SOIL SURVEY

Salem County New Jersey

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
NEW JERSEY AGRICULTURAL EXPERIMENT STATION
Issued May 1969

Major fieldwork for this soil survey was done in the period 1944–1966. Soil names and descriptions were approved in 1966. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1965. This survey was made cooperatively by the Soil Conservation Service and the New Jersey Agricultural Experiment Station at Rutgers, the State University, College of Agriculture and Environmental Science. It is part of the technical assistance furnished to the Salem County Conservation District.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY of Salem County contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, or other structures; and in determining the value of tracts of land for agriculture, industry, or recreation.

Locating Soils

All of the soils of Salem County are shown on the detailed map at the back of this survey. This map consists of many sheets that are made from aerial photographs. Each sheet is numbered to correspond with numbers shown on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbol. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information in the survey. This guide lists all of the soils of the county in alphabetic order by map symbol. It shows the page where each kind of soil is described, and also the page for the capability unit, woodland group, or any other group in which the soil has been placed.

Individual colored maps showing the relative suitability or limitations of soils for many specific purposes can be developed by using the soil map and information in the text. Interpretations not included in the text can be developed by grouping the soils according to their suitability or limitations for a particular use. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils in the soil descriptions and in the discussions of the capability units and other groupings.

Foresters and others can refer to the section "Use of Soils as Woodland," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others concerned with wildlife will find information about soils and wildlife in the section "Use of Soils for Wildlife."

Engineers and builders will find, under "Engineering Uses of the Soils," tables that give engineering properties of the soils in the county and that name soil features that affect engineering practices and structures.

Community planners and others concerned with suburban development can read about the soil properties that affect the choice of homesites, industrial sites, schools, and parks in the section "Soils and Community Developments."

Scientists and others can read about how the soils were formed and how they are classified in the section "Formation and Classification of Soils."

Newcomers in Salem County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Information About the County," which gives additional information.

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SOIL SURVEY OF SALEM COUNTY, NEW JERSEY

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SOILS SURVEYED BY ALBERT D. BACKER, L. E. LINDLEY, VAN R. POWLEY, AND LEONARD ZOBLER, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE NEW JERSEY AGRICULTURAL EXPERIMENT STATION AT RUTGERS, THE STATE UNIVERSITY, COLLEGE OF AGRICULTURE AND ENVIRONMENTAL SCIENCE

SALEM COUNTY is in the extreme southwestern corner of southern New Jersey (fig. 1). The county is bounded by the Delaware River on the west, by Gloucester County on the north, and by Cumberland County on the south and east. The county is 29 miles long from north to south and about 27 miles from east to west. Its area is 224,000 acres, or 350 square miles. Salem, the county seat, is in the southwestern corner of the county and is about 96 miles from New York City, 30 miles from Camden, N.J., and Philadelphia, Pa., and 12 miles from Wilmington, Del.

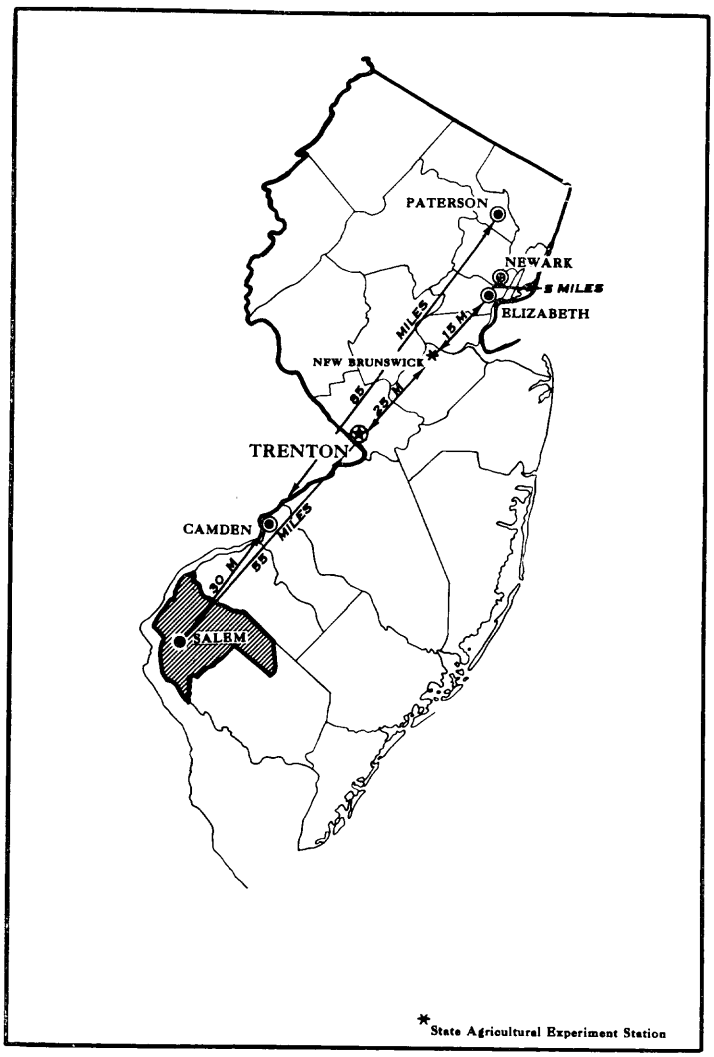


Figure 1.—Location of Salem County in New Jersey.

Salem County is in the inner part of the Atlantic Coastal Plain. It has a humid, temperate climate that is influenced considerably by the ocean.

The western side of the county is a nearly level plain, 5 to 8 miles wide, that is composed of extensive tidal flats, productive farmland, and industrial sites. Most of this plain is 10 to 40 feet above sea level. In the center of the county, the elevation ranges from 50 feet to about 140 feet and the landscape is gently rolling. From the central part to the eastern edge of the county, the surface slopes gently eastward at a rate of about 3 feet to the mile.

The soils were formed in a variety of materials. Soil texture ranges from sand to clay, and silty soils are extensive. In about one-third of the county, the soils have poor or very poor internal drainage.

The first permanent settlement in Salem County was established in 1675 by John Fenwick, who brought farmers and tradesmen from England. The settlers cut the trees from their homesites and planted crops. As the colony prospered, larger areas of forests were cleared along the rivers and streams and were sown to hay and grain. Many of the colonial homes that these early settlers built are still standing, and some of the soils have been in cultivation for nearly 300 years.

The county is principally farmland, but there is a large forested tract in the south-central part of the county. Many farms throughout the county contain woodlots that are located mostly in low areas or on steep soils.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Salem County, where they are located, and how they can be used.

They went into the county knowing they likely would

find many soils they had already seen and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by roots of plants.

The soil scientists made comparisons among the soil profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. To use this survey efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons, or layers, that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Keyport and Sassafras, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that go with their behavior in the natural, untouched landscape. Soils of one series can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

Many soil series contain soils that differ in texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Sassafras loamy sand and Sassafras sandy loam are two soil types in the Sassafras series. The difference in texture of their surface layers is apparent from their names.

Some soil types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Sassafras sandy loam, 2 to 5 percent slopes, is one of several phases of Sassafras sandy loam, a soil type that ranges from nearly level to strongly sloping.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that greatly help in drawing boundaries accurately. The soil map in the back of this survey was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil type or soil phase.

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed and so small in size that it is not practical to show them separately on the map. Therefore, they show this mixture of soils as one mapping unit and call it a soil complex. Ordinarily, a soil complex is named for the major kinds of soil in it, for example, Downer-Sassafras loamy sands. Also, on most soil maps, areas are shown that are so rocky, so shallow, so wet, or so frequently worked by wind and water that they are not classified by soil series. These areas are shown on a soil map like other mapping units, but they are given descriptive names, such as Dune land or Fresh water marsh, and are called land types rather than soils.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kind of soils in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soils. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in a way that it is readily useful to different groups of readers, among them farmers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in the soil surveys. On the basis of yield and practice tables and other data, the soil scientists set up trial groups, and then test them by further study and by consultation with farmers, agronomists, engineers, and others. Then, the scientists adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back if this survey shows, in color, the soil associations in Salem County. A soil association is a landscape that has a distinctive pattern and proportion of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different proportion or pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect management.

The nine soil associations that were mapped in the county are shown on the colored map at the back of this publication and are described in the paragraphs that follow.

1. Tidal Marsh-Made Land Association

Organic silts subject to daily flooding and fine to very coarse dredged river material on flats along the Delaware River

This association consists of extensive bands of Tidal marsh that are subject to daily flooding, and impoundments of dredged materials from the river. The dredged materials are above tidal flooding. The association is about 16 percent of the county.

Tidal marsh comprises about 90 percent of this association. It is composed of silt and organic deposits, 1 foot to 20 feet in thickness, along the Delaware River and the main streams. The water of the river is salty, but that in the streams is mostly fresh. The marsh supports vegetation composed mostly of grasses, reeds, and sedges. In former years the grass was cut for salt hay, but not much hay is cut now. Nearly all the areas have been extensively ditched to control mosquitoes.

Made land, dredged river materials, comprises about 10 percent of the association. It consists of material pumped from the river when the shipping channels are deepened, widened, or maintained. This work goes on almost all the time. Some of the impoundments have received several pumpings. Size of the dredged materials ranges from clay to boulders, but silt is predominant, and most of the soil is silty after it has dried and settled.

Minor soils, mostly of the Othello series, comprise less than 1 percent of the association.

The Tidal marsh provides a good habitat for waterfowl and for muskrats. In the past considerable diking was done to hold back the tides, but storms sooner or later broke nearly all the dikes. Except for special needs, it is not now considered economical to improve Tidal marsh for cropping. Made land, dredged river materials, has potential industrial and commercial uses after it has been drained and has settled.

2. Galestown-Sassafras-Berryland Association

Sandy, excessively drained to poorly drained soils on low terraces along the Delaware River

This association occupies broad, generally level river terraces in the northern part of the county, between Pedricktown and Penns Grove. The soils are mostly sandy, and they lie from 5 to 25 feet above sea level. The association makes up about 7 percent of the county.

Galestown soils comprise about 30 percent of the association. They are light-colored, droughty sands in high positions.

Sassafras soils, also in high positions, comprise about 20 percent of the association. They are brown, well-drained soils that have loamy subsoil. They can hold a moderate supply of water for plants.

Scattered among the Galestown and Sassafras soils are hundreds of wet, closed, circular, saucerlike depressions that contain Berryland soils. They occupy about 20 percent of the association. The Berryland soils are sandy, dark colored, and poorly drained. The depressions range mostly from 5 to 10 acres in size, but the largest are as big as several hundred acres. The depressions are not easily drained, because of the low position, the distance to an outlet, and the need in many places to run a drain through properties held by numerous owners. Many areas have reverted to woodland.

Minor soils make up about 30 percent of the association. They are Klej, Woodstown, Fallsington, Othello, and Pocomoke soils. They are not quite so sandy as the Galestown and Sassafras soils. They range from moderately well drained to very poorly drained.

The sandy soils of this association are extensively used for high-value crops, especially asparagus. Wind erosion is a problem. Because the association is near the Delaware River, there has been considerable residential, industrial, and commercial expansion, especially on the well-drained soils. The poorly drained soils, which make up about 40 percent of the association, are severely limited for use as drainage fields for septic tanks.

3. Mattapex-Othello-Woodstown Association

Dominantly silty, moderately well drained to poorly drained, nearly level to gently sloping soils along the Delaware River

This association is a nearly level plain that extends from Penns Grove and Pennsville southward to a point beyond Salem. Nearly all of it has been cleared for production of crops. Most of the industries of the county are in this association. The areas are low lying, from 10 to 30 feet above sea level. Drainage is through the sluggish, winding streams of the estuaries. The association makes up about 12 percent of the county.

Mattapex soils make up about 35 percent of this association. They occupy high positions in the landscape. They are moderately well drained, silty soils that are underlain at about 30 inches by sand and gravel. Their water-holding capacity is high.

Othello soils make up about 25 percent of the association. They are gray, poorly drained, silty soils in low positions. Poor drainage severely limits their potential uses.

Woodstown soils make up about 20 percent of this association. They occupy intermediate or high positions, and they are somewhat more sandy than Mattapex or Othello soils. They are brownish and moderately well drained, and they have loamy subsoil that can hold a moderate supply of water for plants.

Minor soils make up about 20 percent of this association. They include Matapeake, Sassafras, and Fallsington soils, Made land, dredged river materials, and Tidal marsh. Many of the minor soils and land types are low and poorly drained.

This association is severely limited by inadequate drainage; that is, the excess water moves away slowly.

Because nearly all the soils have internal drainage that is at least somewhat restricted, they are not well suited to many vegetables or to fruits. Dairy and grain farms predominate. Asparagus and tomatoes are grown on the high-lying fields, and pasture, hay, corn, and soybeans, on the low-lying fields.

The moderately high or high water table is a severe limitation for homesites and for spetic disposal fields.

4. Sassafras-Woodstown-Fallsington Association

Sandy, well-drained to poorly drained, nearly level to gently sloping soils

This association is made up of two areas. The larger one extends along the northern boundary of the county, on the south side of Oldmans Creek, from the Salem River to Elmer. In it the elevation ranges from 10 to 140 feet, and some of the soils are steep. The smaller area lies around Canton, and extends in a narrow strip northward from Canton in the southwestern part of the county. The association is about 18 percent of the county.

Sassafras soils make up about 25 percent of this association. They occupy high positions in the landscape. They are brown, well-drained soils that have loamy subsoil and can hold a moderate amount of water that plants can use.

Woodstown soils occupy about 20 percent of the association. They are in intermediate positions in the landscape. Woodstown soils are brownish and moderately well drained. They have loamy subsoil and can hold a moderate supply of water for plants.

Fallsington soils make up about 15 percent of this association. They occupy low positions in the landscape. They are gray and poorly drained, and they have loamy subsoil.

Minor soils make up 40 percent of the association. They include Chillum, Matapeake, Marlton, Howell, Fort Mott, and Aura soils. Most of the minor soils are well drained or moderately well drained.

Amounts of the different soils that have been cleared for farming range from 50 percent to 100 percent. A cover of trees has been coming back on many of the poorly drained soils. The types of farms include vegetable, dairy, fruit, and general farms. Vegetables generally are irrigated.

The poorly drained soils and the clayey Marlton and Howell soils have moderate to severe limitations for homesites and for septic disposal fields.

5. Mattapex-Matapeake Association

Silty, moderately well drained and well drained, level to strongly sloping soils

This association lies in a belt reaching from Salem to Woodstown. Most of the areas are nearly level but are high enough to permit adequate surface drainage. The association makes up about 8 percent of the county.

Soils of the two major series developed in a silty mantle about 30 inches thick that is underlain by coarser material, generally sand or gravel. Mattapex soils comprise about 50 percent of the association. They are moderately well drained soils in intermediate positions on the landscape, below areas of Matapeake soils. Matapeake soils, which comprise about 40 percent of the association, are in high positions and are well drained. The soils of both of these series have high water-holding capacity.

Minor soils, mostly Sassafras, Woodstown, and Othello, comprise 10 percent of the association. Sassafras soils are well drained, and Woodstown soils are moderately well drained. Othello soils are gray, silty, and poorly drained.

The soils of this association are intensively used for farming. Dairy and vegetable farms predominate. Tomatoes, asparagus, and potatoes are the main vegetables grown. Much of the land is irrigated. The dominant soils have few severe limitations for nonfarm uses. Some of the less extensive soils have restricted drainage, but this can be readily improved.

6. Keyport-Elkton Association

Loamy and silty, moderately well drained and poorly drained, level to moderately steep soils overlying slowly permeable clays

Most of the soils of this association are nearly level, but there are some that have gentle, moderate, strong, or steep slopes. The soils were formed in clay deposits, and they lie from 10 to 90 feet above sea level. This association comprises about 6 percent of the county.

Keyport soils make up about 45 percent of this association. They include nearly all the sloping soils of the association and some of the the nearly level soils. Keyport soils were developed in thick beds of clay. They are moderately well drained and slowly permeable.

Elkton soils also make up about 45 percent of this association. They are in low positions and are gray, poorly drained soils that developed in beds of clay.

Minor soils make up the rest of the association. They include Bayboro, Lenoir, and other more sandy soils.

The proportions of different soils that have been cleared for farming range from 30 to 70 percent. Dairy farms and general farms are the most common types, and corn, hay, and soybeans are the most common crops. It is difficult to manage the soils properly for crops. Because the Keyport and Elkton soils are difficult to plow, drain, and cultivate, 10 to 30 percent of the association is idle. The idle fields revert to forests after several years.

The soils of this association provide clay for the brick industry. The slow permeability of the major soils is a severe limitation for septic disposal fields.

7. Sassafras-Evesboro-Downer Association

Sandy, droughty, gently sloping to strongly sloping soils

This association lies in an area called the Barrens, in which the soils are sandy and gently to strongly sloping. The native cover is scrubby hardwood forest. Abandoned fields, as a rule, become covered with pine trees. The elevation ranges from 50 to 140 feet. This association comprises about 9 percent of the county.

Sassafras soils, which are in high positions, make up about 35 percent of the association. They are brown, well-drained soils that have loamy subsoil capable of holding a moderate supply of water for plants.

Evesboro soils, which range from nearly level to strongly sloping, make up about 25 percent of the association. They are deep, sandy soils that have very low natural fertility and low water-holding capacity.

Downer soils, about 15 percent of the association, are in high positions and are gently to moderately sloping. They are well-drained soils that have sandy loam subsoil and can hold a moderately low amount of water.

