, ML	A-2-4	0	100	95-100	50-90	15-35	<18	NP-3
	12-35	Sandy loam, sandy clay loam, loam.	SM, SC, ML, CL	A-2-4, A-4, A-2-6, A-6	0	100	95-100	60-95	30-75	25-36	8-15
	35-60	Stratified loamy sand to sandy loam.	SM	A-2-4, A-4	0	95-100	90-100	50-75	15-40	<20	NP-5
FrB, FrC, FrC2, FrD, FrD2, FrE2- Freehold	0-12	Sandy loam-------	SM, SC, ML, CL	A-2-4, A-4	0	100	95-100	60-95	30-75	20-30	3-10
	12-35	Sandy loam, sandy clay loam, loam.	SM, SC, ML, CL	A-2-4, A-4, A-2-6, A-6	0	100	95-100	60-95	30-75	25-36	8-15
	35-60	Stratified loamy sand to sandy loam.	SM	A-2-4, A-4	0	95-100	90-100	50-75	15-40	<20	NP-5

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
FsA---------- Freehold	0-12	Loam----------	SM, SC, ML, CL	A-2-4, A-4	0	100	95-100	60-95	30-75	20-30	3-10
	12-35	Sandy loam, sandy clay loam, loam.	SM, SC, ML, CL	A-2-4, A-4, A-2-6, A-6	0	100	95-100	60-95	30-75	25-36	8-15
	35-60	Stratified loamy sand to sandy loam.	SM	A-2-4, A-4	0	95-100	90-100	50-75	15-40	<20	NP-5
FUB*:											
Freehold--------	0-12	Sandy loam-------	SM, SC, ML, CL	A-2-4, A-4	0	100	95-100	60-95	30-75	20-30	3-10
	12-35	Sandy loam, sandy clay loam, loam.	SM, SC, ML, CL	A-2-4, A-4, A-2-6, A-6	0	100	95-100	60-95	30-75	25-36	8-15
	35-60	Stratified loamy sand to sandy loam.	SM	A-2-4, A-4	0	95-100	90-100	50-75	15-40	<20	NP-5
Urban land------	0-6		---	---	---	---	---	---	---	---	---
HaB---------- Hammonton	0-19	Loamy sand-------	SM	A-2-4, A-1-B, A-3	0	90-100	85-100	40-75	10-30	---	NP
	19-31	Sandy loam, gravelly sandy loam.	SM, SC	A-2-4, A-1-B, A-4	0	80-100	70-100	40-90	20-40	<25	NP-8
	31-60	Stratified gravelly sand to sandy loam.	SM, SP-SM	A-2-4, A-1-B, A-4, A-3	0	60-100	45-100	20-70	5-40	<16	NP-2
HbA, HbB--------- Hammonton	0-19	Sandy loam-------	SM	A-2-4, A-1-B, A-4	0	90-100	85-100	50-70	25-40	<18	NP-3
	19-31	Sandy loam, gravelly sandy loam.	SM, SC	A-2-4, A-1-B, A-4	0	80-100	70-100	40-90	20-40	<25	NP-8
	31-60	Stratified gravelly sand to sandy loam.	SM, SP-SM	A-2-4, A-1-B, A-4, A-3	0	60-100	45-100	20-70	5-40	<16	NP-2
HLA*:											
Hammonton-------	0-19	Sandy loam-------	SM	A-2-4, A-1-B, A-4	0	90-100	85-100	50-70	25-40	<18	NP-3
	19-31	Sandy loam, gravelly sandy loam.	SM, SC	A-2-4, A-1-B, A-4	0	80-100	70-100	40-90	20-40	<25	NP-8
	31-60	Stratified gravelly sand to sandy loam.	SM, SP-SM	A-2-4, A-1-B, A-4, A-3	0	60-100	45-100	20-70	5-40	<16	NP-2
Urban land------	0-6		---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
HnA, HnB--------- Holmdel	0-12	Sandy loam--------	SM, SC, ML, CL	A-2-4, A-4	0	98-100	98-100	60-95	30-75	8-25	3-7
	12-38	Sandy loam, sandy clay loam, loam.	SM, SC, ML, CL	A-2-4, A-4, A-6, A-2-6	0	98-100	98-100	60-95	30-75	20-40	5-20
	38-60	Stratified fine sandy loam to sand.	SM, SM-SC, SP-SM	A-2-4, A-3, A-4	0	95-100	90-100	50-85	5-50	<20	NP-5
HUA*: Holmdel---------	0-12	Sandy loam--------	SM, SC, ML, CL	A-2-4, A-4	0	98-100	98-100	60-95	30-75	8-25	3-7
	12-38	Sandy loam, sandy clay loam, loam.	SM, SC, ML, CL	A-2-4, A-4, A-6, A-2-6	0	98-100	98-100	60-95	30-75	20-40	5-20
	38-60	Stratified fine sandy loam to sand.	SM, SM-SC, SP-SM	A-2-4, A-3, A-4	0	95-100	90-100	50-85	5-50	<20	NP-5
Urban land------	0-6		---	---	---	---	---	---	---	---	---
HV. Humaquepts											
HwB-------------- Hooksan	0-6	Sand--------------	SP, SP-SM	A-3	0	100	98-100	85-99	0-5	---	NP
	6-60	Fine sand, sand	SP, SP-SM	A-3	0	100	98-100	85-99	0-5	---	NP
HxA-------------- Hooksan Variant	0-6	Sand--------------	SP, SP-SM	A-3, A-1, A-2	0	95-100	90-100	45-70	2-10	---	NP
	6-60	Stratified sand to loamy sand.	SP, SM, SM-SC	A-1, A-2, A-3	0	95-100	85-100	40-90	2-30	25	NP-7
KeA, KeB, KeC, KeD-------------- Keyport	0-8	Sandy loam--------	SM, SC, ML, CL	A-2-4, A-4	0	95-100	95-100	60-85	30-55	<26	NP-10
	8-60	Silty clay loam, clay loam, clay.	ML, CL, MH, CH	A-6, A-7-6	0	95-100	95-100	85-100	70-95	35-60	15-35
KGB*: Keyport---------	0-8	Sandy loam--------	SM, SC, ML, CL	A-2-4, A-4	0	95-100	95-100	60-85	30-55	<26	NP-10
	8-60	Silty clay loam, clay loam, clay.	ML, CL, MH, CH	A-6, A-7-6	0	95-100	95-100	85-100	70-95	35-60	15-35
Urban land------	0-6		---	---	---	---	---	---	---	---	---
KlA-------------- Klej	0-36	Loamy sand--------	SM	A-2, A-4	0	100	95-100	50-95	15-45	<20	NP-5
	36-60	Sand, fine sand	SP-SM, SM	A-1, A-2	0	90-100	75-100	40-80	5-35	<20	NP-5
KmB-------------- Klej	0-4	Loamy sand--------	SM, SP-SM	A-2	0	100	95-100	50-75	5-30	<20	NP-5
	4-46	Sand, loamy sand	SM, SP-SM	A-1, A-2	0	90-100	90-100	45-80	5-30	<20	NP-5
	46-60	Clay--------------	CL, CH	A-6, A-7	0	95-100	90-100	80-100	70-90	<55	11-30
KUA*: Klej------------	0-36	Loamy sand--------	SM	A-2, A-4	0	100	95-100	50-95	15-45	<20	NP
	36-60	Sand, fine sand	SP-SM, SM	A-1, A-2	0	90-100	75-100	40-80	5-35	<20	NP
Urban land------	0-6		---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
KvA---------- Kresson	0-9	Loam----------	ML, CL, SM, SC	A-2, A-4, A-6	0	95-100	85-100	50-95	25-75	20-50	2-20
	9-40	Clay, clay loam, sandy clay.	ML, CL, MH, CH	A-6, A-7	0	95-100	90-100	70-95	55-90	35-60	10-25
	40-60	Stratified sandy loam to clay.	SM, SC, CL, ML	A-6, A-7	0	95-100	90-100	70-90	35-80	30-50	10-20
LaA---------- Lakehurst	0-10	Sand----------	SP, SM, SP-SM	A-1, A-2, A-3	0	95-100	95-100	50-80	0-15	---	NP
	10-36	Sand, fine sand, loamy sand.	SP, SM, SP-SM	A-1, A-2, A-3	0	95-100	95-100	50-80	0-30	---	NP
	36-60	Sand, gravelly sand, sandy loam.	SP, SM, SC, SM-SC	A-1, A-2, A-3	0	80-100	70-100	40-80	0-40	<30	NP-8
LeB, LeC--------- Lakewood	0-13	Sand----------	SP, SP-SM	A-1, A-2, A-3	0	95-100	90-100	40-90	0-12	---	NP
	13-30	Sand, fine sand, loamy sand.	SP, SM, SP-SM	A-1, A-2, A-3	0	85-100	80-100	40-85	0-30	---	NP
	30-60	Sand, gravelly sand, sandy loam.	SP, SM, SM-SC	A-1, A-2, A-3	0	85-100	75-100	40-90	0-35	<20	NP-5
Ma----------	0-30	Muck----------	PT	A-8	---	---	---	---	---	---	---
Manahawkin	30-60	Sand, gravelly sand.	SW, SP, SP-SM, GW	A-1	0	40-100	35-100	20-50	4-10	---	NP
MbC---------- Marlton	0-8	Sandy loam-------	ML, CL, SM, SC	A-2-4, A-4, A-2-6, A-6	0	95-100	80-100	50-75	25-90	19-31	3-12
	8-46	Sandy clay, sandy clay loam, clay.	SC, SM, CH, MH	A-2-6, A-6, A-7-6, A-2-7	0	95-100	80-100	65-75	35-95	35-55	15-25
	46-60	Stratified sandy loam to clay.	SM, SC, ML, MH	A-4, A-6, A-7-5	0	95-100	80-100	70-90	35-90	22-55	7-25
MlB---------- Marlton	0-8	Loam----------	ML, CL, SM, SC	A-2-4, A-4, A-2-6, A-6	0	95-100	80-100	50-75	25-90	19-31	3-12
	8-46	Sandy clay, sandy clay loam, clay.	SC, SM, CH, MH	A-2-6, A-6, A-7-6, A-2-7	0	95-100	80-100	65-75	35-95	35-55	15-25
	46-60	Stratified sandy loam to clay.	SM, SC, ML, MH	A-4, A-6, A-7-5	0	95-100	80-100	70-90	35-90	22-55	7-25
PeA---------- Pemberton	0-25	Loamy sand-------	SM, SP-SM	A-2, A-3	0	100	100	80-100	5-20	---	NP
	25-45	Sandy loam, fine sandy loam, sandy clay loam.	SM, SC	A-2	0	100	100	90-100	25-35	25-40	3-10
	45-60	Stratified sand to clay.	SP-SM, CL, ML	A-2, A-4, A-6, A-7	0	100	95-100	70-95	10-80	<50	NP-30

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
PhB, PhD---------- Phalanx	0-17	Loamy sand-------	SM, SP-SM	A-1-B, A-2-4, A-3	0	90-100	85-95	40-70	5-15	<19	NP-3