Soils of minor extent make up the rest of the association. They include Galestown, Klej, and Fallsington soils, Muck shallow, and small areas of other soils.

About 30 percent of the association has been cleared for production of vegetables. The rest is either idle or is wooded. The soils on the whole are either too infertile or

too droughty for most crops. Percolation in most of the soils is rapid enough for septic disposal fields.

8. Chillum-Othello-Mattapex Association

Silty, well-drained to poorly drained, nearly level to gently sloping soils

This association lies on the gently rolling divide that ranges in elevation from 120 to 140 feet. It comprises about 8 percent of the county.

Chillum soils make up about 40 percent of this association. They developed in several feet of silty material over cemented beds of gravel, sand, and clay. They are well-drained and have high water-holding capacity. Nearly all the areas of Chillum soils are used to produce crops.

Othello soils make up about 25 percent of the association. They are gray, poorly drained, silty soils in low positions. Poor drainage severely limits their potential uses. Large areas of the Othello soils are wooded.

Mattapex soils make up about 20 percent of the association. They occupy intermediate positions in the landscape. They are brown, moderately well drained, silty soils that are underlain by sand or gravel. They have high water-holding capacity. Nearly all the areas of Mattapex soils are used for crops.

Minor soils that make up the other 15 percent of the association include Muck, Sassafras, Woodstown, and other soils.

Dairy and vegetable farms predominate in this association. Potatoes, tomatoes, and asparagus are the main vegetables grown. The soils are well suited to crops. Limitations of the soils for septic disposal fields range from moderate to severe.

9. Aura-Sassafras-Downer Association

Gravelly and sandy, well-drained, mainly gently sloping soils

This association is in the eastern part of the county. Only about half of it has been cleared for crops. The remaining forest has mostly hardwood trees, but some fields have been abandoned and are covered with pines. This association comprises about 16 percent of the county.

Aura soils make up about 35 percent of this association. They are well-drained, loamy or sandy soils in high positions. They generally are gravelly, and they have a firm subsoil at a depth of about 26 inches that restricts growth of roots.

Sassafras soils make up about 25 percent of the association. They occupy high positions, and normally they lie just below areas of Aura soils. Sassafras soils are brown and well drained. They have loamy subsoil that can hold a moderate amount of water.

Downer soils make up about 5 percent of this association. They are gently sloping to moderately sloping soils in high positions. They are well drained, and they have sandy loam subsoil that can hold a moderately low amount of water.

Minor soils make up the other 35 percent of the association. They include Muck, Woodstown, Evesboro, Klej, Fallsington, Pocomoke, and other soils. The areas of Muck are adjacent to streams, are subject to flooding, and have a cover of trees. The Fallsington and Pocomoke soils are in low-lying positions.

The farms in this association produce vegetables, fruit (fig. 2), general crops, and poultry. Production of crops could be expanded by clearing some of the wooded areas in this association if the need arises. The preferred soils, in order, are the Sassafras, Aura, and Downer.

The firm layer in Aura soils is a moderate limitation for the disposal of sewage from septic tanks. Aura soils are gravelly or are underlain by gravel, and most gravel pits in the county are located in them.

Descriptions of the Soils

This section describes the soil series and the individual soils, or mapping units, of Salem County in alphabetical order. For each soil series, certain features, such as water-holding capacity, permeability, and reaction, are given.

Water-holding capacity was estimated for the upper 30 inches of each soil. The permeability rate reported is the one for the least permeable horizon in the soil.

In this county the reaction of all the soils except Made land, dredged river materials, originally was either extremely acid or very strongly acid. Through repeated liming, the reaction of most of the soils used for crops or pasture has been changed and now ranges between medium acid and neutral. In some soils the zone of reduced acidity extends to a depth of 3 feet or more.

A detailed description, by horizons, of a representative soil profile, and a discussion of the range of major characteristics are given for each soil series. Following the description of the soil series, there is a description of each mapping unit of that series.

Technical terms used in the soil descriptions are defined in the Soil Survey Manual (*15*)[1] or in the Glossary at the back of this survey. Descriptions of soil color are based on the Munsell color charts and, unless otherwise noted, are for the moist soil.

A list of the soils, their map symbols, capability classification, and woodland suitability grouping is given in the "Guide to Mapping Units" at the beginning of the map section. The approximate acreage and proportionate extent of each mapping unit are given in table 1. The location and distribution of each mapping unit are shown on the detailed soil map.

Aura Series

The Aura series consists of well-drained soils that developed in thick beds of sand and gravel (fig. 3). Below a depth of about 26 inches is a layer of firm sandy clay loam that restricts penetration of roots. Aura soils are on hilltops and divides at high elevations in the southeastern part of the county, mostly east of Elmer.

A typical Aura soil has a yellowish-brown surface layer about 17 inches thick and a reddish-brown or yellowish-red subsoil of gravelly sandy clay loam. The subsoil is firm below about 26 inches and, beginning at about 40 to 60 inches beneath the surface, gradually becomes less firm. The firm layer restricts roots and has moderately slow permeability.

[1] Italicized numbers in parentheses refer to Literature Cited, p. 86.

Figure 2.—**Apples and peaches grow well on Aura soils.**

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent	Soil	Area	Extent
	Acres	*Percent*		*Acres*	*Percent*
Aura gravelly sandy loam, 0 to 5 percent slopes	2,940	1.3	Dune land	70	(1)
Aura gravelly sandy loam, 5 to 10 percent slopes, eroded	300	.1	Elkton silt loam, 2 to 5 percent slopes	200	0.1
Aura loam, 0 to 2 percent slopes	1,570	.7	Elkton-Bayboro sandy loams, 0 to 2 percent slopes	1,300	.6
Aura loam, 2 to 5 percent slopes	2,490	1.1	Elkton-Bayboro silt loams, 0 to 2 percent slopes	6,300	2.8
Aura loamy sand, 0 to 5 percent slopes	440	.2	Evesboro sand, 0 to 5 percent slopes	4,200	1.9
Aura sandy loam, 0 to 5 percent slopes	4,900	2.2	Evesboro sand, 5 to 10 percent slopes	1,230	.5
Aura sandy loam, 5 to 10 percent slopes, eroded	470	.2	Evesboro sand, 10 to 15 percent slopes	600	.3
Berryland sand	2,360	1.1	Evesboro sand, 15 to 30 percent slopes	250	.1
Berryland-Othello complex	300	.1	Evesboro-Aura complex, 10 to 15 percent slopes	110	(1)
Berryland sand, heavy subsoil variant	440	.2	Fallsington sandy loam, 0 to 3 percent slopes	5,900	2.6
Bibb silt loam, mucky stratum	4,400	2.0	Fallsington-Othello complex, 0 to 2 percent slopes	1,130	.5
Clay pits	20	(1)	Fallsington-Pocomoke-Berryland complex	1,520	.7
Clayey land, Keyport materials, steep	170	.1	Fort Mott loamy sand, 0 to 5 percent slopes	3,100	1.4
Clayey land, Marlton materials, steep	400	.2	Fort Mott loamy sand, 5 to 10 percent slopes	190	.1
Chillum silt loam, 0 to 2 percent slopes	1,440	.6	Fresh water marsh	3,300	1.5
Chillum silt loam, 2 to 5 percent slopes	7,000	3.1	Galestown sand, 0 to 5 percent slopes	6,000	2.7
Downer loamy sand, 0 to 5 percent slopes	1,720	.8	Galestown-Sassafras-Klej complex, 0 to 5 percent slopes	1,180	.5
Downer loamy sand, 5 to 10 percent slopes	260	.1	Gravel pits	490	.2
Downer-Sassafras loamy sands, 0 to 5 percent slopes	1,930	.9	Howell soils, 0 to 5 percent slopes	380	.2
Downer-Sassafras sandy loams, 0 to 5 percent slopes	1,220	.5	Keyport loam, 2 to 5 percent slopes, eroded	5,400	2.4
Dragston-Woodstown sandy loams, clayey substrata, 2 to 5 percent slopes	870	.4			

See footnote at end of table.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Area	Extent
	Acres	*Percent*
Keyport loam, 5 to 10 percent slopes, eroded	1,100	0.5
Keyport loam, 10 to 15 percent slopes, eroded	370	.2
Keyport sandy loam, 0 to 5 percent slopes	760	.3
Keyport soils, 5 to 10 percent slopes, eroded	440	.2
Keyport soils, 10 to 15 percent slopes, eroded	170	.1
Klej loamy sand, 0 to 3 percent slopes	1,840	.8
Klej-Woodstown-Galestown loamy sands, 0 to 3 percent slopes	790	.4
Lenoir-Keyport silt loams, 0 to 2 percent slopes	1,320	.6
Made land, dredged river materials	7,000	3.1
Made land, sanitary land fill	20	(1)
Marlton soils, 2 to 5 percent slopes	130	.1
Marlton soils, 2 to 5 percent slopes, eroded	290	.1
Marlton soils, 5 to 10 percent slopes, eroded	870	.4
Marlton soils, 10 to 15 percent slopes, eroded	400	.2
Matapeake silt loam, 0 to 2 percent slopes	1,560	.7
Matapeake silt loam, 2 to 5 percent slopes	5,500	2.5
Matapeake silt loam, 5 to 10 percent slopes	630	.3
Matapeake silt loam, 5 to 10 percent slopes, eroded	630	.3
Matapeake silt loam, thin solum, 10 to 15 percent slopes	250	.1
Mattapex silt loam, 0 to 2 percent slopes	7,300	3.3
Mattapex silt loam, 2 to 5 percent slopes	6,800	3.0
Mattapex silt loam, 5 to 10 percent slopes	180	.1
Mattapex silt loam, clayey substratum, 0 to 2 percent slopes	1,260	.6
Mattapex silt loam, clayey substratum, 2 to 5 percent slopes	3,200	1.4
Mattapex silt loam, clayey substratum, 5 to 10 percent slopes	260	.1
Mattapex silt loam, glauconitic substratum, 0 to 2 percent slopes	1,130	.5
Mattapex silt loam, glauconitic substratum, 2 to 5 percent slopes	3,200	1.4
Muck, shallow	4,200	1.9
Othello silt loam, 0 to 3 percent slopes	12,300	5.5
Peat, shallow	1,060	.5
Pocomoke-Berryland loamy sands	2,600	1.2
Pocomoke sandy loam	1,290	.6
Sand pits	300	.1
Sandy and clayey land, glauconitic materials, gently sloping	280	0.1
Sandy land, Downer and Sassafras materials, steep	480	.2
Sassafras loamy sand, 0 to 5 percent slopes	5,000	2.2
Sassafras loamy sand, 5 to 10 percent slopes	370	.2
Sassafras loamy sand, 10 to 15 percent slopes	260	.1
Sassafras sandy loam, 0 to 2 percent slopes	2,080	.9
Sassafras sandy loam, 2 to 5 percent slopes	11,000	4.9
Sassafras sandy loam, 5 to 10 percent slopes	920	.4
Sassafras sandy loam, 5 to 10 percent slopes, eroded	840	.4
Sassafras sandy loam, 10 to 15 percent slopes	240	.1
Sassafras sandy loam, 10 to 15 percent slopes, eroded	270	.1
Sassafras-Aura loams, 0 to 5 percent slopes	890	.4
Sassafras-Aura sandy loams, 0 to 5 percent slopes	260	.1
Sassafras-Galestown-Woodstown loamy sands, 0 to 5 percent slopes	4,800	2.1
Sassafras-Woodstown sandy loams, 0 to 5 percent slopes	790	.4
Tidal marsh	31,700	14.2
Woodstown loamy sand, 0 to 5 percent slopes	1,360	.6
Woodstown loamy sand, clayey substratum, 0 to 5 percent slopes	520	.2
Woodstown sandy loam, 0 to 5 percent slopes	10,200	4.6
Woodstown sandy loam, 5 to 10 percent slopes	300	.1
Woodstown sandy loam, clayey substratum, 2 to 5 percent slopes	280	.1
Woodstown-Dragston loamy sands, 0 to 5 percent slopes	510	.2
Woodstown-Dragston sandy loams, 0 to 5 percent slopes	2,050	9
Woodstown-Fallsington-Klej complex, 0 to 3 percent slopes	300	.1
Woodstown-Klej-Sassafras loamy sands, 0 to 3 percent slopes	660	.3
Total	224,000	100.0

[1] Less than 0.05 percent.

The content of organic matter is normally moderate to low; natural fertility is moderate. Water-holding capacity ranges from moderately low to moderate, depending on the texture of the surface soil. When the Aura soils dry out, they tend to become hard.

The native vegetation is trees, mostly oaks. Idle fields normally become covered with pines if pine trees that produce seed are nearby.

Aura soils are used mostly for fruit, vegetables, and general crops.

A representative profile of Aura loam, 0 to 2 percent slopes, on the eastern edge of a gravel pit of the New Jersey State Highway Department, 1 mile east of Elmer:

A1—0 to 14 inches, yellowish-brown (10YR 5/4) loam, very pale brown (10YR 7/4) when dry; very weak, coarse, platy structure; friable; gradual, wavy boundary; 10 to 16 inches thick.

A2—14 to 17 inches, yellowish-brown (10YR 5/4), very pale brown (10YR 7/4) when dry, very slightly clayey gravelly sandy loam; very weak, medium, subangular blocky structure; friable when moist, hard when dry; clear, wavy boundary; 2 to 3 inches thick.

B21t—17 to 26 inches, reddish-brown (5YR 4/4 toward 7.5YR) gravelly sandy clay loam to gravelly coarse sandy loam; massive to very weak, subangular blocky structure, obscured by abundant fine gravel; clods friable when moist, hard when dry; clay coats on sand grains distinct; clear, wavy boundary; 6 to 10 inches thick.

B22t—26 to 32 inches, yellowish-red (5YR 4/6 toward 3/6 and 2.5YR) gravelly coarse sandy clay loam; very weak, coarse and medium, subangular blocky structure; firm in place, clods friable, hard when dry; clay coats on sand grains distinct; gradual, wavy boundary; 6 to 8 inches thick.

B23t—32 to 39 inches, reddish-brown (5YR 4/4) gravelly coarse sandy clay loam; very weak, coarse and medium, subangular blocky structure; firm in place, clods friable, hard when dry; clay coats on sand grains prominent; clear, wavy boundary; 6 to 8 inches thick.

B31t—39 to 62 inches, dark-red and red (2.5YR 3/6 to 4/6), much speckled with browner and paler colors, gravelly coarse sandy loam; massive, stratified; very firm in place, clods firm, very hard when dry; clay coats on sand grains prominent; clear, wavy boundary; 15 to 30 inches thick.

B32t—62 to 80 inches, dark-red to red (2.5YR 3/6 to 4/6 with some 5/8) light gravelly coarse sandy loam to gravelly loamy coarse sand; noticeable clay but little silt; massive; stratified; very firm in place, clods firm when moist but crushable to clay-coated grains when wet; in some strata clay coats are few but clear; in

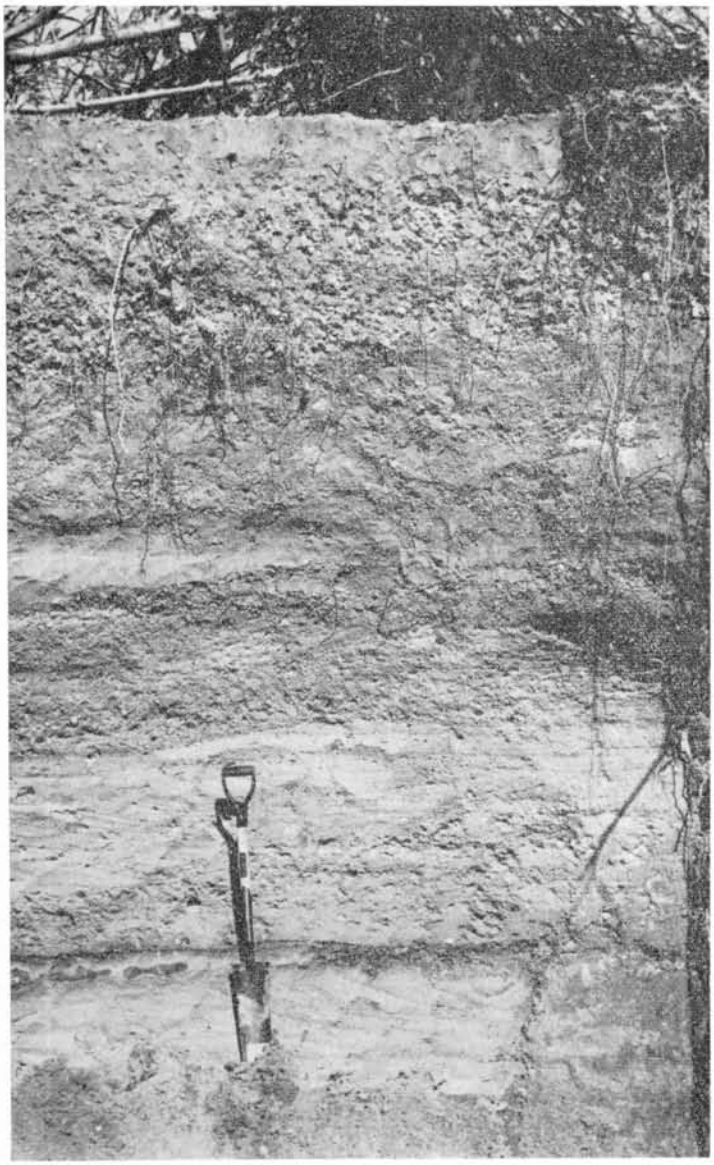


Figure 3.—**Representative profile of an Aura soil.**

others they are coarse and prominent; clear, wavy boundary; 15 to 25 inches thick.