	17-38	Sandy loam, loamy sand, channery sandy loam.	SM, SP-SM, SC	A-1-B, A-2-4	0-15	80-95	80-95	35-70	10-40	<25	NP-10
	38-60	Sand, loamy sand, flaggy sand.	SP, SM, GM, GP-GM	A-1-B, A-2-4, A-3	0-30	35-100	20-100	15-75	2-25	<20	NP-2
PT*. Pits											
PW. Psamments											
SaB, SaC, SaD, SaE---------- Sassafras	0-11	Sandy loam-------	SM, ML, CL	A-2, A-4	0	85-100	80-100	50-95	25-65	12-32	NP-10
	11-36	Loam, sandy clay loam, sandy loam.	SM-SC, CL, ML	A-2, A-4, A-6	0	85-100	75-100	50-95	30-75	20-33	5-15
	36-60	Gravelly sandy loam, fine sandy loam, sand.	SP-SM, SC, SM	A-1, A-2, A-4	0	70-100	55-100	30-75	5-50	<26	NP-8
SgB, SgC---------- Sassafras	0-11	Gravelly sandy loam.	SM, CL, ML	A-1, A-2, A-4	0	80-85	70-75	45-70	20-55	<32	NP-10
	11-36	Loam, sandy clay loam, sandy loam.	SM-SC, CL, ML	A-2, A-4, A-6	0	85-100	75-100	50-95	30-75	20-33	5-15
	36-60	Gravelly sandy loam, loamy sand, sand.	SP-SM, SC, SM	A-1, A-2, A-4	0	70-100	55-100	30-75	5-50	<26	NP-8
SlA---------- Sassafras	0-11	Loam----------	SM, ML, CL	A-2, A-4	0	85-100	80-100	50-95	25-65	12-32	NP-10
	11-36	Loam, sandy clay loam, sandy loam.	SM-SC, CL, ML	A-2, A-4, A-6	0	85-100	75-100	50-95	30-75	20-33	5-15
	36-60	Gravelly sandy loam, fine sandy loam, sand.	SP-SM, SC, SM	A-1, A-2, A-4	0	70-100	55-100	30-75	5-50	<26	NP-8
Sn---------- Shrewsbury	0-12	Sandy loam-------	SM, SC, ML, CL	A-2-4, A-4	0	95-100	95-100	60-95	30-75	<27	NP-9
	12-30	Sandy loam, sandy clay loam, clay loam.	SM, SC, ML, CL	A-2-6, A-4, A-6	0	95-100	95-100	65-100	35-80	25-40	7-18
	30-60	Stratified loamy sand to sandy loam.	SM, SC	A-2-4, A-4	0	90-100	90-100	60-95	15-45	<23	NP-8
SS*: Sulfaquents.											
Sulfihemists.											

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
ToA, ToC, ToD---- Tinton	0-32	Loamy sand-------	SM, SP-SM	A-2, A-3	0	100	100	70-100	5-20	---	NP
	32-46	Fine sandy loam, sandy loam, sandy clay loam.	SM, SC, SM-SC	A-2, A-4, A-6	0	80-100	75-100	60-100	20-50	20-40	3-15
	46-60	Stratified sand to sandy loam.	SM, SP-SM, SM-SC	A-2, A-4	0	100	98-100	70-100	10-40	---	NP-6
TUB*: Tinton----------	0-32	Loamy sand-------	SM, SP-SM	A-2, A-3	0	100	100	70-100	5-20	---	NP
	32-46	Fine sandy loam, sandy loam, sandy clay loam.	SM, SC, SM-SC	A-2, A-4, A-6	0	80-100	75-100	60-100	20-50	20-40	3-15
	46-60	Stratified sand to sandy loam.	SM, SP-SM, SM-SC	A-2, A-4	0	100	98-100	70-100	10-40	---	NP-6
Urban land------	0-6		---	---	---	---	---	---	---	---	---
UA. Udorthents											
UD*: Udorthents.											
Urban land------	0-6		---	---	---	---	---	---	---	---	---
UL*. Urban land											
WnB---------- Woodstown	0-9	Sandy loam-------	SM, SC, ML, CL-ML	A-2, A-4, A-6	0	100	100	60-95	30-75	<34	NP-12
	9-35	Sandy clay loam, loam, sandy loam.	SM, CL-ML	A-2, A-4, A-6	0	100	70-100	45-90	25-60	<32	NP-12
	35-60	Sandy loam, loamy sand, gravelly sand.	SM, SP-SM	A-1, A-2, A-3	0	80-100	70-95	35-55	5-25	<26	NP-6
WoA---------- Woodstown	0-9	Loam----------	SM, SC, ML, CL-ML	A-2, A-4, A-6	0	100	100	60-95	30-75	<34	NP-12
	9-35	Sandy clay loam, loam, sandy loam.	SM, CL-ML	A-2, A-4, A-6	0	100	70-100	45-90	25-60	<32	NP-12
	35-60	Sandy loam, loamy sand, gravelly sand.	SM, SP-SM	A-1, A-2, A-3	0	80-100	70-95	35-55	5-25	<26	NP-6

* 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		Wind erodibility group	Organic matter
								K	T		
	In	Pct	G/cc	In/hr	In/in	pH					Pct
AeA, AeB----------	0-8	5-25	1.40-1.60	0.6-6.0	0.14-0.21	3.6-5.5	Low----------	0.32	3	3	.5-3
Adelphia	8-38	20-35	1.50-1.70	0.2-2.0	0.13-0.18	3.6-5.5	Moderate-----	0.43			
	38-60	5-15	1.50-1.70	0.6-20.0	0.07-0.15	3.6-5.5	Low----------	0.20			
ALA*:											
Adelphia--------	0-8	5-25	1.40-1.60	0.6-6.0	0.14-0.21	3.6-5.5	Low----------	0.32	3	3	.5-3
	8-38	20-35	1.50-1.70	0.2-2.0	0.13-0.18	3.6-5.5	Moderate-----	0.43			
	38-60	5-15	1.50-1.70	0.6-20.0	0.07-0.15	3.6-5.5	Low----------	0.20			
Urban land------	0-6	---	---	---	---	---	----------	---	---	---	---
At---------------	0-20	1-6	1.00-1.40	6.0-20	0.04-0.08	3.6-5.0	Low----------	0.17	3	1	2-4
Atsion	20-28	2-7	1.40-1.60	2.0-20	0.04-0.15	3.6-5.0	Low----------	0.20			
	28-38	2-10	1.60-1.80	6.0-20	0.04-0.14	4.5-5.0	Low----------	0.20			
	38-60	2-15	1.60-1.80	0.2-20	0.03-0.20	4.5-5.0	Low----------	0.28			
Cm---------------	0-9	10-35	1.20-1.50	0.2-2.0	0.18-0.24	3.6-5.5	Moderate-----	0.43	2	---	2-6
Colemantown	9-36	35-60	1.20-1.70	0.06-0.2	0.20-0.24	4.5-5.5	Moderate-----	0.37			
	36-60	10-50	1.35-1.70	0.2-0.6	0.16-0.20	4.5-5.5	Low----------	0.37			
CnE, CnC2, CnD3, CoA----------	0-13	10-20	1.20-1.45	0.6-6.0	0.14-0.22	3.6-5.5	Low----------	0.28	4	3	1-3
Collington	13-32	15-35	1.30-1.65	0.2-2.0	0.12-0.16	3.6-5.5	Moderate-----	0.32			
	32-60	5-15	1.55-1.70	0.6-20.0	0.05-0.15	3.6-5.5	Low----------	0.24			
CRB*:											
Collington------	0-13	10-20	1.20-1.45	0.6-6.0	0.14-0.22	3.6-5.5	Low----------	0.28	4	3	1-3
	13-32	15-35	1.30-1.65	0.2-2.0	0.12-0.16	3.6-5.5	Moderate-----	0.32			
	32-60	5-15	1.55-1.70	0.6-20.0	0.05-0.15	3.6-5.5	Low----------	0.24			
Urban land------	0-6	---	---	---	---	---	----------	---	---	---	---
CtB, CtC, CtC2, CtD2----------	0-10	5-20	1.20-1.60	0.6-2.0	0.14-0.22	4.5-6.5	Low----------	0.28	4	3	1-4
Colts Neck	10-35	10-30	1.30-1.65	0.6-2.0	0.10-0.20	4.5-6.5	Low----------	0.32			
	35-60	3-15	1.30-1.65	2.0-20	0.10-0.18	4.5-6.5	Low----------	0.20			
CtE2----------	0-10	5-10	1.20-1.55	2.0-20	0.10-0.13	4.5-6.5	Low----------	0.20	4	2	1-4
Colts Neck	10-35	10-30	1.30-1.65	0.6-2.0	0.10-0.20	4.5-6.5	Low----------	0.32			
	35-60	3-15	1.30-1.65	2.0-20	0.10-0.18	4.5-6.5	Low----------	0.20			
DnA, DnC---------	0-10	3-8	1.20-1.60	6.0-20.0	0.06-0.08	3.6-5.5	Low----------	0.20	4	2	.5-2
Downer	10-26	6-18	1.45-1.65	0.6-6.0	0.10-0.13	4.5-5.5	Low----------	0.28			
	26-60	3-25	1.40-1.75	>2.0	0.03-0.10	4.5-5.5	Low----------	0.17			
DoA, DoB---------	0-10	5-10	1.20-1.60	2.0-6.0	0.10-0.14	3.6-5.5	Low----------	0.28	4	3	1-3
Downer	10-26	6-18	1.45-1.65	0.6-6.0	0.10-0.13	4.5-5.5	Low----------	0.28			
	26-60	3-25	1.40-1.75	>2.0	0.03-0.10	4.5-5.5	Low----------	0.17			
DUB*:											
Downer----------	0-10	5-10	1.20-1.60	2.0-6.0	0.10-0.14	3.6-5.5	Low----------	0.28	4	3	1-3
	10-26	6-18	1.45-1.65	0.6-6.0	0.10-0.13	4.5-5.5	Low----------	0.28			
	26-60	3-25	1.40-1.75	>2.0	0.03-0.10	4.5-5.5	Low----------	0.17			
Urban land------	0-6	---	---	---	---	---	----------	---	---	---	---

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		Wind erodibility group	Organic matter
								K	T		
	In	Pct	G/cc	In/hr	In/in	pH					Pct
En----------	0-7	11-30	1.20-1.40	0.6-2.0	0.15-0.22	3.6-5.5	Low----------	0.43	3	---	1-3
Elkton	7-39	35-55	1.25-1.55	<0.2	0.14-0.19	3.6-5.5	Moderate-----	0.28			
	39-60	5-50	1.30-1.55	0.2-6.0	0.14-0.20	3.6-5.5	Moderate-----	0.28			
EvB, EvC, EvD, EvE----------	0-7	1-4	1.10-1.55	6.0-20	0.04-0.09	3.6-5.0	Low----------	0.17	5	2	<1
Evesboro	7-32	3-6	1.10-1.55	6.0-20	0.04-0.09	3.6-5.0	Low----------	0.17			
	32-60	1-5	1.10-1.60	6.0-20	0.04-0.10	4.5-5.0	Low----------	0.17			
EWB*:											
Evesboro--------	0-7	1-4	1.10-1.55	6.0-20	0.04-0.09	3.6-5.0	Low----------	0.17	5	2	<1