B33t—80 to 93 inches, dark-red and red (2.5YR 3/6 and 4/6) coarse sandy loam to loamy sand; massive, stratified; very firm in place, clods firm but crushable to grains; clay coats prominent on sand grains and in interstices; gradual, wavy boundary; 10 to 20 inches thick.

C—93 to 110 inches +, dark-brown (7.5YR 4/4 to 4/6) loamy coarse sand or coarse sand in which clay is dominant over silt; clay coatings of strong brown, yellowish red, and yellow (7.5YR 5/6, 5YR 5/6, 10YR 7/6); massive; stratified; firm to very firm in place, clods easily crushed to grains that are partly coated with light-colored clay.

Average thickness of the solum is more than 5 feet. Depth to the firm layer (B22t horizon) ranges from 12 to 40 inches but is mostly about 26 inches. The amount of rounded quartzose gravel in the solum varies considerably from place to place, from about 2 percent in some places to almost 50 percent in others. The gravel is mostly quartz but is partly weathered chert.

The range of texture in the surface soil includes loam, sandy loam, gravelly sandy loam, and loamy sand. Sandy loams and loamy sands have grayish-brown surface soil where they have been plowed and a thin, bleached horizon at the surface where they have not been plowed.

The subsoil is sandy clay loam or heavy sandy loam. Normally, it ranges from strong brown (7.5YR 5/6) to yellowish red (5YR 4/6), but in places it is dark red (2.5YR 3/6).

The substratum contains less silt than the subsoil, and its clay content decreases gradually with depth. It is generally less firm than the subsoil, but its consistence ranges from friable to firm.

Aura soils are so strongly weathered that fragments of feldspar and even those of chert are soft.

Aura soils adjoin areas of Sassafras, Downer, Woodstown, Dragston, Chillum, or Mattapex soils. They do not have the mottling that is present in the Woodstown, Dragston, and Mattapex soils. The subsoil of sandy clay loam distinguishes Aura soils from Chillum soils, which are dominantly silt loam to a depth of 30 inches.

Aura gravelly sandy loam, 0 to 5 percent slopes (AgB).—This soil has a surface layer of gravelly sandy loam of which 15 to 40 percent is small, rounded quartz gravel. The gravel content is partly the result of the presence of gravel in the parent sediments and partly the result of concentration of gravel at the surface when finer material was removed by erosion. The gravel limits the capacity of this soil to hold moisture, makes the soil less suitable than the nongravelly Aura soils for seeded vegetables, and makes tillage difficult.

In many fields there are spots where some of the sticky subsoil has been mixed into the plowed layer.

This soil is used for fruit, vegetables, and general crops. (Capability unit IIs–9; woodland suitability group 6)

Aura gravelly sandy loam, 5 to 10 percent slopes, eroded (AgC2).—This soil has a surface layer more gravelly and more sandy than the one in the the profile described as representative of the series. Erosion has so thinned the surface soil that plowing turns up some subsoil in many places. The thickness of the surface layer in most places is about 8 to 10 inches. Runoff is rapid, and the erosion hazard is severe whenever the soil is cultivated. The soil tends to be droughty.

Included in the mapped areas of this soil are small amounts of Downer and Sassafras soils.

This Aura soil is suited to fruit, vegetables, and general farm crops; it is not well suited to seeded vegetables, because of the gravel. (Capability unit IIIe–9; woodland suitability group 6)

Aura loam, 0 to 2 percent slopes (AlA).—This soil has the profile described as typical of the series. The plow layer of loam gives the soil more water-holding capacity than that of the sandy loam or the loamy sand. Quartz pebbles are likely to be scattered over the surface, but they do not make up more than 15 percent of the surface layer. Lima beans, corn, tomatoes, and fruit are common crops. (Capability unit I–4; woodland suitability group 1)

Aura loam, 2 to 5 percent slopes (AlB).—This soil is similar to Aura loam, 0 to 2 percent slopes, except that it is more sloping and the erosion hazard is greater. Included in the areas mapped are a few small knolls where erosion has exposed the sticky, gravelly subsoil. This soil is suited to fruit, vegetables, corn, grain, and hay. (Capability unit IIe–4; woodland suitability group 1)

Aura loamy sand, 0 to 5 percent slopes (AmB).—The profile of this soil is similar to the one described as representative of the series, except that the surface layer, to a depth of 18 inches, is loamy sand instead of loam. Small

areas of Sassafras soils and of Fort Mott loamy sand are included in the areas mapped.

This Aura soil is easy to till but is droughty and subject to wind and water erosion. Damage to vegetable crops by windblown sand is common in March and April. The surface soil takes in moisture rapidly, but the water-holding capacity is moderately low. The soil is too droughty for hay or pasture. If irrigated, it is better suited to fruit and vegetables. (Capability unit IIIs–10; woodland suitability group 6)

Aura sandy loam, 0 to 5 percent slopes (ArB).—This soil has a profile similar to the one described as representative of the series, except the surface soil is sandy loam. It has a slightly higher infiltration rate than the loam, but has moderate water-holding capacity. It is subject to water erosion. Included in the areas mapped are small areas of loam and of loamy sand, and also small areas of Galestown sand and Downer loamy sand. Gravelly spots are common.

This Aura soil is suited to most vegetables, fruit, and general crops. It is subject to the same restricting influence of the firm or very firm subsoil and substratum as the other Aura soils. Control of erosion is needed. (Capability unit IIs–9; woodland suitability group 6)

Aura sandy loam, 5 to 10 percent slopes, eroded (ArC2).—This soil is similar to Aura sandy loam, 0 to 5 percent slopes, but is more sloping and is moderately eroded. It has a surface layer more sandy than the one described as representative of the series. The surface soil of sandy loam has been thinned by erosion to about 9 inches. In many places the original surface layer has been thinned so much that sticky and gravelly subsoil is incorporated into the plow layer. Shallow gullies are common. These features cause uneven intake and storage of moisture and uneven maturing of crops. This eroded soil tends to puddle when wet and to crack when dry. Hazards of runoff and erosion are severe, and rather intense measures are needed to save water and soil.

This soil is used for fruit and vegetables and for general crops, although careful management is needed if erosion is to be controlled. (Capability unit IIIe–9; woodland suitability group 6)

Bayboro Series

Bayboro soils are low lying, clayey, and very poorly drained. They are primarily in the Keyport-Elkton general soil area, in association with Elkton soils. Because of their small extent, they were mapped in this county only in two Elkton-Bayboro complexes.

A typical Bayboro soil has a surface layer of black silt loam about 10 inches thick and a subsoil of gray silty clay that extends to a depth of about 50 inches. A substratum of light-gray silty clay lies below the subsoil, but the boundary between the two layers is faint.

Unless they have been drained, Bayboro soils have water on the surface much of the time. They have high water-holding capacity and are slowly permeable. Organic-matter content and natural fertility are high. Water moves too slowly through them to permit good underdrainage, but surface drainage generally works fairly well. Dugout ponds have a slow recharge rate, except in places where the silty clay is underlain by sand. The soils occur in frost pockets and are subject to heaving when freezing takes place.

The native vegetation is hardwood forest composed of pin oak, willow oak, and swamp white oak. Much of the area is wooded.

The soils are suitable for general crops if they are cleared and adequately drained. Sweetgum seeds readily if a field is left idle.

Profile of a Bayboro silt loam in a cultivated field, about 1⅘ miles north of Alloway and about 90 yards northeast of the railroad crossing, near a culvert:

Ap—0 to 10 inches, black (10YR 2/1) silt loam; moderate, medium, subangular blocky structure; slightly firm, slightly sticky, slightly plastic; abrupt, smooth boundary; 8 to 12 inches thick.

B1—10 to 16 inches, very dark gray (10YR 3/1) silty clay; few, fine, prominent, reddish-yellow (7.5YR 7/8) mottles; strong, medium, prismatic structure; plastic when wet, very firm when dry; abrupt, slightly wavy boundary; 0 to 8 inches thick.

B2g—16 to 25 inches, light-gray (10YR 7/2) silty clay; common, fine and medium, prominent, reddish-yellow (7.5YR 6/8) and dark-gray (10YR 4/1) mottles; moderate, medium and coarse, blocky structure tending toward prismatic structure; slightly sticky, plastic when wet, very firm when dry; surface of peds appears smooth; clear, smooth boundary; 4 to 10 inches thick.

B3g—25 to 49 inches, ped faces light-gray (10YR 7/2) silty clay; reddish-yellow (7.5YR 7/8) and light-gray mottles in interiors of peds; moderate, fine, subangular blocky structure; sticky, plastic; root channels filled with dark-gray material; gradual boundary; 20 to 30 inches thick.

C—49 to 55 inches, light-gray (7.5YR 7/1) silty clay; many, prominent, yellow (10YR 7/8) and reddish-yellow (7.5YR 7/8) mottles; weak, fine, blocky structure or massive; some root channels filled with dark-colored material.

The solum is typically more than 40 inches thick. Where the clay layers are thick, however, it is difficult to tell where the genetic horizons stop and the substratum begins.

The range in texture of the A horizon includes sandy loam, loam, and clay loam. The color of the A horizon is very dark gray or black. In places there are prominent, fine mottles.

Texture of the B horizon ranges from heavy clay loam to clay. Structure is strong angular blocky in some profiles. The peds are dense, but in summer large cracks are formed between them.

Texture of the C horizon is mostly clay, silty clay, or clay loam, but in some places the C horizon is more sandy below a depth of 40 inches.

Bayboro soils occur with Lenoir and Elkton soils. Their very dark surface layer distinguishes them from those soils. They also occur with Othello soils. Bayboro soils contain more clay and are less silty than the Othello soils.

Berryland Series

The Berryland series consists of very poorly drained soils that formed in sand. They have a very dark surface soil over layers of brown and gray sand. They are on low-lying flats along the Delaware River and along streams in the southern and eastern parts of the county.

A typical Berryland soil has a surface layer of black sand that is about 8 inches thick and has a high content of organic matter. Below it are successive layers of loose, gray or brown sand, dark-brown loamy sand, and loose, yellowish-brown sand.

When rainfall is normal, Berryland soils have a water table that is at or above the surface late in winter and in spring and drops to a depth of several feet below the surface in summer. If an outlet can be reached, the high water

table can be lowered readily by either open ditches or underdrains. Berryland soils have low natural fertility. Permeability is rapid. The water-holding capacity is moderately low. The soil texture is so coarse that capillary action cannot bring water to the root zone in summer when the water table is low.

Nearly all Berryland soils have a forest cover of red maple, pitch pine, and holly and an undergrowth of highbush blueberries. Small areas have been cleared and drained and are being used for soybeans, corn, and some summer-planted vegetables. In nearby counties these soils are extensively used for blueberries.

The soils have severe limitations for commercial, industrial, and residential uses because of the high water table.

A representative profile of Berryland sand along the road from Quinton, in Salem County, to Jericho, in Cumberland County, one-fourth of a mile west of the county boundary:

O—3 inches to 0, dark reddish-brown (5YR 2/2) roots and partially decayed leaves; matted; soft; abrupt, wavy boundary; 2 to 3 inches thick.

A1—0 to 8 inches, black (N 1/0) sand and organic matter; massive; friable; sprinkling of sand grains bleached white; clear, wavy boundary; 7 to 12 inches thick.

A21—8 to 10 inches, light brownish-gray (10YR 6/2) sand; gradual, smooth boundary; 0 to 4 inches thick.

B1—10 to 16 inches dark-brown (7.5YR 4/2) sand; single grain; loose; clear, smooth boundary; 4 to 7 inches thick.

B21h—16 to 19 inches, dark reddish-brown (5YR 3/2) loamy sand; single grain; loose; clear to gradual, smooth boundary; 2 to 3 inches thick.

B22h—19 to 24 inches dark-brown (7.5YR 4/2) loamy sand; massive; friable, firm in place; gradual, smooth boundary; 5 to 6 inches thick.

B3—24 to 28 inches, dark-brown (7.5YR 4/4) sand; single grain; loose; gradual boundary; 0 to 8 inches thick.

C—28 to 42 inches, sand; yellowish brown (10YR 5/6) in the upper part, approaching brownish yellow (10YR 6/6) in lower part; single grain; loose; very few, pale-gray mottles in the upper part; some loose, rounded quartzose gravel.

Thickness of the solum ranges from 15 to 30 inches and in most places is about 24 inches. In some places brown layers resembling the B horizon are repeated through the C horizon.

The range in texture of the A horizon includes sand, loamy sand, and rarely sandy loam. Color ranges from black or very dark gray to gray. The B horizon is discontinuous in places, and in some profiles it is cemented. It normally hardens on drying. The C horizon is gravel in some profiles. In some places loamy sand or sandy loam layers are present below 40 inches. The color of the C horizon ranges from gray to yellowish brown, except where there are repeated dark layers.

Berryland soils are near or beside Klej, Dragston, Fallsington, and Pocomoke soils. Their surface soil is much darker than that of Klej soils. They have coarser subsoil than that of the Dragston, Fallsington, and Pocomoke soils.

Berryland sand (Bp).—This soil has the profile that is described for the soil series. It is nearly level and lies on low flats along most of the streams. Where the soil has not been artificially drained, the water table is at the surface during winter and early in spring but stays several feet below the surface during summer.

In some places the surface soil is dark gray instead of black. In some places the surface soil is muck or peat that ranges up to 12 inches in thickness. The soil in these areas is not so permeable as the typical soil. The surface layer resists wetting when dry. It subsides and shrinks upon drying and is subject to burning. In some places the soil is underlain at a depth between 40 and 60 inches by layers that are mostly sandy clay or sandy clay loam. These fine-textured layers might reduce the recharge rate in dugout ponds. In some places the subsoil is sandy loam instead of loamy sand, and in such areas the dark-brown layers that are described in the representative profile are not likely to be present.

This soil is very poorly suited to cultivated crops. Highbush blueberries grow naturally on it and produce well if they are grown commercially. (Capability unit Vw-26; woodland suitability group 7)

Berryland-Othello complex (Br).—This complex is composed of nearly level Berryland and Othello soils in about equal proportions. The Berryland soil has a surface layer of sand and a profile similar to the one described as representative of the Berryland series. The Othello soil has a surface layer of silt loam and a profile similar to the one described as representative of the Othello series. The surface horizon of the Othello soil is somewhat more sandy in some places than the one described as representative.

Both soils need drainage if they are to be farmed. Underdrains are more effective in Berryland than in Othello soils. Some surface drainage may be needed in the Othello parts of this complex. (Capability unit Vw–26; woodland suitability group 7)

Berryland Series, Heavy Subsoil Variant

This variant of the Berryland series consists of soils that are similar to the normal Berryland soils, except that the surface layer is lighter colored and the substratum is finer textured, consisting of silt loam, loam, or silty clay loam.

These soils formed where sand overlies finer sediments, mainly in the northwestern corner of the county on the plains bordering the Delaware River. The soils are in depressed flats and hollows where the water table is high.

Permeability is rapid to the underlying finer textured layer, but in that layer is moderately slow. Organic-matter content is moderately high, but the natural fertility is low. The water-holding capacity is moderately low. Water is near the surface during the wettest periods. Drainage may be difficult because outlets are difficult to find in low areas. Recharge rates are slow in dugout ponds.

Red maple and blackgum trees grow naturally on these soils. The soils are suited to blueberries and can be used for some vegetables.

A representative profile of Berryland sand, heavy subsoil variant, 2 miles southeast of Pedricktown:

Ap—0 to 10 inches, dark-gray (N 4/0) sand; single grain; loose; abrupt, smooth boundary; 8 to 12 inches thick.

A1—10 to 20 inches, very dark gray (N 3/0) sand; single grain; loose; clear boundary; 6 to 14 inches thick.

B21h—20 to 30 inches, very dusky red (2.5YR 2/2) loamy sand that is nearly sandy loam; single grain; firm, very hard when dry; clear, wavy boundary; 6 to 12 inches thick.

B22h—30 to 35 inches, very dusky red (2.5YR 2/2) gravelly sand; single grain; unevenly loose to firm; many fine to large pebbles; few to common cobbles up to 6 inches in diameter; 0 to 8 inches thick.

IIC—35 to 50 inches, gray silt loam; few to common mottles of brownish yellow (10YR 6/8) to dark reddish brown (5YR 3/4); massive; friable; clearly micaceous.

Thickness of the solum ranges from 20 to 50 inches but in most places is about 30 inches.

The texture of the A horizon ranges from sand to loamy sand. Color ranges from black to gray. In some profiles a light-colored layer (A2) is present beneath the dark surface layer.

Consistence in the B horizon ranges from loose to firm. In some profiles the B horizon is weakly cemented. Gravel is mixed with the sand in some profiles. The underlying C horizon ranges from silt loam to clay loam and in some profiles contains glauconite.

Soils of the Berryland series, heavy subsoil variant, are associated mainly with the Galestown, Klej, Howell, Sassafras, Woodstown, and Dragston soils.

Berryland sand, heavy subsoil variant (Be).—This soil has the profile that is described for the Berryland series, heavy subsoil variant. It is level or nearly level. Many areas are small and occupy slight depressions.

Light-colored, windblown sand covers the typically dark-colored surface layer in some areas. Variations in the mapping unit include a sandy soil that does not have dark-brown subsoil, a soil in which the dark-brown subsoil is indurated, and a soil in which the finer textured substratum is absent.

This soil is poorly suited to cultivation. It is well suited to commercial production of blueberries. (Capability unit Vw–26; woodland suitability group 7)

Bibb Series

The Bibb series consists of dark-gray, poorly drained soils. They were formed in recent deposits of mineral soil materials eroded from adjoining slopes. Bibb soils commonly are on flooded bottom lands of streams that drain to the west into tidewater, but the soils lie higher than the tidal waters.

A typical profile is composed of about 2½ feet of gray or dark-gray silt loam over a dark-gray to black muck layer, 1 foot or more thick. This organic layer is generally underlain, in turn, by coarse sand.

Bibb soils are moderately slowly permeable, have a high content of organic matter, and have moderate natural fertility. They have high water-holding capacity. Since they are poorly drained and are subject to frequent overflows, they are not suited to cultivation. They are well suited to pasture, but some drainage may be needed. They have severe limitations for residential, commercial, and industrial uses.

Representative profile of Bibb silt loam, mucky stratum, at intersection of Woodstown-Salem Pike and Salem River on the south edge of the Borough of Woodstown:

A1—0 to 20 inches, dark-gray (N 4/0) silt loam that has few, fine to medium, yellowish-red (5Y 5/6) mottles along root channels; massive; friable; gradual boundary; 10 to 30 inches thick.

C1g—20 to 30 inches, dark-gray (N 4/0) silt loam; massive; friable; abrupt boundary; 0 to 15 inches thick.

IIC2g—30 to 60 inches, black muck; massive; friable; abrupt, smooth boundary; 12 to 36 inches thick.

IIIC3g—60 inches +, gray medium to coarse sand; single grain; loose.

Thickness of the upper mineral part of Bibb soils ranges from 10 to 45 inches and in most places is around 30 inches.

Texture of the A horizon is silt loam, mucky loam, or, in a few places, sandy loam. In some places the soil is gravelly. The color is mostly gray or black, but in some places it is brownish. The content of organic matter is moderate to high. In some places the profile is highly mottled.

The underlying muck layer has high organic-matter content and is subject to compression and subsidence. Beneath the muck are layers of material that is mostly sandy.

Bibb soils are associated with Peat and Tidal marsh and with Pocomoke and Berryland soils. They are composed mostly of mineral matter and so differ from Peat and Tidal marsh, which are composed chiefly of organic remains. They do not have the developed subsoil horizons that are present in Pocomoke and Berryland soils.

Bibb silt loam, mucky stratum (Bs).—This soil has the profile that is described for the series. It is nearly level and is on flood plains. Drainage ranges from somewhat poorly drained to very poorly drained. (Capability unit Vw–28; woodland suitability group 4)

Clay Pits

Clay pits (Cq) consists of pits where the soil and soil materials have been removed by power shovels to a depth of 10 to 20 feet to obtain clay. The pits are generally in areas of Keyport or of Woodstown soils, in places where the substratum is clay. Generally, the edges of the pits are steep.

Permeabilty is very slow in the clay that remains on the pit floors. Erosion is severe on the pit sides.

Control of erosion, difficulties of revegetation, and slow permeability of the clay are major problems in developing worked-out clay pits for further use. These areas have severe limitations for industrial and commercial uses because the pits become partly filled with water during rainy seasons. Some of the pits have been developed for recreational uses. Sweetgums and red maples are the chief trees that will grow in the pits. Clay pits have not been classified in a capability unit or a woodland suitability group.

Clayey Land, Keyport Materials, Steep

Clayey land, Keyport materials, steep (CbE) is composed mostly of fine-textured soil material in which soil horizons are not present or are faint. Apparently, the clayey material erodes at a rate fast enough to prevent development of soil horizons. Seep spots occur in some places. Runoff is rapid. Most areas are in hardwood forest. (Capability unit VIIe–1; woodland suitability group 2)

Clayey Land, Marlton Materials, Steep

Clayey land, Marlton materials, steep (CcF) consists mostly of steeply sloping, clayey soils that are highly glauconitic. In most places the soil horizons common to Marlton soils are not consistently present. Some steep slopes are predominantly sandy.

The areas of this mapping unit are steep slopes adjacent to streams, and nearly all of them are wooded. For the best use, they should remain in trees. (Capability unit VIIe–1; woodland suitability group 2)

Chillum Series

The Chillum soils are well-drained, gently sloping soils that are silty in the upper 30 inches and below that depth are weakly cemented gravelly sandy clay loam. These soils are chiefly on uplands in the vicinity of Shirley and Pole Tavern.

A representative Chillum soil has surface soil of brown silt loam and subsoil about 18 inches thick that is yellowish-brown or strong-brown silt loam or silty clay loam. The substratum is gravelly sandy clay loam.

Chillum soils have high water-holding capacity, moderate natural fertility and organic-matter content, and moderately slow permeability.

Natural vegetation consists of hardwood trees, chiefly oaks. Most of the acreage has been cleared and is used for potatoes, high-value vegetables, corn, hay, or pasture.

These soils have no limitations for ordinary recreational uses and slight, if any, limitations for residential or commercial uses. The firm substratum of moderately slow permeability is a moderate limitation for disposal of waste from septic tanks.

Representative profile of a Chillum silt loam, three-fourths of a mile south of Daretown on Aldine-Daretown Road:

Ap—0 to 10 inches, brown (10YR 5/3) silt loam; very weak, fine, granular structure; friable; abrupt, smooth boundary; 8 to 12 inches thick.

A2—10 to 18 inches, yellowish-brown (10YR 5/6) silt loam; very weak, medium, subangular blocky structure; friable; gradual boundary; 8 to 15 inches thick.

B21t—18 to 30 inches, yellowish-brown (10YR 5/6) silt loam; weak, fine, subangular blocky structure; firm in place, friable in hand; weak clay films; few quartz pebbles; gradual boundary; 8 to 14 inches thick.

B22t—30 to 36 inches, strong-brown (7.5YR 5/6) silty clay loam; massive; firm in place, friable in hand; some clay films; some gravel, including disintegrated chert; clear, wavy boundary; 6 to 10 inches thick.

IIB3—36 to 50 inches, strong-brown (7.5YR 5/6) gravelly sandy clay loam; low silt content; stratified but otherwise massive; very firm in place, friable in hand; sticky when wet; clay encircles grains and pebbles; 20 percent gravel, ¼ to 1 inch in size; gravel is mainly quartz and partly disintegrated chert.

In most places the solum is about 50 inches thick; its thickness ranges from 40 to 60 inches.

Color of the A horizon is brown or dark brown. The range in texture of the A horizon includes silt loam, loam, or, rarely, fine sandy loam.

The Chillum soils are in the same localities as Mattapex and Othello soils, which also were formed in silty materials. Chillum soils do not have the mottling that is common to the Mattapex and Othello soils. Chillum soils differ from the Matapeake soils by having a firm, gravelly substratum. They have a more silty surface soil and upper subsoil than the Aura soils. They have a higher content of silt in the upper profile than the Sassafras soils.

Chillum silt loam, 0 to 2 percent slopes (ChA).—A profile of this soil is described as representative of the series.

Small areas of moderately well drained Mattapex soils are included in some of the areas mapped. They may require some drainage if high-value crops are grown. (Capability unit I–4; woodland suitability group 1)

Chillum silt loam, 2 to 5 percent slopes (ChB).—This soil is similar to Chillum silt loam, 0 to 2 percent slopes, except for its slightly steeper slopes. The hazard of erosion is moderate when the soil is cultivated. Included in the areas mapped are some places where the subsoil has been penetrated by plowing or has been exposed at the surface. Also included are a few gravelly knolls where the silty covering is thin. Such places are mostly isolated inclusions of Aura soils. There are a few small draws or somewhat low areas, and also some other areas where the very firm IIB3 horizon is missing and the soil is somewhat like a Matapeake soil.

This Chillum soil has the same wide suitability for use that is normal for Chillum soils, but careful management is needed to control runoff and erosion. (Capability unit IIe–4; woodland suitability group 1)

Downer Series

The Downer series consists of deep, well-drained soils that were formed in deposits of sand and gravel that contain small amounts of clay and silt. For the most part, the Downer soils are nearly level to gently sloping and are on lower slopes east of Elmer and between Quinton, Alloway, and Jericho.

Where Downer soils have been cultivated, the surface layer is brownish-yellow loamy sand about 19 inches thick over about the same thickness of yellowish-brown sandy loam. The substratum is very pale brown sand.

Permeability is moderate or moderately rapid. Organic-matter content is low to moderate, and the natural fertility is low. Moisture-holding capacity is low or moderately low.

Natural vegetation in most places is oak but may be pine in the Quinton, Alloway, and Jericho areas. Sassafras or pine trees are usually the first to occupy abandoned fields.

Downer soils are suitable for vegetables and field crops. High-value crops are generally irrigated. Yields of pasture and hay are normally too low to be profitable. Wind erosion and sandblasting of crops are serious problems in places where Downer soils are cultivated or left bare.

Representative profile of a Downer loamy sand:

O—1 inch to 0, black (5YR 2/1) organic matter; abrupt boundary; 0 to 1 inch thick.

A11—0 to 1 inch, gray (10YR 6/1) loamy sand; single grain; loose; clear boundary; 0 to 1 inch thick.

A12—1 to 2 inches, brown (10YR 5/3) loamy sand; single grain; loose; clear boundary; 1 to 3 inches thick.

A2—2 to 19 inches, brownish-yellow (10YR 6/6) loamy sand; single grain; loose; clear boundary; 12 to 17 inches thick.

B2t—19 to 38 inches, yellowish-brown (10YR 5/8) sandy loam; weak, medium, subangular blocky structure; loose; clay bridges present but patchy; gradual boundary; 10 to 19 inches thick.

C—38 to 60 inches, very pale brown (10YR 8/4) sand variegated with reddish yellow (7.5YR 6/6); single grain; loose.

Thickness of the solum ranges from 24 to 40 inches; in most places it is about 28 inches.

The texture of the A horizon ranges from sandy loam to loamy sand; its color, from grayish brown to yellowish brown, depending on the organic-matter content; and its structure, from weak, fine granular to loose, single grain, depending on the texture. Texture of the B horizon is loamy sand or light sandy loam.

The C horizon normally is strikingly looser and generally coarser than the subsoil. Quartzose gravel is present in varying amounts. Normally, the C horizon is composed of alternating layers of sand and sandy loam. The layers of sandy loam are thinner than the layers of sand and, in some places, are weakly cemented.

Downer soils nearly everywhere occur with Aura, Sassafras, Evesboro, and Galestown soils. They do not have the firm layer that is present in Aura soils. Their subsoil is neither so fine as that of the Sassafras soils nor so coarse as that of the Galestown or Evesboro soils.

Downer loamy sand, 0 to 5 percent slopes (DoB).—A profile of this soil is described as representative of the soil series. Included in the areas mapped are small areas of Sassafras, Aura, and Galestown soils. In the small, rounded depressions common in the areas of this soil, the surface layer is likely to be sandy loam. There, the soil is less droughty than this soil and is not so subject to wind erosion.

This Downer soil is droughty, and irrigation is needed

if high-value crops are to be grown. (Capability unit IIs–6; woodland suitability group 3)

Downer loamy sand, 5 to 10 percent slopes (DoC).—This soil resembles Downer loamy sand, 0 to 5 percent slopes, except for its steeper slope and the resulting greater hazard of water erosion. In some places the surface soil has been thinned by erosion. In as much as 15 percent of some of the areas mapped, the subsoil is loamy sand.

This soil is more droughty than Downer loamy sand, 0 to 5 percent slopes, because the subsoil is slightly more sandy, runoff is greater, and the soil is thinner. (Capability unit IIIe–6; woodland suitability group 3)

Downer-Sassafras loamy sands, 0 to 5 percent slopes (DuB).—In this complex the soil of 50 to 60 percent of the acreage mapped is similar to a Downer loamy sand as described for the Downer series, except that in some places the B horizon contains less clay. The soil of the other 40 to 50 percent of the acreage mapped is similar to a Sassafras loamy sand as described for the Sassafras series, except for a surface layer that is thicker than normal. These soils lie in a complex pattern, and it is not practicable to map them separately at the scale of the soil map.

These soils are droughty, and special management is needed for protection against wind erosion and sandblasting of crops. If irrigated, these soils are suitable for most vegetable crops. Yields of pasture and hay are low. (Capability unit IIs–6; woodland suitability group 3)

Downer-Sassafras sandy loams, 0 to 5 percent slopes (DvB).—In this complex, 50 to 60 percent of the acreage mapped is Downer sandy loam, and the rest is Sassafras sandy loam. The two soils lie in a complex pattern, and it is not practicable to show them separately at the scale of the soil map.

The Sassafras soil holds moisture and nutrients slightly better than the Downer soil, but both soils have few limitations and are well suited to most uses. (Capability unit IIe–5; woodland suitability group 3)

Dragston Series

The Dragston series consists of somewhat poorly drained, sandy soils. In most places they have slopes from 0 to 5 percent and are at the foot of steeper slopes, on flats, or in enclosed depressions. They were developed in loose, stratified sandy loam or sand. They lie in small areas that are scattered throughout the county.

Dragston soils have a surface soil of dark grayish-brown sandy loam, a subsoil of mottled yellowish-brown sandy loam, and a substratum of loose sand.

In their natural state, these soils have their subsoil saturated with water in winter and spring. Permeability is moderate to a depth of 30 inches. Water-holding capacity is moderate. Organic-matter content is low or moderate, and natural fertility is moderate.

Natural vegetation is pin oak and willow oak. Most of the areas have been cleared and are used for vegetables, field crops, hay, or pasture. The wet subsoil delays farming in spring and restricts the kinds of crops that can be grown. Either open ditches or underground drains will provide drainage. Most farmed areas have been artificially drained. If fields are abandoned, the first growth is usually highbush blueberries or red maples.

Dragston soils have moderate limitations, because of their wetness, for commercial, residential, and agricultural use. The seasonal high water table is a moderate limitation for house cellars and septic fields.

Representative profile of a Dragston sandy loam on a slope of 1 percent, formerly cultivated, 200 yards north of the intersection of Tuft Road and Fort Mott Road:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) sandy loam; weak, fine, granular structure; very friable; abrupt, smooth boundary; 6 to 12 inches thick.

A2—8 to 15 inches, yellowish-brown (10YR 5/4) sandy loam; many, faint, dark yellowish-brown (10YR 4/4) mottles; weak, fine, granular structure; very friable; abrupt boundary; 3 to 7 inches thick.

B2t—15 to 30 inches, yellowish-brown (10YR 5/6) sandy loam; many, medium, distinct, grayish-brown (10YR 5/2) mottles; weak, medium, subangular blocky structure; slightly plastic when wet; clay bridges on most sand grains; clear boundary; 10 to 20 inches thick.

C—30 to 60 inches, yellowish-brown (10YR 5/6) stratified sand and sandy loam; many, medium to coarse, distinct, strong-brown (7.5YR 5/6) mottles; single grain; loose.

Thickness of the solum ranges from 20 to 54 inches and in most places is about 28 inches.

Texture of the A horizon ranges from sandy loam to loamy sand. Texture of the B horizon ranges from sandy loam to sandy clay loam. A mottled gray and brown B3 horizon of sandy loam, ranging from 2 to 10 inches in thickness, is present in some profiles.

The C horizon consists of stratified layers of sand and sandy loam. In some places the material in one or more of these layers is firm. Some profiles have a clayey substratum. Rounded quartzose gravel is present in varying amounts.

Dragston soils occur with Woodstown, Fallsington, Pocomoke, and Klej soils. Dragston soils have gray mottles higher in the B horizon than do the Woodstown soils. They are not so gray as Fallsington and Pocomoke soils. They are not so sandy as the Klej soils.

Dragston-Woodstown sandy loams, clayey substrata, 2 to 5 percent slopes (DwB).—The soils of this mapping unit have profiles similar to those described as representative for the Dragston series and the Woodstown series, respectively, except they have a clayey substratum. Proportions of the two kinds of soil are about equal.

Texture of the substratum is clay, clay loam, or silty clay loam. Normally, the clayey substratum is between 30 and 40 inches below the surface. In a few places it is less than 30 inches below the surface.

The soils of this unit, if they are drained, are suitable for most vegetables and field crops. Hay and pasture crops produce good yields without drainage.

Because permeability is slow in the substratum, these soils have severe limitations for septic fields. The recharge rate may be slow in dugout ponds. The clayey substratum is likely to be unstable for foundations. (Capability unit IIw–14; woodland suitability group 1)

Dune Land

Dune land (Dz) consists of thick deposits of sand blown from the Delaware River beaches. The sand is generally in the form of dunes that are 50 to 200 feet wide and 1 to 10 feet high and are at altitudes just above tide level. When there are extremely high tides, the areas are subject to partial flooding. The deposits are so recent that there has been no soil development. The texture is sand of medium or coarse size. The areas are extremely droughty, and the sand is subject to drifting.

Dune land occurs in such small, irregular tracts and has such severe limitations that it is not practical to use

it for farming. The limitations are also severe for residential and commercial uses. The very rapidly permeable sand provides a poor filter for septic effluent, and pollution of ground water may occur. (Capability unit VIIs–8; not classified in a woodland suitability group)

Elkton Series

The Elkton series consists of deep, poorly drained soils that have a fine-textured subsoil (fig. 4). They occupy broad, low flats in the south-central and southwestern parts of the county.

A representative soil of the Elkton series has a light-gray surface soil, a light-gray subsoil of mottled clay, and a substratum of clay loam. In their natural condition, the Elkton soils contain excess water throughout much of the year.