	7-32	3-6	1.10-1.55	6.0-20	0.04-0.09	3.6-5.0	Low----------	0.17			
	32-60	1-5	1.10-1.60	6.0-20	0.04-0.10	4.5-5.0	Low----------	0.17			
Urban land------	0-6	---	---	---	---	---	----------	---	---	---	---
Fb----------	0-8	3-20	1.20-1.45	0.6-6.0	0.15-0.24	3.6-5.5	Low----------	0.28	4	---	---
Fallsington	8-36	15-30	1.30-1.55	0.6-2.0	0.15-0.18	3.6-5.5	Low----------	0.43			
	36-60	5-10	1.35-1.60	2.0-6.0	0.06-0.16	3.6-5.5	Low----------	0.43			
FnA, FnC---------	0-12	5-10	1.25-1.60	6.0-20	0.07-0.12	3.6-5.5	Low----------	0.20	4	2	1-2
Freehold	12-35	15-30	1.25-1.65	0.6-2.0	0.12-0.18	4.5-5.5	Low----------	0.32			
	35-60	3-12	1.45-1.65	2.0-20.0	0.07-0.15	4.5-5.5	Low----------	0.37			
FrB, FrC, FrC2, FrD, FrD2, FrE2, FsA----------	0-12	10-15	0.90-1.65	0.6-6.0	0.14-0.20	3.6-5.5	Low----------	0.28	4	3	1-3
Freehold	12-35	15-30	1.25-1.65	0.6-2.0	0.12-0.18	4.5-5.5	Low----------	0.32			
	35-60	3-12	1.45-1.65	2.0-20.0	0.07-0.15	4.5-5.5	Low----------	0.37			
FUB*:											
Freehold--------	0-12	10-15	0.90-1.65	0.6-6.0	0.14-0.20	3.6-5.5	Low----------	0.28	4	3	1-3
	12-35	15-30	1.25-1.65	0.6-2.0	0.12-0.18	4.5-5.5	Low----------	0.32			
	35-60	3-12	1.45-1.65	2.0-20.0	0.07-0.15	4.5-5.5	Low----------	0.37			
Urban land------	0-6	---	---	---	---	---	----------	---	---	---	---
HaB----------	0-19	2-7	1.20-1.60	6.0-20.0	0.06-0.10	3.6-5.5	Low----------	0.20	4	2	1-3
Hammonton	19-31	10-18	1.45-1.65	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.28			
	31-60	2-7	1.40-1.75	>2.0	0.03-0.15	4.5-5.5	Low----------	0.17			
HbA, HbB---------	0-19	5-10	1.20-1.60	2.0-6.0	0.10-0.14	3.6-5.5	Low----------	0.28	4	3	2-4
Hammonton	19-31	10-18	1.45-1.65	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.28			
	31-60	2-7	1.40-1.75	>2.0	0.03-0.15	4.5-5.5	Low----------	0.17			
HLA*:											
Hammonton-------	0-19	5-10	1.20-1.60	2.0-6.0	0.10-0.14	3.6-5.5	Low----------	0.28	4	3	2-4
	19-31	10-18	1.45-1.65	2.0-6.0	0.10-0.16	4.5-5.5	Low----------	0.28			
	31-60	2-7	1.40-1.75	>2.0	0.03-0.15	4.5-5.5	Low----------	0.17			
Urban land------	0-6	---	---	---	---	---	----------	---	---	---	---
HnA, HnB---------	0-12	10-15	1.25-1.40	0.6-6.0	0.10-0.20	3.6-5.5	Low----------	0.28	3	3	1-3
Holmdel	12-38	15-30	1.35-1.45	0.6-2.0	0.12-0.19	4.5-5.5	Low----------	0.32			
	38-60	2-15	1.50-1.65	>2.0	0.05-0.16	4.5-5.5	Low----------	0.17			
HUA*:											
Holmdel---------	0-12	10-15	1.25-1.40	0.6-6.0	0.10-0.20	3.6-5.5	Low----------	0.28	3	3	1-3
	12-38	15-30	1.35-1.45	0.6-2.0	0.12-0.19	4.5-5.5	Low----------	0.32			
	38-60	2-15	1.50-1.65	>2.0	0.05-0.16	4.5-5.5	Low----------	0.17			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	G/cc	In/hr	In/in	pH					Pct
HUA*:											
Urban land	0-6	---	---	---	---	---	---	---	---	---	---
HV. Humaquepts											
HwB	0-6	<5	1.30-1.70	6.0-20	0.02-0.08	5.1-7.8	Low	0.10	5	1	<1
Hooksan	6-60	<5	1.30-1.70	6.0-20	0.01-0.03	5.6-7.8	Low	0.10			
HxA	0-6	1-6	1.00-1.40	6.0-20	0.06-0.08	4.5-5.0	Low	0.17	3	---	2-4
Hooksan Variant	6-60	3-10	1.60-1.80	6.0-20	0.04-0.14	4.5-5.0	Low	0.20			
KeA, KeB, KeC, KeD	0-8	5-20	1.20-1.60	0.6-6.0	0.12-0.18	3.6-5.5	Low	0.37	3-2	3	1-3
Keyport	8-60	30-50	1.35-1.60	<0.2	0.13-0.17	4.5-5.5	Moderate	0.32			
KGB*:											
Keyport	0-8	5-20	1.20-1.60	0.6-6.0	0.12-0.18	3.6-5.5	Low	0.37	3-2	3	1-3
	8-60	30-50	1.35-1.60	<0.2	0.13-0.17	4.5-5.5	Moderate	0.32			
Urban land	0-6	---	---	---	---	---	---	---	---	---	---
KlA	0-36	2-12	1.45-1.65	>6.0	0.06-0.11	3.6-5.0	Low	0.17	5	2	1-3
Klej	36-60	2-10	1.40-1.60	>6.0	0.06-0.08	3.6-5.0	Low	0.17			