Permeability is slow. Organic-matter content is moderate and natural fertility is moderate. The Elkton soils have high water-holding capacity and they drain very slowly. The soils are in frost pockets and are subject to severe frost heaving.

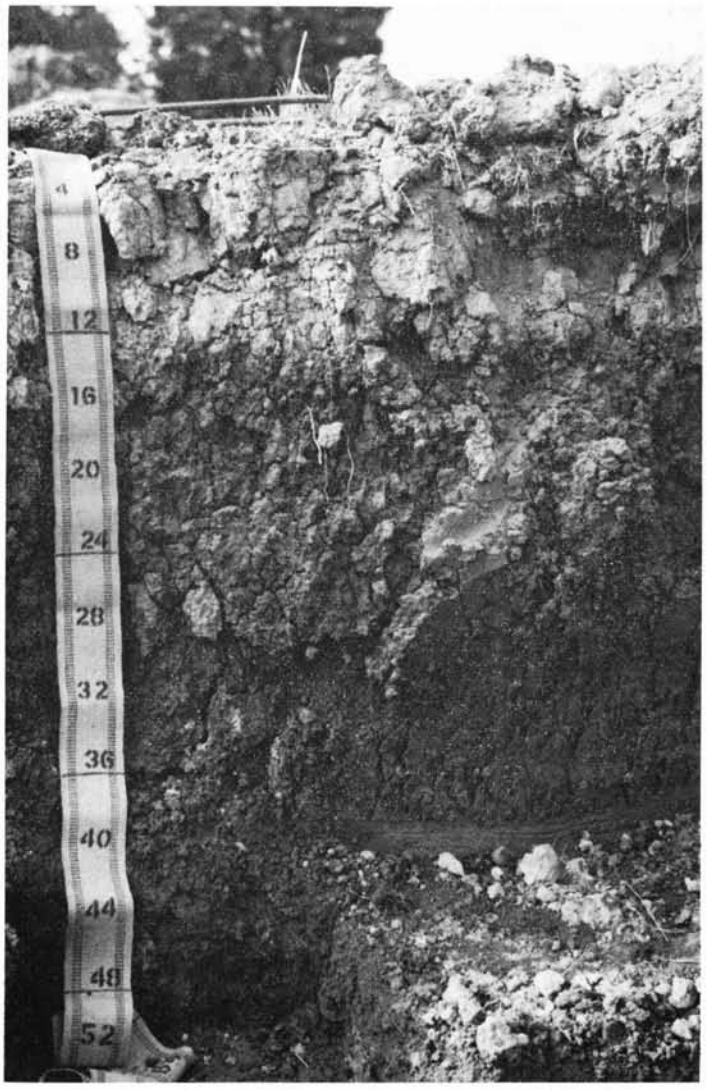


Figure 4.—**Elkton soils have clay subsoil that has subangular blocky or blocky structure.**

Natural vegetation is willow oak, white oak, and some sweetgum.

Where cleared, Elkton soils are used primarily for hay (generally clover), pasture, corn, and soybeans. They need surface drainage to make them suitable for crops, and they dry out too slowly for most spring crops. Underground drains work too slowly to be satisfactory. The soils are difficult to work. Most of the time, they are either too wet to permit planting or too dry to be tilled.

The excessive ground water and the fine texture are severe limitations in drainage. These features also severely limit the stability of foundations and the disposal of effluent from septic tanks.

Representative profile of an Elkton silt loam that has a slope of 0 to 1 percent, one-fourth of a mile from Commissioners Pike on Glasshouse Lane, Alloway:

Ap—0 to 6 inches, light-gray (10YR 6/1) silt loam; many, fine to medium, prominent, brownish-yellow (10YR 6/6) mottles; weak, fine, granular structure; friable; clear, smooth boundary; 6 to 10 inches thick.

B1g—6 to 10 inches, light-gray (10YR 7/2) clay loam; many, fine to medium, prominent, brownish-yellow (10YR 6/6) mottles; medium, subangular blocky structure; firm when moist, plastic when wet; clear, wavy boundary; 3 to 5 inches thick.

B2tg—10 to 21 inches, light-gray (10YR 7/1) clay; many, fine to medium, prominent, brownish-yellow (10YR 6/8) mottles; strong, medium, subangular blocky to blocky structure; very firm when moist, plastic when wet, hard when dry; strong, waxy clay skins on peds; clear, wavy boundary; 8 to 20 inches thick.

B3tg—21 to 46 inches, light-gray (10YR 7/1) clay; few to common, fine to medium, prominent mottles; moderate, medium, subangular blocky structure; firm when moist, plastic when wet; clay skins fewer at increasing depths; clear, wavy boundary; 0 to 25 inches thick.

Cg—46 to 60 inches, gray (10YR 5/1) clay loam; massive.

Thickness of the solum ranges from 20 to 60 inches and in many places is about 35 inches. The boundary between the developed solum and the massive substratum is not distinct.

The Elkton soils are the poorly drained soils of the drainage sequence that includes the brown, moderately well drained Keyport soils, the somewhat poorly drained Lenoir soils, and the dark-colored, very poorly drained Bayboro soils. Elkton soils occur with these soils and also with Othello soils, which are poorly drained and composed mostly of moderately fine textured materials.

Texture of the A horizon ranges from silt loam to sandy loam, and its color ranges from light gray to dark gray. Texture of the B horizon ranges from clay loam to clay or silty clay. Colors of the mottles include yellowish brown, brownish yellow, and red. The C horizon is clay loam in most places but ranges from clay to sandy loam.

Elkton silt loam, 2 to 5 percent slopes (EkB).—This soil has a profile similar to the one described as representative of the series. The gentle slopes permit surface drainage of this very slowly permeable soil. There is a moderate hazard of erosion when the soil is cultivated. The soil is severely limited for most uses by its wetness and very slow permeability. (Capability unit IIIw–23; woodland suitability group 4)

Elkton-Bayboro sandy loams, 0 to 2 percent slopes (ElA).—This mapping unit is about 70 percent Elkton soil, 15 to 20 percent Bayboro soil, and 10 to 15 percent other soils. The Elkton and Bayboro soils are similar to those described as representative of their respective series, except the surface layer is sandy loam. Minor soils in the com-

plex include Keyport soils and soils that have an organic surface layer. The soils of this mapping unit are slowly permeable, but the sandy surface layer can be drained well enough for production of some crops. Corn, soybeans, hay, and pasture are the crops best suited to these soils. (Capability unit IIIw–19; woodland suitability group 4)

Elkton-Bayboro silt loams, 0 to 2 percent slopes (EnA).—The soils in this mapping unit have profiles like those described as representative of the Elkton series and the Bayboro series, respectively. The Elkton soil makes up about 70 percent of the acreage of the mapping unit; Bayboro and other soils make up the rest. Silt loam is the most common texture of the surface soil, but extensive areas of loam, and small areas of clay loam, were included in mapping this complex.

Some of the areas of this soil complex are small, rounded depressions, flat places, and long, narrow places along drainageways. In these places water is on or near the surface so much of the time that an organic layer a few inches thick has accumulated. Bayboro is the dominant soil in these wet places.

Both of the soils of this mapping unit are subject to ponding in winter and late in spring. The wetness for most of the year, very slow permeability, low positions on the landscape, and lack of adequate outlets for surface drainage severely limit these soils for the growing of most crops. (Capability unit IIIw–23; woodland suitability group 4)

Evesboro Series

The Evesboro series consists of deep, excessively drained, very sandy soils. They are mostly on stream terraces in the eastern part of the county. They consist of coarse-textured, loose sediments that were deposited by water or wind. They have weakly developed soil horizons or none.

A typical profile of a wooded Evesboro soil has thin layers of gray and dark grayish-brown sand over yellowish-brown sand. Where the soil has been plowed, the color is grayish brown or pale brown. Generally the sand is more pale at increasing depths. The sand in most places extends to a depth of 10 feet or more.

Permeability is rapid; lime and fertilizer leach rapidly. Moisture-holding capacity and organic-matter content are low, and natural fertility is very low. Wind erosion and sandblasting of crops are severe hazards.

The natural vegetation is pine and oak trees. Lowbush blueberry is the most common shrub. Most areas are wooded.

Only crops that are drought resistant and able to stand the summer heat are suitable, such as sweetpotatoes, peaches, grapes, pumpkins, and cantaloups. Irrigation is needed for all high-value crops.

If the soils are used for homesites, lawns are most likely to survive if they are seeded or planted with drought-resistant grasses and fertilized and watered frequently.

Representative profile of an Evesboro sand in the center of an island in the middle of the Maurice River, 1 mile southeast of Norma:

O1—3 inches to ½ inch, loose oak leaves and pine needles.
O2—½ inch to 0, peat composed of pine needles and oak leaves.
A2—0 to 2 inches, gray (N 5/0) sand; most sand grains are bleached white; single grain; loose; smooth boundary; 0 to 3 inches thick.
A3—2 to 6 inches, dark grayish-brown (10YR 4/2) sand; single grain; loose; smooth boundary; 4 to 10 inches thick.
C—6 to 60 inches, yellowish-brown (10YR 5/6) sand; single grain; loose.

The A horizon normally is composed of medium and coarse, loose sand. Where cultivated, it generally is grayish brown or pale brown. In places where the soil has not been plowed, it generally has at the surface a bleached layer several inches thick.

The Evesboro soils occur with Galestown, Downer, and Klej soils. They contain less silt and clay than the Galestown and Downer soils. Evesboro soils do not have the mottling that is present in Klej soils.

Evesboro sand, 0 to 5 percent slopes (EvB).—This soil has the profile that is described as representative of the Evesboro series. The areas mapped contain small inclusions that have surface soil of loamy sand and small inclusions of Downer, Fort Mott, and Klej soils. The Evesboro soil and the inclusions are droughty and have low natural fertility.

The best use for this Evesboro soil generally is for trees, wildlife habitat, or recreation. Special crops, such as sweetpotatoes, grapes, peaches, and pumpkins, are grown in some places. Irrigation should be available if crops are grown.

This soil is rapidly permeable, but its use for disposal of septic effluent may cause pollution because the porous soil does not filter the waste properly. (Capability unit VIIs–8; woodland suitability group 6)

Evesboro sand, 5 to 10 percent slopes (EvC).—This soil is similar to Evesboro sand, 0 to 5 percent slopes, but is more sloping. It is in small areas along drainageways in the eastern part of the county. Slopes are generally short.

The combined factors of moderate slope, erosion hazard, and very low moisture capacity make this soil unsuitable for crops. Areas that have been cleared for farming are suitable for growing Christmas trees or for use as wildlife habitat. (Capability unit VIIs–8; woodland suitability group 6)

Evesboro sand, 10 to 15 percent slopes (EvD).—Except for its strong slopes, this soil is similar to the Evesboro soils already described. It occurs on short slopes adjacent to streams. The erosion hazard is so severe that a permanent cover is needed to keep this soil in place.

This soil is suited to trees, as wildlife habitat, or for recreational uses that permit protective cover. (Capability unit VIIs–8; woodland suitability group 6)

Evesboro sand, 15 to 30 percent slopes (EvF).—This steep Evesboro soil lies on short slopes near streams.

The areas are in forest and are not suited to more intensive use. A permanent protective cover is needed to keep the sand in place.

Because of the steep slopes, this soil has severe limitations for residential, industrial, or commercial use. (Capability unit VIIs–8; woodland suitability group 6)

Evesboro-Aura complex, 10 to 15 percent slopes (EwD).—About 50 to 80 percent of this complex is Evesboro sand. The rest is Aura and other soils. Both major soils are very droughty and are limited by a severe erosion hazard. Most areas have been cleared, but the soils are very severely limited for production of crops. They are better suited to trees or to wildlife habitat. (Capability unit VIIs–8; woodland suitability group 6)

Fallsington Series

The Fallsington series consists of grayish, poorly drained, moderately coarse textured soils. They are gener-

ally low lying and are located in the northern and western parts of the county.

A typical profile in a cropped field has surface soil of gray or dark-gray sandy loam and subsoil that is gray and grayish brown and distinctly mottled. Beneath the subsoil, at a depth of about 32 inches, there are stratified layers of sand and fine sandy loam.

Fallsington soils have moderate permeability, high water-holding capacity, moderate organic-matter content, and moderate natural fertility. In their natural condition, when rainfall is normal, the water table in winter is about 1 foot below the surface. In summer it drops to about 5 feet below the surface.

Either open ditches or underdrains may be used to lower the water table. If the soils are drained, they are suitable for blueberries and for summer vegetables that can withstand short periods of excess water in the subsoil. They are also suitable for general farm and pasture plants that are tolerant of short periods of wetness. These soils generally cannot be drained well enough to produce perennial crops, such as asparagus, fruit, and alfalfa.

The natural vegetation consists of pin oak, willow oak, white oak, red maple, and gum trees and a dense stand of highbush blueberry, gallberry, sweet pepperbush, and other shrubs.

The high water table severely limits any residential, commercial, and industrial uses of Fallsington soils. An outlet must be provided if surface ponding is to be prevented. Fallsington soils make good sites for dugout ponds.

Representative profile of a nearly level Fallsington sandy loam, in an idle field, one-half mile east of St. George Church in Deepwater:

Ap—0 to 8 inches, gray (10YR 5/1) sandy loam; many, medium, faint, grayish-brown (10YR 5/2) mottles; weak, fine, granular structure; very friable; clear, smooth boundary; 6 to 12 inches thick.

B1tg—8 to 15 inches, olive-gray (5Y 5/2) sandy loam; many, fine, distinct, yellowish-brown (10YR 5/6) mottles; very weak, subangular blocky structure; very friable; clay flows in worm channels; clear, smooth boundary; 0 to 10 inches thick.

B2tg—15 to 32 inches, grayish-brown (10YR 5/2) heavy sandy loam; many, medium, distinct yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; friable; clay bridges on sand grains; clear boundary; 10 to 20 inches thick.

IIC1—32 to 40 inches, strong-brown (7.5YR 5/6) sand; single grain; loose; 8 to 30 inches thick.

IIC2—40 to 54 inches, light brownish-gray (2.5Y 6/2) fine sandy loam; few, coarse, prominent mottles of strong brown (5YR 5/6); massive; friable.

Thickness of the solum ranges from 20 to 40 inches and in many places is about 30 inches.

The A horizon is mostly sandy loam, although in some small areas it is loam or loamy sand. Its color ranges from gray to dark grayish brown. Mottles are faint to distinct and range from few to common. The texture of the B horizon is sandy loam or sandy clay loam. Mottles of varied colors range from distinct to prominent and, in size, from fine to medium.

The C horizon is composed of stratified layers of loose sand and sandy loam. These layers are normally grayish, but in places some of them are brightly colored.

Fallsington soils occur with Woodstown, Dragston, and Pocomoke soils. Fallsington soils are grayer than Woodstown and Dragston soils and are lighter than Pocomoke soils.

Fallsington sandy loam, 0 to 3 percent slopes (FdA).—This soil has the profile that is described for the series. There are small areas of a Pocomoke soil included in the areas mapped.

This Fallsington soil, when drained, is suited to most general crops and to late-planted vegetables. (Capability unit IIIw–21; woodland suitability group 4)

Fallsington-Othello complex, 0 to 2 percent slopes (FeA).—This complex is about 60 percent Fallsington sandy loam, about 35 percent Othello silt loam, and about 5 percent Pocomoke soils. The soils have profiles similar to those described as representative of their respective series. They occur together in such an intricate pattern that it is not practical to map them separately at the scale of the soil map.

In some places both surface drainage and underdrainage are needed before the Othello soil is farmed, since movement of water through the subsoil is slower than in the Fallsington soil. The Othello soil dries slowly, and wetness may delay planting and cultivation. The Othello soil is not so suitable for vegetables as the more sandy Fallsington soil. (Capability unit IIIw–21; woodland suitability group 4)

Fallsington-Pocomoke-Berryland complex (Fp).—This complex is about 40 percent Fallsington loamy sand, 30 percent Pocomoke loamy sand, 20 percent Berryland sand, and 10 percent other soils. Profiles of the Fallsington and Pocomoke soils differ from those described as representative of their respective series in having a surface layer of loamy sand and a solum that is slightly thicker than that described.

The Pocomoke soils occupy the lowest positions and are generally wetter than the Fallsington soils. The Berryland soils are more sandy than either Fallsington or Pocomoke soils. All the soils are nearly level or gently sloping.

All these soils are suitable for blueberries. Wetness is a severe limitation to production of field crops, even if a drainage system has been installed. (Capability unit IIIw–21; woodland suitability group 4)

Fort Mott Series

The Fort Mott soils are well drained, somewhat pale, and loose. These soils lie in part on broad plains, known as terraces, along streams, and particularly along the Delaware River. They are more extensive, however, in the uplands. The soils are gently to moderately sloping. They were formed in sandy sediments that are dominantly quartz and in some places include a little mica, feldspar, or glauconite. The sediments appear to be mostly water-deposited material, but in a few places there is evidence that the material was moved by wind.

Where the soil is farmed, a typical profile has a surface layer of loamy sand, about 30 inches thick, that is dark grayish brown in the upper 8 inches and pale brown below. Underlying the pale-brown loamy sand is yellowish-brown sandy loam that grades to a substratum of loamy sand at a depth of about 52 inches. See plate 1, page 20.

Water enters these soils rapidly. Even in the subsoil, where the texture is finest, water can move downward at a moderate rate. The water-holding capacity is low. Organic-matter content and natural fertility are low. The soils are subject to wind erosion.

Some Fort Mott soils are used for growing vegetables, but they are mostly covered with trees or are idle.

Representative profile of Fort Mott loamy sand, 0 to 5

percent slopes, 1 mile north of the intersection of Lehigh Road and Fort Mott Road:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) loamy sand; single grain; loose; abrupt, smooth boundary; 7 to 10 inches thick.

A2—8 to 30 inches, pale-brown (10YR 6/3) loamy sand; single grain; loose; clear, wavy boundary; 20 to 45 inches thick.

B1—30 to 33 inches, yellowish-brown (10YR 5/6) sandy loam; massive; very friable; clear, wavy boundary; 0 to 6 inches thick.

B2t—33 to 49 inches, yellowish-brown (10YR 5/6) sandy loam containing a variable amount of clay; in some places the texture is nearly sandy clay loam; weak, fine, subangular blocky structure; friable; clay bridges on sand grains; clear, wavy boundary; 8 to 18 inches thick.

B3—49 to 52 inches, grayish-brown (10YR 5/2) sandy loam that has low content of clay; single grain; very friable; clear, wavy boundary; 2 to 5 inches thick.

C—52 to 55 inches, strong-brown (7.5YR 5/6) loamy sand; single grain; faintly stratified; loose; conspicuously micaceous.

The thickness of the solum ranges from 40 inches to more than 60 inches and in most places is around 45 inches. Texture of the A horizon is loamy sand or sand.

The Fort Mott soils are somewhat more sandy and have a thicker surface layer than the Sassafras soils. They are better drained and less mottled than the Woodstown and Dragston soils. They do not have the dark-gray color and mottling that are present in the Fallingston and Pocomoke soils. They are not so sandy throughout as the excessively drained Evesboro soils, the wetter Klej soils, or the very wet, darker colored Berryland soils. Fort Mott soils have a B horizon that is finer textured and contains more silt than that in the Galestown soils.

Fort Mott loamy sand, 0 to 5 percent slopes (FrB).—This soil has the profile that is described for the Fort Mott series. Included in the areas mapped are small acreages of Galestown soils, of Sassafras sandy loam, and of somewhat wet soils, such as Woodstown and Klej soils. A few, small areas contain scattered pebbles.

This Fort Mott soil is droughty. The moisture-retaining layer is much deeper than in a Sassafras loamy sand. Care must be taken to see that seedlings obtain enough moisture until their roots can reach the deeper layers. Wind erosion, which may account for accumulation of the thick surface layer, causes exposure and sandblasting of tender roots and drifting of this soil. Water erosion is not generally a hazard. (Capability unit IIIs–7; woodland suitability group 3)

Fort Mott loamy sand, 5 to 10 percent slopes (FrC).—This soil is similar to Fort Mott loamy sand, 0 to 5 percent slopes, but it has moderate, rather than gentle, slopes, and its slopes are less even.

This soil is on benchlike positions along the southeastern banks of streams. The areas lie well above flood levels. Such areas might be old natural levees, windblown accumulations trapped by vegetation along the streams, or both.

This soil is more droughty than similar but less sloping soils, because the depth to the water table is greater. Although the slopes are moderate, the hazard of water erosion is only slight to moderate. Mainly because of droughtiness, this soil has severe limitations for cultivation. The choice of crops is limited. (Capability unit IVs–7; woodland suitability group 3)

Fresh Water Marsh

Fresh water marsh (Fw) is frequently covered by water. It occurs in inland areas that are mostly along the large streams that are affected by tides. In those places the land is flooded when extremely high tides prevent the freshwater streams from discharging their flow. In addition there are some areas of Fresh water marsh in closed depressions at higher elevations. Fresh water marsh has a much lower salt content than Tidal marsh.

The silty layer is highly organic. In some places the highly organic horizon extends to a depth of several feet. In some spots organic matter makes up most of the soil, enough to make it muck or peat. Texture of the layer under the highly organic horizon ranges from sand to clay, but in most places it is sand mixed with gravel.

The native vegetation consists of marsh plants, trees, and shrubs. The areas at higher elevations are wooded.

The risk of flooding, a high water table and the unstable soil material severely limit commercial, residential, or agricultural uses of this land type. Marsh is suited to wildlife habitat and to limited production of trees. (Capability unit VIIIw–29; not classified in a woodland suitability group)

Galestown Series

The Galestown soils are coarse-textured, excessively drained soils on the coastal terraces near Pedricktown and in the eastern part of the county near Cohansey.

A typical profile of a wooded Galestown soil has pale brown or very pale brown sand to a depth of about 27 inches. Below this is a layer of strong-brown loamy sand about 25 inches thick. Below the subsoil, sand layers are common.

Natural fertility is low. Permeability is rapid, organic-matter content is low, and water-holding capacity is moderately low. The soils are subject to wind erosion. The water table normally is more than 60 inches below the surface.

Asparagus and tomatoes are the most common crops grown on Galestown soils. Early vegetables are also grown. Irrigation is needed for crops other than asparagus.

Representative profile of a Galestown sand that has slopes of 0 to 2 percent, in a wooded area, south of campsite in Camp Roosevelt:

O1—2 inches to ½ inch, loose leaves.

O2—½ inch to 0, peaty material of partially decomposed leaves, needles, and twigs.

A1—0 to 1 inch, grayish-brown (2.5Y 5/2) mixed with white (N 8/0) and black (10YR 2/1) sand grains; single grain; loose; irregular boundary; 0 to 2 inches thick.

A2—1 to 7 inches, pale-brown (10YR 6/3) sand; single grain; loose; gradual, irregular boundary; 6 to 12 inches thick.

A3—7 to 27 inches, very pale brown (10YR 7/4) sand; single grain; loose; gradual, smooth boundary; 19 to 22 inches thick.

B2t—27 to 37 inches, strong-brown (7.5YR 5/6) loamy sand; very weak, granular structure; very friable; clay films on sand grains are thin, and clay bridges are weak; gradual, smooth boundary; 10 to 30 inches thick.

B3—37 to 52 inches, strong-brown (7.5YR 5/8) sand; single grain; loose; abrupt, smooth boundary; 0 to 15 inches thick.

C—52 to 60 inches, very pale brown (10YR 7/4) and yellow (10YR 7/6) sand; single grain; loose.

Thickness of the solum ranges from 35 to more than 60 inches and in most places is about 40 inches.

Where the soil is cultivated, the upper part of the A horizons, to a depth of 8 to 10 inches, is darker than the lower part. The darker color has been caused by the addition of organic matter. Texture of the A horizon is sand or loamy sand.

Texture of the B horizon is loamy sand or sandy loam. A few rounded, quartzose pebbles are in either the A or the B horizon in some profiles.

The substratum is sand or loamy sand; in some places it is partly rounded quartzose gravel.

Galestown soils occur with Evesboro, Downer, Sassafras, Klej, and Woodstown soils. They have heavier clay films on sand grains in the subsoil than the Evesboro soils. The subsoil is coarser textured than that of the Downer or the Sassafras soils. Galestown soils do not have the mottling that is present in the Klej and Woodstown soils.

Galestown sand, 0 to 5 percent slopes (GaB).—This soil has the profile that is described for the series and about the same range of characteristics as described for the series. There are small inclusions in the areas mapped of soils that have a surface layer of loamy sand or sandy loam, and there are also inclusions of Downer and Klej soils. In some wooded areas the upper 4 inches of the surface layer has been bleached to a gray color. Irrigation is needed on this Galestown soil if high-value crops are grown. (Capability unit IVs–7; woodland suitability group 6)

Galestown-Sassafras-Klej complex, 0 to 5 percent slopes (GbB).—This mapping unit is about 40 percent Galestown soils and 60 percent Sassafras, Klej, and Fort Mott soils. The Galestown and Klej soils have profiles similar to those described as representative of their respective series. The Sassafras soil has a profile that differs from the representative one described for that series by having a surface layer of loamy sand. The Galestown soil and the Fort Mott soil are gently sloping and occur as low dunes. The Klej soil is on flats or in depressions. The soils in this mapping unit are so mixed that it is not practical to show them separately at the scale of the soil map.

Use of the soils is limited by droughtiness, a wind erosion hazard, and low natural fertility. The Klej soil has a slight limitation of wetness in winter and spring. (Capability unit IVs–7; woodland suitability group 6)

Gravel Pits

Gravel pits (Gp) is a mapping unit created by removal of soil and other overburden to a depth of 10 to 30 feet to obtain the underlying gravel. The pits are generally located in areas of Aura or Sassafras soils, in deposits classified as the Bridgeton formation on the Geologic Map of New Jersey (*6*). Edges of the pits are mostly vertical escarpments. The floors are gently sloping to level. In general most areas of Gravel pits have not been excavated below the water table, but some of them have been. Pits that are being worked are changed in size and shape as the material is excavated. Permeability is moderate to rapid in the sandy material that makes up most of the pit floor.

Abandoned Gravel pits are eyesores and nuisances. Measures for rehabilitation of mined-out areas include grading, control of erosion, and revegetation. Recreational, industrial, or commercial uses are feasible. Pits that have been excavated below the water table offer possibilities for ponds. This mapping unit has not been classified in a capability unit or a woodland suitability group.

Howell Series

The Howell series consists of dark grayish-brown, well drained to moderately well drained soils that have moderately fine textured subsoil. They are on the broad, gently undulating plain between the Delaware River and Auburn. They developed in slightly glauconitic, somewhat micaceous, dark-colored, moderately fine textured marine deposits. The marine deposits have been covered with a foot or more of recently deposited, highly quartzose loamy sand, which makes up the surface layer of most of the soils.

A Howell soil generally has a dark grayish-brown surface layer of loamy sand. This layer and the subsurface layer of light yellowish-brown loamy sand in most places have a total thickness of about 18 inches. Beneath them is subsoil of clay loam that is darker brown or yellowish brown and in some places is slightly redder than the subsurface soil. At about 34 inches below the surface, the subsoil grades to the substratum of micaceous fine sandy clay loam, which contains some glauconite.

The sandy surface layer allows rapid infiltration, but movement of water is slower in the deeper, finer textured horizons. As a result the subsoil is saturated with water for short periods in extremely wet seasons. Water-holding capacity is moderate to high. Organic-matter content is low or moderate, and natural fertility is moderate.

In woods, red oak, scarlet oak, white oak, and beech trees are common. Ash, sweetgum, hickory, and yellow-poplar trees are scattered. In some places yellow-poplar occurs in nearly pure stands. Viburnum and spicebush are common shrubs.

Howell soils are mostly cleared and are used extensively for growing vegetables.

Representative profile of a Howell loamy sand that has slopes of 0 to 5 percent:

Ap—0 to 12 inches, dark grayish-brown (10YR 4/2) loamy sand; single grain; loose; abrupt, smooth boundary; 9 to 12 inches thick.

A2—12 to 18 inches, light yellowish-brown (10YR 6/4) loamy sand; slightly pale in the upper 5 inches; single grain; loose; gradual, wavy boundary; 0 to 20 inches thick.

IIB1—18 to 26 inches, yellowish-brown (10YR 5/6) gravelly clay loam; moderate, fine to medium, subangular blocky structure; friable when moist, slightly plastic when wet; clay coats on ped surfaces; gradual, smooth boundary; 0 to 6 inches thick.

IIB2t—26 to 34 inches, dark yellowish-brown (10YR 4/4) clay loam; common, fine to medium, dark reddish-brown (5YR 3/3) mottles; moderate, fine to medium, subangular blocky structure; plastic; clay coats glaze surfaces of peds; contains rare bands, about one-fourth inch thick, of concretionary iron; clear, wavy boundary; 6 to 10 inches thick.

IIC1—34 to 43 inches, dark yellowish-brown (10YR 3/4) sandy clay loam; massive; slightly plastic; clay coatings present in upper part; gradual, smooth boundary; 6 to 26 inches thick.

IIC2—43 to 75 inches, similar to the horizon above, but stratified; lower part is more sticky than plastic; strong brown (7.5YR 5/6) below 70 inches.

Thickness of the solum ranges from 15 to 48 inches but in most places is about 35 inches.

Texture of the surface layer ranges from loamy sand to loam.

Texture of the B horizon ranges from clay loam to silty clay loam. Color of the B horizon is dark brown in most places but is somewhat olive in some places where the glauconite content is higher than normal. Some faint to distinct mottles are present in places. Quartzose gravel is present in places but, as a rule, not in large amounts.

The C horizon generally consists of thin layers of sandy loam.

Howell soils occur with the Galestown, Sassafras, and Woodstown soils, and Berryland sand, heavy subsoil variant. Their clay loam subsoil distinguishes Howell soils from all the others named.

Howell soils, 0 to 5 percent slopes (HoB).—A profile of this soil is the one described as representative of the series. The soil is on low knolls in the area between Pedricktown and Auburn.

This soil is suited to fruit, vegetables, general crops, hay, and pasture. The sandy surface layer is subject to wind erosion if it is not protected. (Capability unit IIe–3; woodland suitability group 1)

Keyport Series

The Keyport series consists of moderately well drained soils that have clayey lower subsoil. They are gently sloping to sharply rolling and occur mostly east of Alloway on simple or complex slopes. They developed in fine-textured, unconsolidated, stratified marine sediments.

A typical profile of a cultivated Keyport soil has a dark-brown surface layer of loam about 14 inches thick. The subsoil consists of about 10 inches of yellowish-brown silty clay loam over brownish-yellow, very plastic clay.

The Keyport soils are slowly permeable. They have high water-holding capacity. They have moderate organic-matter content and natural fertility. They retain added nutrients well. Their slow permeability causes water to pond on the surface in nearly level places, and in those spots aeration is poor during wet seasons.

Eastern redcedar is common in pastures and hedgerows and is among the first trees to become established when the soils are left idle. The native vegetation is white oak, red oak, black oak, scarlet oak, willow oak, American holly, sweetgum, and dogwood trees.

Keyport soils are used mostly for hay, pasture, corn, soybeans, and small grains. Dairy farms are common on these soils.

Surface drainage is needed on the gently sloping Keyport soils. Control of erosion is needed on the sloping or rolling soils. The slow percolation rate in the Keyport soils is a severe limitation to their use for septic drainage fields.

Representative profile of a Keyport loam that has slopes of 0 to 2 percent, 1½ miles north of Quinton:

A1—0 to 9 inches, dark-brown (10YR 3/3) loam; weak, fine to very fine, crumb structure; very friable; gradual, wavy boundary; 8 to 10 inches thick.

A2—9 to 14 inches, pale-brown (10YR 6/3) loam; moderate, fine to medium, crumb structure; friable; abrupt, smooth boundary; 4 to 6 inches thick.

B1t—14 to 24 inches, yellowish-brown (10YR 5/6) silty clay loam; few, fine, distinct, yellowish-red (5YR 5/8) mottles; strong, fine to coarse, subangular blocky structure; plastic; thin clay films on ped faces; gradual boundary; 8 to 12 inches thick.

B2t—24 to 35 inches, brownish-yellow (10YR 6/8) clay; few to many, very fine, faint to distinct, light-gray (10YR 7/1) mottles and few, fine, distinct, yellowish-red (5YR 5/8) mottles; strong, medium, angular blocky and subangular blocky structure; very firm when moist, very plastic when wet; gray clay films on ped faces.

C—35 to 50 inches, light yellowish-brown (10YR 6/4) clay; white (10YR 8/2), strong-brown (7.5YR 5/8), and olive-yellow (5Y 6/6) mottles; massive; firm; very plastic.

Thickness of the solum ranges from 30 to 52 inches. Texture of the A horizon ranges from silt loam to sandy loam. Texture of the B horizon ranges from heavy silty loam to clay. Structure of the B horizon ranges from subangular blocky to blocky. Consistence normally is plastic when the soil material is wet, very firm when the material is moist, and very hard when it is dry. Yellow and brown colors are predominant in the soil mass, but the mottling includes reds and grays also.

The C horizon normally is fine textured, but sandy layers are present in some profiles.

The Keyport soils are most commonly associated with the Lenoir soils, which are somewhat poorly drained, and the Elkton soils, which are poorly drained. The Keyport soils are browner than the Lenoir and the Elkton soils.

Keyport loam, 2 to 5 percent slopes, eroded (KlB2).—This soil has a profile similar to the one described for the series, but the surface layer has been thinned by erosion and the plow layer commonly contains material from the subsoil. In places the surface layer is silty clay loam, and it bakes and cracks when it dries. Gullies are common, and some of them have been cut into the subsoil.

Risk of further erosion is a limitation in crop production. This soil seals readily and then sheds rainwater. Germination of seeds is poorer than on the uneroded Keyport soils. (Capability unit IIe–1; woodland suitability group 2)

Keyport loam, 5 to 10 percent slopes, eroded (KlC2).—This soil has a profile similar to the one described for the series, but the surface layer has been thinned by erosion and the plow layer contains some finer material from the subsoil. Baking and cracking are common when this soil dries. Gullies are common, and some of them have been cut into the subsoil. On these sloping soils, the hazard of erosion is a severe limitation to crop production. If row crops are grown, careful management is needed to prevent sheet erosion and gullying. (Capability unit IIIe–1; woodland suitability group 2)

Keyport loam, 10 to 15 percent slopes, eroded (KlD2).—This soil has a profile that differs somewhat from the one described as representative of the series. The surface soil is loam, and it has been thinned by erosion. The soil is sloping to strongly sloping. The plow layer generally contains material from the subsoil. This soil is limited by a very severe erosion hazard when cultivated but is suitable for occasional cultivation. The slope is a severe limitation to residential use of this soil. (Capability unit IVe–1; woodland suitability group 2)

Keyport sandy loam, 0 to 5 percent slopes (KpB).—This soil has a surface layer of sandy loam that is 6 to 16 inches thick. In a few places the surface layer is gravelly sandy loam. Some of the areas mapped are up to 15 percent nearly level Lenoir soils. More than 60 percent of the acreage of this soil has slopes of less than 3 percent, and surface drainage is needed on this acreage. Open ditches are more effective than underdrains.