KmB	0-4	1-4	1.45-1.60	6.0-20	0.06-0.11	3.6-5.0	Low	0.17	5	---	<1
Klej	4-46	2-5	1.55-1.65	6.0-20	0.06-0.08	3.6-5.0	Low	0.17			
	46-60	40-60	1.60-1.70	0.06-0.6	0.16-0.20	3.6-5.0	High	0.43			
KUA*:											
Klej	0-36	2-12	1.45-1.65	>6.0	0.06-0.11	3.6-5.0	Low	0.17	5	---	1-3
	36-60	2-10	---	>6.0	0.06-0.08	3.6-5.0	Low	0.17			
Urban land	0-6	---	---	---	---	---	---	---	---	---	---
KvA	0-9	10-20	1.2-1.35	0.2-6.0	0.18-0.22	3.6-5.5	Moderate	0.43	2	4	2-4
Kresson	9-40	35-45	1.25-1.40	0.06-0.2	0.16-0.20	3.6-5.5	Moderate	0.37			
	40-60	30-45	1.25-1.40	0.06-0.2	0.16-0.20	3.6-5.5	Low	0.32			
LaA	0-10	.1-4	1.10-1.65	6.0-20	0.04-0.09	3.6-5.0	Low	0.17	5	1	---
Lakehurst	10-36	1-10	1.45-1.65	6.0-20	0.04-0.10	3.6-5.0	Low	0.17			
	36-60	2-10	1.30-1.80	6.0-20	0.04-0.10	4.5-5.0	Low	0.10			
LeB, LeC	0-13	1-4	1.25-1.50	6.0-20	0.04-0.09	3.6-5.0	Low	0.10	5	1	1-2
Lakewood	13-30	1-10	1.10-1.60	6.0-20	0.04-0.10	3.6-5.0	Low	0.17			
	30-60	2-4	1.50-1.65	0.6-20	0.04-0.10	3.6-5.0	Low	0.10			
Ma	0-30	---	0.30-0.65	6.0-20	0.30-0.35	3.6-5.5	---	0.17	---	---	20-95
Manahawkin	30-60	0-10	1.10-1.70	2.0-20	0.04-0.08	4.5-5.0	Low	0.17			
MbC, MlB	0-8	10-25	1.15-1.30	0.6-6.0	0.12-0.19	<4.-5.5	Low	0.43	3	3	2-3
Marlton	8-46	30-45	1.25-1.40	0.06-0.2	0.10-0.16	4.5-5.5	Moderate	0.43			
	46-60	15-45	1.25-1.40	0.06-2.0	0.10-0.16	4.5-5.5	Low	0.24			
PeA	0-25	3-10	1.30-1.50	2.0-6.0	0.04-0.10	3.6-5.0	Low	0.20	4	1	1-2
Pemberton	25-45	8-35	1.40-1.50	2.0-6.0	0.14-0.18	3.6-5.0	Low	0.28			
	45-60	2-45	1.25-1.60	0.6-6.0	0.06-0.16	3.6-5.0	Low	0.20			
PhB, PhD	0-17	2-10	1.20-1.35	>6.0	0.03-0.08	3.6-5.0	Low	0.20	4	1	.5-2
Phalanx	17-38	5-2	1.50-1.85	2.0-20.0	0.06-0.14	4.5-5.5	Low	0.28			
	38-60	1-9	1.60-1.85	>6.0	0.02-0.08	4.5-5.5	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		Wind erodibility group	Organic matter
								K	T		
	In	Pct	G/cc	In/hr	In/in	pH					Pct
PT*. Pits											
PW. Psamments											
SaB, SaC, SaD, SaE----------	0-11	3-20	1.20-1.60	0.6-6.0	0.12-0.20	3.6-5.5	Low----------	0.28	4	3	.5-2.0
Sassafras	11-36	15-30	1.50-1.65	0.6-2.0	0.11-0.22	3.6-5.5	Low----------	0.37			
	36-60	5-10	1.50-1.70	0.6-20	0.04-0.12	3.6-5.5	Low----------	0.17			
SgB, SgC----------	0-11	3-20	1.20-1.60	0.6-6.0	0.10-0.12	3.6-5.5	Low----------	0.24	4	3	.5-20
Sassafras	11-36	15-30	1.50-1.65	0.6-2.0	0.11-0.22	3.6-5.5	Low----------	0.37			
	36-60	5-20	1.50-1.70	0.6-20	0.04-0.12	3.6-5.5	Low----------	0.17			
SlA----------	0-11	3-20	1.20-1.60	0.6-6.0	0.12-0.20	3.6-5.5	Low----------	0.28	4	---	---
Sassafras	11-36	15-30	1.50-1.65	0.6-2.0	0.11-0.22	3.6-5.5	Low----------	0.37			
	36-60	5-10	1.50-1.70	0.6-20	0.04-0.12	3.6-5.5	Low----------	0.17			
Sn----------	0-12	5-20	1.20-1.70	0.6-6.0	0.16-0.20	3.6-5.5	Low----------	0.32	5	3	3-5
Shrewsbury	12-30	15-35	1.20-1.70	0.2-2.0	0.13-0.17	3.6-5.5	Moderate-----	0.28			
	30-60	5-15	1.40-1.70	2.0-20	0.07-0.15	3.6-5.5	Low----------	0.20			
SS*: Sulfaquents.											
Sulfihemists.											
ToA, ToC, ToD----	0-32	1-7	0.90-1.65	0.6-6.0	0.04-0.10	3.6-5.5	Low----------	0.20	4	1	.5-1
Tinton	32-46	5-30	1.20-1.65	2.0-6.0	0.14-0.18	3.6-5.5	Low----------	0.28			
	46-60	2-15	1.35-1.65	0.6-6.0	0.06-0.12	3.6-5.5	Low----------	0.20			
TUB*: Tinton----------	0-32	1-7	0.90-1.65	0.6-6.0	0.04-0.10	3.6-5.5	Low----------	0.20	4	1	.5-1
	32-46	5-30	1.20-1.65	2.0-6.0	0.14-0.18	3.6-5.5	Low----------	0.28			
	46-60	2-15	1.35-1.65	0.6-6.0	0.06-0.12	3.6-5.5	Low----------	0.20			
Urban land------	0-6	---	---	---	---	---	----------	---	---	---	---
UA. Udorthents											
UD*: Udorthents.											