When adequately drained, this Keyport soil is suited to production of vegetables, such as tomatoes, cabbage, and pumpkins. It is better suited to field crops, hay, or pasture. (Capability unit IIw–11; woodland suitability group 2)

Keyport soils, 5 to 10 percent slopes, eroded (KpC2).—These soils, as a result of erosion, have a surface layer thinner than that of the representative profile described for the series. In some places the surface layer of a cultivated soil is mostly material from the subsoil. Texture of the surface layer ranges from loam to silty clay loam. Gullies are common, and in places they have cut into the subsoil.

The hazard of erosion is a severe limitation to crop production. The surface layer in most places contains so much clay that these soils are difficult to work. Germina-

tion of seeds is poor. The hazard of runoff is severe. These soils are well suited to hay or pasture. (Capability unit IIIe–1; woodland suitability group 2)

Keyport soils, 10 to 15 percent slopes, eroded (KpD2).—The soils in this mapping unit are sloping or strongly sloping, and their surface soil has been thinned by erosion. In most places the texture of the surface soil is between a sandy loam and a loam. In a few places it is silty clay loam or loamy sand. Gullies that have cut into the subsoil are present but are not common.

These keyport soils have not been cropped intensively, because of their strong slopes. The soils in woods and pastures have not been so severely eroded as those used for row crops.

The soils in this unit are severely limited by the hazard of erosion if they are cultivated. They are well suited to hay and pasture. (Capability unit IVe–1; woodland suitability group 2)

Klej Series

The Klej series consists of moderately well drained and somewhat poorly drained, nearly level, sandy soils. They were formed in deep sands in positions that are intermediate in elevation. The Klej soils are subject to a fluctuating water table. They are principally in the northwestern, southeastern, and eastern parts of the county.

A typical profile of a Klej soil consists of loamy sand to a depth of 50 inches. In cultivated areas the surface soil is brown to a depth of 8 inches. Below the plowed layer is pale-yellow loamy sand; mottling with grayish brown begins at a depth of about 24 inches. The substratum, below a depth of 36 inches, is yellowish-brown sand mottled with light gray.

In their natural condition, Klej soils have a water table about 2 feet below the surface late in winter and in spring. Normally it drops to a depth of more than 5 feet in summer. In drained areas the water table is nearly always more than 2 feet below the surface. Klej soils are rapidly permeable. They have low water-holding capacity. The soil texture is so coarse that water cannot rise in summer after the water table has dropped. Organic-matter content is low and natural fertility is very low. Added fertilizer and lime leach readily.

The natural vegetation on the moderately well drained Klej soils is mostly white oak, black oak, red oak, and scarlet oak. The somewhat poorly drained Klej soils, which are in the lowest places, support pin oak and willow oak.

Most Klej soils have been cleared for the growing of vegetables. They are too droughty for hay and pasture. If large areas are left bare, the soils are subject to wind erosion and crops are subject to sandblasting. Where high-value crops are grown, widely spaced underdrains or open ditches reduce the hazard of the seasonal high water table.

The moderate depth to the water table is a moderate limitation of these soils for septic fields or for homes that have cellars.

Representative profile of a Klej loamy sand that has a slope of 1 percent, in a cultivated field, 2 miles west of Sharptown:

Ap—0 to 8 inches, brown (10YR 4/3) loamy sand; single grain; loose; abrupt, smooth boundary; 7 to 9 inches thick.

AC—8 to 24 inches, pale-yellow (2.5Y 7/4) loamy sand; single grain; loose; gradual, irregular boundary; 12 to 18 inches thick.

C1—24 to 36 inches, pale-yellow (2.5Y 7/4) loamy sand that has few to common, fine to medium, yellowish-brown (10YR 5/6) and grayish-brown (10YR 5/2) mottles; gradual, irregular boundary; 8 to 10 inches thick.

C2—36 to 60 inches, yellowish-brown (10YR 5/6) sand that has few to common, fine, faint, strong-brown (7.5YR 5/6) and light-gray (10YR 7/2) mottles; single grain; loose; gradual, smooth boundary.

Texture throughout the profile ranges from sand to loamy sand. Soil horizons are so weakly expressed that only A and C horizons were designated in the description. The depth to mottling ranges from 10 to 30 inches but normally is more than 20 inches. In some places the colors of the C horizon are of higher chroma than those stated in the profile description.

Klej soils are associated with Evesboro, Galestown, Downer, Sassafras, Woodstown, and Fallsington soils. The Klej soils are mottled, and the Evesboro and Downer soils are not. The thick loamy sand distinguishes Klej soils from the less sandy Woodstown soils.

Klej loamy sand, 0 to 3 percent slopes (KmA).—This soil has the profile described as representative of the soil series. The areas mapped contain minor inclusions of Woodstown, Sassafras, and Evesboro soils. Also included in the areas mapped are some soils that have loamy sand subsoil in which there is evidence of clay accumulation. The increased amount of clay is so small that it is of no importance in the use and management of the soil. In some places this Klej soil lacks gray mottles but has few to many mottles of chroma higher than gray. (Capability unit IIIw–16; woodland suitability group 3)

Klej-Woodstown-Galestown loamy sands, 0 to 3 percent slopes (KnA).—This mapping unit is about 50 percent Klej loamy sand, 20 percent Woodstown loamy sand, 20 percent Galestown loamy sand, and 10 percent other soils. The soils occur in such an intricate pattern that it is not practical to show them separately at the scale of the soil map. Each of the three main soils has a profile similar to the one described as representative of its series.

The three soils are suited to the same crops and management, except that in some places drainage of the Klej and Woodstown soils is needed. Control of wind erosion is needed on all three soils. The Woodstown soils are not so droughty as the Klej and Galestown soils. Irrigation is needed if high-value crops are grown on any of the three soils. (Capability unit IIIw–16; woodland suitability group 3)

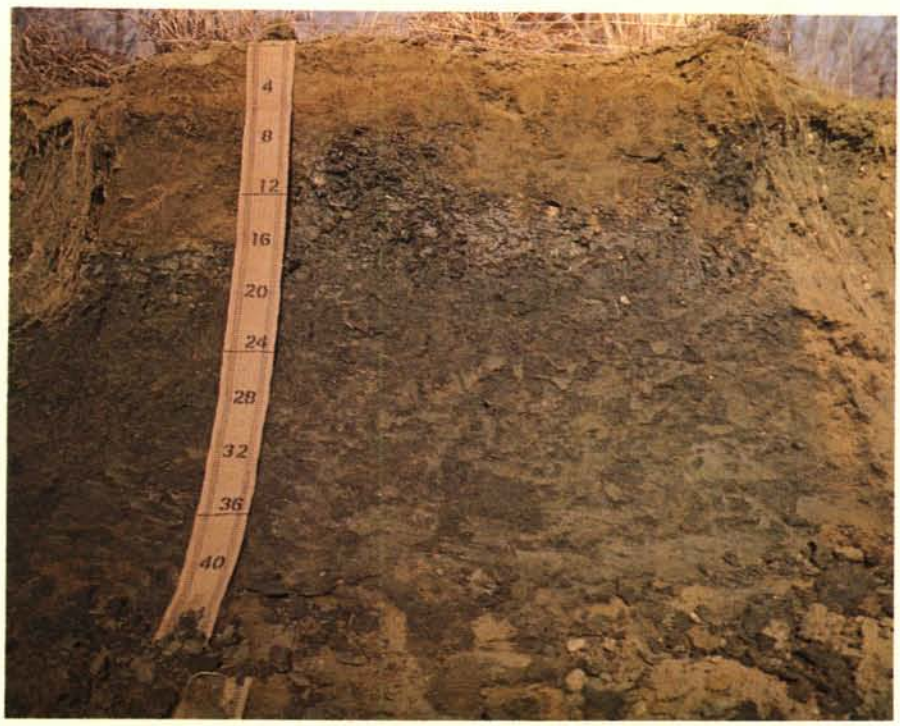
Lenoir Series

The Lenoir series consists of nearly level, somewhat poorly drained soils that have clayey subsoil. They developed in fine-textured sediments. They occur on slopes of low relief, and at the foot of stronger slopes. Most of the areas are east of Alloway.

A typical profile of a cultivated Lenoir soil has surface soil of grayish-brown silt loam about 8 inches thick, over subsoil that is yellowish-brown and gray, mottled clay. The clay extends to a depth of more than 60 inches.

Lenoir soils are slowly permeable and do not drain readily. Water may stand on or near the surface in any season. The soils have high water-holding capacity, and they hold added fertilizer well. Organic-matter content and natural fertility are moderate.

Eastern redcedar is common in pastures and in hedgerows and is among the first trees to become established



***Top*, Fort Mott soils have dark grayish-brown and pale yellowish-brown, thick, sandy layers over a slightly finer textured, yellowish-brown subsoil that retains a moderate amount of moisture.**

***Bottom*, Marlton soils have a mottled, slowly permeable, dull-colored sandy clay subsoil that is plastic when wet and very hard when dry.**

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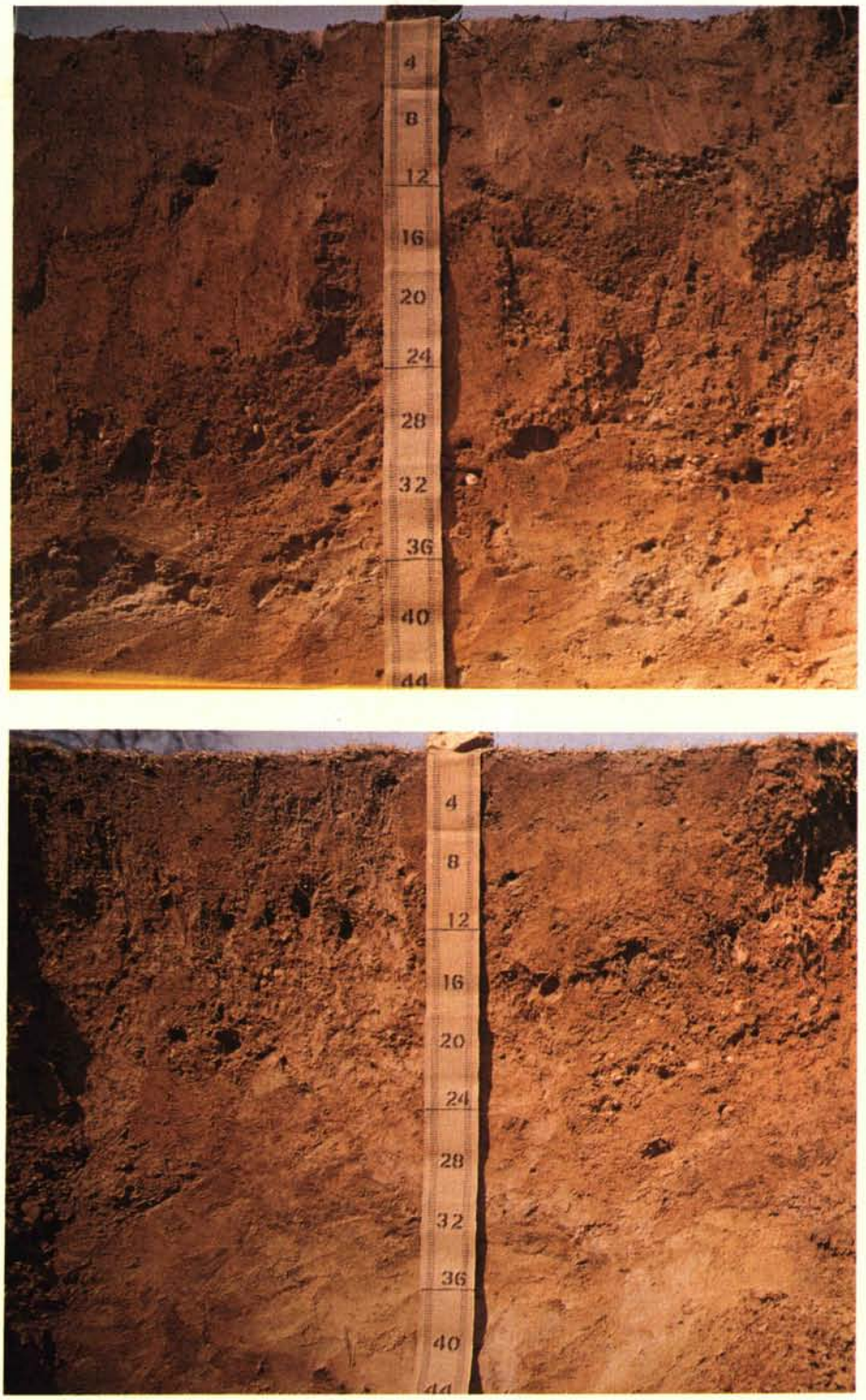

Top, Matapeake soils are well drained and have moderately thick, silty upper layers underlain by stratified, loose sand and gravel.

Bottom, Mattapex soils, glauconitic substratum, are moderately well drained. They have brown, silty upper layers underlain by clayey material that slows percolation.

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when these soils are left idle. Natural vegetation is white oak, pin oak, southern red oak, willow oak, sweetgum, and American holly.

Crops are generally limited to hay, pasture, corn, soybeans, and small grain. The Lenoir soils are not well suited to vegetables, because of their high clay content. In most places underdrains would not work rapidly enough to remove the surplus water. Surface drainage, such as that provided by bedding and shallow ditches, is needed.

Representative profile of Lenoir silt loam, 0 to 2 percent slopes, one-fourth mile from Woodstown-Alloway Road on Whitey Witt Road, Alloway:

Ap—0 to 8 inches, grayish-brown (10YR 5/2) silt loam; weak, fine, granular structure; friable; clear, smooth boundary; 8 to 12 inches thick.

B2t—8 to 32 inches, yellowish-brown (10YR 5/6) clay; few to common, fine to medium, distinct, light-gray (2.5Y 7/2) mottles; moderate, medium, subangular blocky and angular blocky structure; firm when moist, plastic when wet, hard when dry; thin, gray clay films on ped faces; gradual boundary; 15 to 30 inches thick.

C—32 to 60 inches, brownish-yellow (10YR 6/6) clay; common to many, distinct, light-gray (2.5Y 7/2) mottles; massive; firm when moist, plastic when wet, hard when dry.

Thickness of the solum normally ranges from 20 to 40 inches; the thickness in most places is about 30 inches. In some places small amounts of quartzose gravel are present throughout the profile.

The A horizon is silt loam, loam, or, rarely, clay loam. Its color ranges from very dark grayish brown to dark gray. In some places this horizon is mottled.

The B horizon is sandy clay or clay. Its color ranges from yellowish brown to grayish brown, and mottles of high chroma are common.

The C horizon ranges from clay to sandy loam; the sandy loam is in thin layers. This horizon is yellow, brown, or gray and normally is strongly mottled.

Lenoir soils are most commonly associated with Keyport and Elkton soils. They are more gray than Keyport soils, but not so gray as Elkton soils. They were not mapped separately, but are mapped in a complex with gently sloping Keyport soils.

Lenoir-Keyport silt loams, 0 to 2 percent slopes (LkA).—This complex is about 50 percent Lenoir silt loam and 30 to 50 percent Keyport silt loam. Each of these soils has a profile similar to the representative one described for its series. Other soils included in some of the delineations have clayey subsoil and are more permeable than the two major soils. Also included are small areas where the surface soil is clay loam, and a few where the soil profile is sandy or gravelly. The Lenoir soils are more grayish, occur in lower positions, and are more poorly drained than the Keyport soils. Both soils have fine-textured subsoil that is slowly permeable, and water stands on the surface during wet seasons. Surface drainage is generally the most efficient way to remove excess water. (Capability unit IIIw–11; woodland suitability group 2)

Made Land, Dredged River Materials

Made land, dredged river materials (Mf) is composed of materials that were dredged from the Delaware River or its tributaries and pumped into extensively diked areas, mostly since 1945. The dredged material ranges from clay to boulders. Boulders, cobbles, gravel, and sand dropped out of the water to form a cone at the discharge pipe. Silt and clay remained in suspension for some time and gradually settled in lower positions over the diked area. Because, generally, several pumpings were made and the discharge pipe was moved from time to time, the coarse-textured cones are present at numerous places within any one area of this land type. The deposits of silt, very fine sand, and clay are much more extensive than the coarse deposits. The fine material is generally gray because it has not had time to oxidize. In some places the surface layer has turned brown to a depth of a few inches. Some mottles of high chroma have been formed.

The fill material ranges from 10 to 20 feet in thickness. It was placed to cover soils of several different kinds, including, Tidal marsh, Peat, Muck, and some of the upland sandy soils. Many of the fills are recent and have not settled completely.

After draining, drying, and settling, the filled areas offer some possibility for farming and, eventually, for commercial and industrial uses. They have low organic-matter content and are subject to wind erosion. Water-holding capacity is high. Permeability is moderately slow. Frost heaving is severe. Stability of building foundations is likely to be poor. The percolation rate probably is too slow to permit use of these areas for septic fields. (Capability unit IIIw–20; not classified in a woodland suitability group)

Made Land, Sanitary Land Fill

Made land, sanitary land fill (Mg) is composed of areas on which refuse has been dumped. In the normal dumping practice, an excavation is made, refuse is dumped, and the refuse is covered from time to time with soil material. The refuse contains many materials, including metal, glass, concrete, stone, wood, garbage, and other household and industrial waste. Differential settling take place. Methane gas and hydrogen sulfide are likely to be formed during the anaerobic decomposition of organic refuse. This land type is not classified in a capability unit or a woodland suitability group.