Urban land------	0-6	---	---	---	---	---	----------	---	---	---	---
UL*. Urban land											
WnB, WoA----------	0-9	3-20	1.20-1.60	0.6-6.0	0.08-0.21	3.6-5.5	Low----------	0.28	4	---	.5-20
Woodstown	9-35	15-30	1.50-1.65	0.6-2.0	0.10-0.21	3.6-5.5	Low----------	0.37			
	35-60	5-10	1.50-1.70	0.6-6.0	0.06-0.16	3.6-5.5	Low----------	0.28			

* 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," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
AeA, AeB---------- Adelphia	B/C	None--------	---	---	1.5-4.0	Apparent	Jan-Apr	High-----	Moderate	High.
ALA*:										
Adelphia---------	B/C	None--------	---	---	1.5-4.0	Apparent	Jan-Apr	High-----	Moderate	High.
Urban land-------	-	None--------	---	---	>2.0	---	---	---	---	---
At---------- Atsion	C/D	None--------	---	---	0-1.0	Apparent	Nov-Jun	Moderate	Low------	High.
Cm---------- Colemantown	C/D	Occasional	Very brief	Sep-Apr	0-1.0	Perched	Oct-Jun	High-----	High-----	High.
CnB, CnC2, CnD3, CoA---------- Collington	B	None--------	---	---	>6.0	---	---	Moderate	Low------	High.
CRB*:										
Collington-------	B	None--------	---	---	>6.0	---	---	Moderate	Low------	High.
Urban land-------	-	None--------	---	---	>2.0	---	---	---	---	---
CtB, CtC, CtC2, CtD2, CtE2------- Colts Neck	B	None--------	---	---	>6.0	---	---	Moderate	Low------	High.
DnA, DnC, DoA, DoB---------- Downer	B	None--------	---	---	>6.0	---	---	Low------	Moderate	High.
DUE*:										
Downer-----------	B	None--------	---	---	>6.0	---	---	Low------	Moderate	High.
Urban land-------	-	None--------	---	---	>2.0	---	---	---	---	---
En---------- Elkton	C/D	Rare--------	---	---	0-1.0	Apparent	Jan-Apr	High-----	High-----	High.
EvB, EvC, EvD, EvE---------- Evesboro	A	None--------	---	---	>6.0	---	---	Low------	Low------	High.
EWB*:										
Evesboro---------	A	None--------	---	---	>6.0	---	---	Low------	Low------	High.
Urban land-------	-	None--------	---	---	>2.0	---	---	---	---	---
Fb---------- Fallsington	B/D	None--------	---	---	0-1.0	Apparent	Dec-May	High-----	High-----	High.
FnA, FnC, FrB, FrC, FrC2, FrD, FrD2, FrE2, FsA-- Freehold	B	None--------	---	---	>6.0	---	---	Moderate	Low------	High.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
FUB*: Freehold	B	None	---	---	>6.0	---	---	Moderate	Low	High.
Urban land	-	None to occasional.	---	---	>2.0	---	---	---	---	---
HaB, HbA, HbB Hammonton	B	None	---	---	1.5-3.0	Apparent	Jan-Apr	High	Moderate	High.
HLA*: Hammonton	B	None	---	---	1.5-3.0	Apparent	Jan-Apr	High	Moderate	High.
Urban land	-	None	---	---	>2.0	---	---	---	---	---
HnA, HnB Holmdel	C	None	---	---	0.5-4.0	Apparent	Dec-May	High	Low	High.
HUA*: Holmdel	C	None	---	---	0.5-4.0	Apparent	Dec-May	High	Low	High.
Urban land	-	None	---	---	>2.0	---	---	---	---	---
HV. Humaquepts										
HwB Hooksan	A	Rare	---	---	>6.0	---	---	---	Low	Low.
HxA Hooksan Variant	D	Rare	---	---	0-1.0	Apparent	Jan-Dec	Moderate	High	High.
KeA, KeB, KeC, KeD Keyport	C	None	---	---	1.5-4.0	Perched	Nov-May	High	High	High.
KGB*: Keyport	C	None	---	---	1.5-4.0	Perched	Nov-May	High	High	High.
Urban land	-	None	---	---	>2.0	---	---	---	---	---
KlA Klej	B	None	---	---	1.5-2.0	Apparent	Dec-Apr	Moderate	Low	High.
KmB Klej	B	None	---	---	1.5-2.0	Perched	Dec-Apr	Moderate	Low	High.
KUA*: Klej	B	None	---	---	1.5-2.0	Apparent	Dec-Apr	Moderate	Low	High.
Urban land	-	None	---	---	>2.0	---	---	---	---	---
KvA Kresson	C	None	---	---	1.0-1.5	Perched	Dec-May	High	High	High.
LaA Lakehurst	A	None	---	---	1.5-3.5	Apparent	Jan-Apr	Low	Low	High.
LeB, LeC Lakewood	A	None	---	---	>6.0	---	---	Low	Low	High.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months		Uncoated steel	Concrete
					Ft					
Ma---------- Manahawkin	D	Frequent----	Long------	Jan-Mar	+1-0	Apparent	Oct-Jul	High-----	High-----	High.
MbC, MlB---------- Marlton	C	None--------	---	---	2.0-5.0	Perched	Nov-May	High-----	High-----	High.
PeA---------- Pemberton	B	None--------	---	---	1.0-4.0	Apparent	Dec-May	Moderate	High-----	High.
PhB, PhD---------- Phalanx	B	None--------	---	---	>6.0	---	---	Low------	Low------	Moderate.
PT*. Pits										
PW. Psamments										
SaB, SaC, SaD, SaE, SgB, SgC, SlA---------- Sassafras	B	None--------	---	---	>6.0	---	---	Moderate	Low------	High.
Sn---------- Shrewsbury	C/D	None--------	---	---	0-1.0	Apparent	Oct-Jun	High-----	High-----	High.
SS*: Sulfaquents.										
Sulfihemists.										
ToA, ToC, ToD----- Tinton	A	None--------	---	---	>6.0	---	---	Moderate	Low------	High.
TUB*: Tinton----------	A	None--------	---	---	>6.0	---	---	Moderate	Low------	High.
Urban land-------	-	None to occasional.	---	---	>2.0	---	---	---	---	---
UA. Udorthents										
UD*: Udorthents.										
Urban land-------	-	None--------	---	---	>2.0	---	---	---	---	---
UL*. Urban land										
WnB, WoA---------- Woodstown	C	None--------	---	---	1.5-2.5	Apparent	Feb-Apr	High-----	Moderate	High.

* 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
Adelphia	Fine-loamy, mixed, mesic Aquic Hapludults
Atsion	Sandy, siliceous, mesic Aeric Haplaquods
Colemantown	Clayey, glauconitic, mesic Typic Ochraquults
Collington	Fine-loamy, mixed, mesic Typic Hapludults
Colts Neck	Fine-loamy, mixed, mesic Typic Rhodudults
Downer	Coarse-loamy, siliceous, mesic Typic Hapludults
Elkton	Clayey, mixed, mesic Typic Ochraquults
Evesboro	Mesic, coated Typic Quartzipsamments
Fallsington	Fine-loamy, siliceous, mesic Typic Ochraquults
Freehold	Fine-loamy, mixed, mesic Typic Hapludults
Hammonton	Coarse-loamy, siliceous, mesic Aquic Hapludults
Holmdel	Fine-loamy, mixed, mesic Aquic Hapludults
Hooksan	Mesic, uncoated Typic Quartzipsamments
Hooksan Variant	Mixed, mesic Typic Psammaquents
Humaquepts	Humaquepts
Keyport	Clayey, mixed, mesic Aquic Hapludults
Klej	Mesic, coated Aquic Quartzipsamments
Kresson	Clayey, glauconitic, mesic Aquic Hapludults
Lakehurst	Mesic, coated Haplaquodic Quartzipsamments
Lakewood	Mesic, coated Spodic Quartzipsamments
Manahawkin	Sandy or sandy-skeletal, siliceous, dysic, mesic Terric Medisaprists
Marlton	Clayey, glauconitic, mesic Typic Hapludults
Pemberton	Loamy, mixed, mesic Arenic Hapludults
Phalanx	Coarse-loamy, siliceous, mesic Typic Hapludults
Psamments	Psamments
Sassafras	Fine-loamy, siliceous, mesic Typic Hapludults
Shrewsbury	Fine-loamy, mixed, mesic Typic Ochraquults
Sulfaquents	Sulfaquents
Sulfihemists	Sulfihemists
Tinton	Loamy, mixed, mesic Arenic Hapludults
Udorthents	Udorthents
Woodstown	Fine-loamy, siliceous, mesic Aquic Hapludults

TABLE 18.--RELATIONSHIP AMONG COMPOSITION, DOMINANT TEXTURE OF THE SUBSOIL, DISTINCTIVE CHARACTERISTICS, AND DRAINAGE OF THE SOILS

Texture of the subsoil and other characteristics*	Drainage					
	Excessively drained	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
MINERAL SOILS						
Sand or loamy sand subsoil**						
Albic horizon, typically more than 6 inches thick	Lakewood		Lakehurst	Lakehurst	Atsion	
Albic horizon, less than 6 inches thick						
Extremely acid to slightly acid	Evesboro		Klej	Klej		
Strongly acid to slightly acid	Hooksan				Hooksan Variant	
No horizonation						
Sandy fill material more than 24 inches thick	Psamments	Psamments	Psamments	Psamments		
Loamy fill material more than 20 inches thick		Udorthents	Udorthents	Udorthents		
Mucky surface layer, slightly acid to mildly alkaline					Sulfaquents	Sulfaquents
Sandy loam and silt loam subsoil, frequently flooded				Humaquepts	Humaquepts	
Sandy loam subsoil**						
With iron-cemented sandstone		Phalanx				
Without iron-cemented sandstone		Downer	Hammonton	Hammonton		
Sandy clay loam subsoil**						
Without glauconite		Sassafras	Woodstown		Fallsington	
Low glauconite						
Sandy surface layer more than 20 inches thick		Tinton	Pemberton	Pemberton		
No sandy surface layer, or sandy surface layer less than 20 inches thick		Freehold, Colts Neck	Holmdel	Holmdel	Shrewsbury	
Moderate glauconite		Collington	Adelphia	Adelphia		
Clayey subsoil**						
Without glauconite			Keyport		Elkton	
High glauconite		Marlton	Marlton	Kresson	Colemantown	

TABLE 18.--RELATIONSHIP AMONG COMPOSITION, DOMINANT TEXTURE OF THE SUBSOIL, DISTINCTIVE CHARACTERISTICS, AND DRAINAGE OF THE SOILS --Continued

Texture of the subsoil and other characteristics*	Drainage					
	Excessively drained	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
ORGANIC SOILS						
Mucky surface layer more than 16 inches thick tidally flooded by saltwater or brackish water						Sulfihemists
Mucky surface layer more than 16 inches thick, flooded by freshwater, and extremely acid						Manahawkin

*Texture of the subsoil is listed in the order of increasing clay content.

**Dominant texture of the horizon that has the finest texture.

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