Marlton Series

The Marlton series consists of well drained to moderately well drained, olive soils that contain a large amount of glauconite. Highly glauconitic material lies beneath the developed soil to a depth of 6 to 10 feet and, in some places, more. Marlton soils are mostly in the north-central part of the county in places where highly glauconitic deposits furnished their parent material.

A typical profile of Marlton soils in a cultivated field has a plowed layer of dark grayish-brown silt loam over a subsurface layer of olive silt loam about 7 inches thick. The subsoil, for the most part, is olive, blocky sandy clay that is firm when moist, plastic when wet, and very hard when dry. It is about 20 inches thick and overlies stratified layers of sandy loam and sandy clay. See plate 1, page 20.

Marlton soils have slow permeability, high water-holding capacity, moderate fertility, and moderate organic-matter content. Because of their clayey subsoil, permeability is slow. The water table may be perched over the clay in abnormally wet periods. A concentration of roots on ped faces in the subsoil suggests that roots cannot enter the peds easily.

The natural vegetation on Marlton soils is a hardwood forest composed mostly of oak, hickory, ash, and yellow-

poplar. Redcedar often seeds naturally in idle fields (fig. 5).

The Marlton soils are difficult to farm because periods of optimum moisture content for plowing and cultivating are short. The soils are suited to general crops, hay, and pasture.

Representative profile of a Marlton silt loam that has a slope of 1 percent, in a permanent pasture, one-half mile north of Sharptown and one-eighth mile west of Marlton Heights:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable; abrupt, smooth boundary; 7 to 12 inches thick.

A2—7 to 11 inches, olive (5Y 5/4) silt loam; weak, fine, granular structure; friable; content of glauconite is high; clear boundary; 3 to 5 inches thick.

B1—11 to 17 inches, olive (5Y 4/4) silty clay loam; moderate, medium to fine, subangular blocky structure; friable when moist, slightly plastic when wet; content of glauconite is high; clear boundary; 0 to 6 inches thick.

B2t—17 to 28 inches, dark-olive (5Y 3/4) sandy clay; few, fine, distinct, dark reddish-brown (5YR 3/4) mottles and iron stains; moderate, fine and medium, subangular blocky structure; firm when moist, plastic when wet, hard when dry; content of glauconite is high; distinct clay films on vertical ped faces and on pebbles; clear boundary; 6 to 18 inches thick.

B22—28 to 32 inches, dark-olive (5Y 3/4) and strong-brown (7.5YR 5/8) clay loam; some pockets of sand; weak, fine to medium, subangular blocky structure; friable when moist, plastic when wet; highly glauconitic; patchy clay films; abrupt boundary; 0 to 6 inches thick.

C—32 to 60 inches, individual grains of dark olive (5Y 3/4) and very pale brown (10YR 8/3) in alternating layers of sandy loam and sandy clay; massive; friable when moist, slightly plastic when wet; highly glauconitic; 2 to 8 percent rounded quartzose gravel.

Thickness of the solum ranges from 24 to 48 inches and in most places is about 36 inches.

Texture of the A horizon is generally loam but ranges from loamy sand to light clay loam. The soil cracks severely on drying.

Texture of the B horizon is sandy clay loam or sandy clay. Structure of the B horizon is blocky or subangular blocky. In some profiles the B horizon has mottles of high chroma.

The C horizon in some places consists partly of thin sheets of ironstone.

In Salem County, Marlton soils occur with Mattapex soils, which developed in a silt mantle that overlies glauconitic beds in many places.

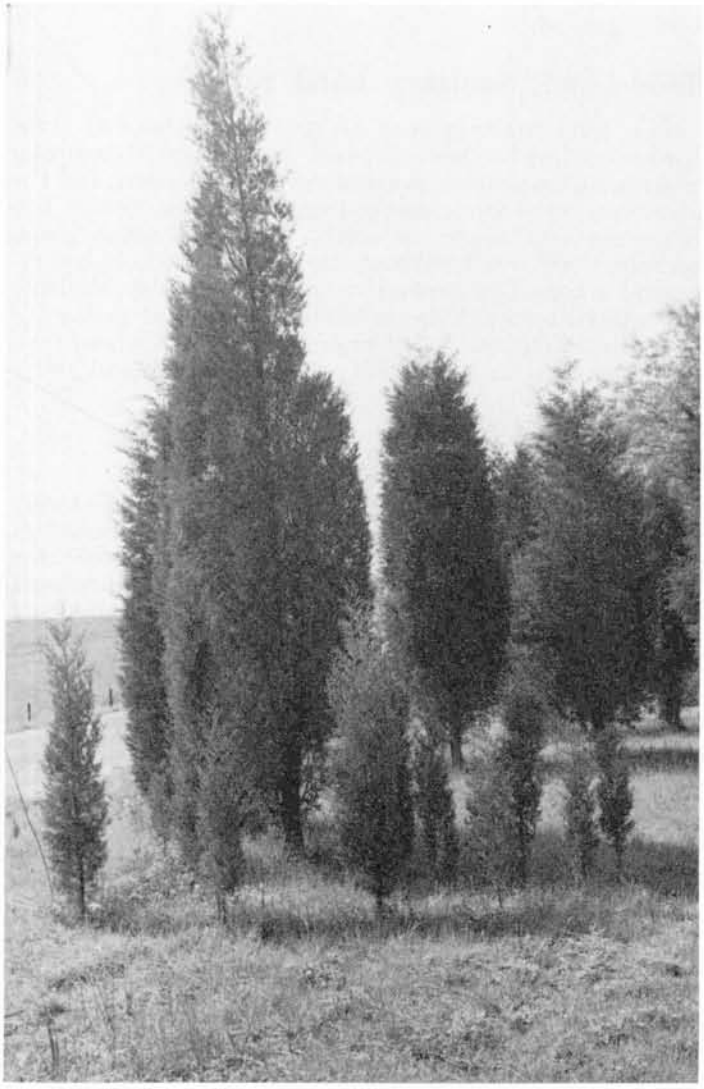

Figure 5.—**Redcedar grows on Marlton soils in many abandoned fields.**

Marlton soils, 2 to 5 percent slopes (MrB).—This mapping unit consists of areas of Marlton soils that have a range of texture in the surface layer that includes silt loam, loam, clay loam, sandy loam, and loamy sand. In most places the texture is loam or sandy loam. The soil profile beneath the surface layer is similar to the one described for the Marlton series. Most of the areas are gently sloping, but some small areas are nearly level.

Included in the areas mapped are some soils that have more sandy subsoil than that typical of Marlton soils. These included sandy soils are more permeable and are easier to work than typical Marlton soils. They are not extensive.

These Marlton soils are best suited to uses that do not require much working of the land, such as pasture, hay, small grain, soybeans, corn, and apples. The sandy loam and the loamy sand are suitable for a wider range of uses and crops than are the other soils. Surface drainage of the nearly level areas is needed. The hazard of erosion is moderate when cultivated crops are grown. (Capability unit IIe–1; woodland suitability group 2)

Marlton soils, 2 to 5 percent slopes, eroded (MrB2).—The soils of this mapping unit have a surface layer that ranges generally from silt loam to loamy sand, and they include some severely eroded soils that have a surface layer of clay loam. Except for the surface layer, the soil profile is similar to the one described as representative of the series. Erosion has so thinned the surface layer in most areas of this mapping unit that plowing turns up the sticky, olive subsoil. Plowing is difficult to manage, because the time of optimum moisture content is so short. Runoff is medium, and the erosion hazard is moderate. The soils are best suited to crops that require little or no cultivation. (Capability unit IIe–1; woodland suitability group 2)

Marlton soils, 5 to 10 percent slopes, eroded (MrC2).—The soils in this mapping unit have a surface layer that ranges from clay loam to loamy sand. Sandy loam and loam are the most extensive of these soils. Except for the surface layer, the soil profile is similar to the one described as representative of the Marlton series. Erosion has thinned

much of the original surface soil and removed most of the organic matter. Plowing now turns up the olive sandy clay subsoil, which is sticky and becomes hard when it dries. It is difficult to cultivate the soils in this unit. When they are cultivated, intensive conservation measures, such as stripcropping and terracing, are needed to reduce runoff and control erosion. The soils are well suited to pasture, hay, wildlife habitat, or Christmas trees. (Capability unit IIIe–1; woodland suitability group 2)

Marlton soils, 10 to 15 percent slopes, eroded (MrD2).—This mapping unit consists of Marlton soils that have a surface layer ranging from sandy clay to sandy loam. These soils are strongly sloping, and erosion has thinned the original surface soil so much that plowing now turns up the sticky, olive subsoil. The plow layer is difficult to work. Gullies have been cut into the subsoil in some fields. Where gullies have been filled, the subsoil is exposed in those adjacent areas from which soil was taken.

Because of their slope and the effects of erosion, the hazard of further damage from erosion is severe if the soils are cultivated. The soils are well suited to pasture, hay, wildlife habitat, or trees. (Capability unit IVe–1; woodland suitability group 2)

Matapeake Series

The Matapeake series consists of well-drained soils that developed in about 30 inches of silty material over coarse-textured material. In most places the coarse material is sand and gravel.

The soils are level to strongly sloping. They occupy the old Delaware River terraces in parts of Mannington Township and Upper Pittsgrove Township.

A typical profile of Matapeake soils has a plow layer of dark-brown, friable silt loam, a subsoil of dark-brown silt loam about 20 inches thick, and a deeper layer of yellowish-brown sandy loam about 6 inches thick. The substratum, to a depth of 10 feet or more, is stratified, loose coarse sand and gravel. See plate 2, page 20.

Permeability is moderately slow. Water-holding capacity is high except in the thin solum phases, and in them it is moderate. Organic-matter content and natural fertility are moderate. The soils are subject to frost heaving.

The natural vegetation was oak forest, but the trees have been cut from most of the area.

Matapeake soils are suited to a wide variety of crops. They are suited to high-value vegetables. field crops, hay, pasture, sod, and nursery crops.

Representative profile of Matapeake silt loam, 0 to 2 percent slopes, 2½ miles northeast of Salem at a sand and gravel pit:

Ap—0 to 10 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; abrupt, smooth boundary; 8 to 10 inches thick.

B21t—10 to 30 inches, dark-brown (7.5YR 4/4) silt loam; clay content is about 5 percent greater than in the horizon above; moderate, medium, subangular blocky structure; slightly firm; continuous, faint, strong-brown (7.5YR 5/6) clay films on peds; content of rounded quartzose gravel in lower part is 5 to 10 percent; gradual, wavy boundary; 12 to 25 inches thick.

IIB22t—30 to 36 inches, yellowish-brown (10YR 5/4) gravelly sandy loam; weak, medium, subangular blocky structure; slightly firm; clay bridges between sand grains are common; content of rounded quartzose gravel is 10 to 15 percent; gradual, wavy boundary; 4 to 6 inches thick.

IIC—36 to 60 inches, brownish-yellow (10YR 6/6) layers of gravel, coarse and medium sand, and sandy loam; single grain and massive; loose to friable.

The thickness of the solum ranges from 24 to 42 inches, and in most places is about 35 inches. The range in texture of the B horizon includes silt loam, loam, and light silty clay loam. The clay content of the B horizon is about 4 to 7 percent greater than that of the A horizon.

The Matapeake soils are the well drained soils of a drainage sequence that includes the moderately well drained Mattapex and the poorly drained Othello soils. Matapeake soils occur with Mattapex, Othello, Sassafras, and Chillum soils. Matapeake soils lack the grayish color that is common to the Mattapex and Othello soils. They are more silty than the Sassafras soils. They are underlain by a loose, coarse-textured substratum instead of the firm or hard substratum of the Chillum soils.

Matapeake silt loam, 0 to 2 percent slopes (MoA).—This soil has a profile similar to the one described as representative of the series. The areas mapped include minor acreages where the surface soil is loam or fine sandy loam. Also included are small areas of Mattapex and of Chillum soils. Drainage of the included Mattapex soil is needed if high-value crops are to be grown on areas of this mapping unit. (Capability unit I–4; woodland suitability group 1)

Matapeake silt loam, 2 to 5 percent slopes (MoB).—This soil has a profile similar to the one that is described for the series. It is gently sloping, and the hazard of erosion is moderate. In some places the soil has been thinned by sheet erosion, and some shallow gullies have formed. Most of the gullies have been filled with soil, and subsoil is exposed in the nearby places where the fill was obtained.

If simple erosion-control methods are used, this soil is suitable for a wide variety of crops. It has few limitations for residential, commercial, and industrial uses. (Capability unit IIe–4; woodland suitability group 1)

Matapeake silt loam, 5 to 10 percent slopes (MoC).—This soil has a profile similar to the one described for the Matapeake series. It is sloping to strongly sloping, and in many fields the surface layer has been thinned by erosion. When the soil is cultivated, the erosion hazard is severe. This soil is suited to most crops grown in the area if erosion-control measures are used. (Capability unit IIIe–4; woodland suitability group 1)

Matapeake silt loam, 5 to 10 percent slopes, eroded (MoC2).—This soil has a profile similar to the one described for the soil series. Erosion has so thinned the surface layer that plowing generally turns up subsoil. On this eroded soil, germination of seeds is poor and crops do not grow well. The erosion hazard is severe when the soil is cultivated. It is difficult to rebuild this soil when the usual cropping systems are followed. This soil is well suited to a permanent cover of grass, trees, or shrubs and to rotations that include long periods of hay. (Capability unit IIIe–4; woodland suitability group 1)

Matapeake silt loam, thin solum, 10 to 15 percent slopes (MpD).—The profile of this soil resembles the one described as representative of the Matapeake series but is thinner. The depth to the coarse material of the C horizon is less than in the typical Matapeake profile, or about 20 inches. The surface layer is thinner than the one described in the typical profile. Plowing turns up subsoil in many places, and some gullies have cut into the subsoil.

This soil has moderate water-holding capacity. Because of the strong slopes and the thin solum, the hazard of erosion is very severe when the soil is cultivated. This soil can be used only occasionally for cultivated crops. It is

better used for hay, pasture, wildlife habitat, or trees. (Capability unit VIe–4; woodland suitability group 1)

Mattapex Series

The Mattapex series consists of moderately well drained soils that are silty in the upper 30 inches. They developed in a silty mantle that was deposited over partly weathered beds of coarse sediments. They mostly have slopes of 0 to 5 percent, but the gradient ranges up to 10 percent. Mattapex soils occupy much of the high ground in the center of the county between Halltown and Eldridges Hill and between Fenwick and Seven Stars.

A typical profile of Mattapex soils has a surface soil of brown, friable silt loam about 12 inches thick over a subsoil of yellowish-brown, mottled silt loam that extends to a depth of about 32 inches. The substratum is stratified layers of loose sand, gravel, and sandy loam. See plate 2, page 20.

The soils are moderately slowly permeable. They have high water-holding capacity. Organic-matter content and natural fertility are moderate. Frost heaving is severe. In the natural condition of these soils, the water table rises within 2 to 3 feet of the surface late in winter and in spring and during long wet periods in summer.

The natural vegetation is oak forest.

Most Mattapex soils have been cleared and are now used for hay, pasture, corn, soybeans, vegetables, sod, or nursery crops. Artificial drainage is needed if alfalfa or high-value vegetables are to be grown.

Mattapex soils have moderate or severe limitations for septic fields, depending on the texture of the underlying layers. Limitations are moderate for homes that require cellars. When Mattapex soils that have been underdrained for farming are converted to residential, commercial, or industrial uses, the drainage system is generally destroyed and the soil reverts to its original wet condition.

Representative profile of a Mattapex silt loam that has a slope of 1 percent, in an excavation for a house at the corner of West Maple Street and Maple Court in Woodstown:

Ap—0 to 12 inches, brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; abrupt, smooth boundary; 8 to 12 inches thick.

B2t—12 to 28 inches, yellowish-brown (10YR 5/6) silt loam; few, distinct, grayish-brown (10YR 5/2) mottles in the lower half; weak, very fine to fine, subangular blocky structure; friable; thin clay skins; clear, smooth boundary; 10 to 25 inches thick.

B3—28 to 32 inches, yellowish-brown (10YR 5/6) silt loam; few to common, fine, prominent, yellowish-red (5YR 5/8) and grayish-brown (10YR 5/2) mottles; weak, fine, subangular blocky structure; friable; clear, smooth boundary; 0 to 8 inches thick.

IIC1—32 to 37 inches, strong-brown (7.5YR 5/8) sandy loam; many, medium to coarse, prominent, light-gray (10YR 7/2) mottles; massive; friable; clear, wavy boundary.

IIC2—37 to 60 inches, strong-brown (7.5YR 5/6) stratified sand and medium gravel; single grain; loose.

Thickness of the solum ranges from 20 to 45 inches and in most places is about 35 inches.

The range in texture of the A horizon includes silt loam, loam, and some fine sandy loam. The texture of the B horizon is silt loam, loam, or light silty clay loam. In some places the consistence is firm in the lowest part of the B horizon.

Mattapex soils occur with the Matapeake, Othello, Woodstown, Dragston, and Fallsington soils. Mattapex soils have a higher content of silt than Dragston and Fallsington soils. They are not so gray as the Othello soils, and their mottled subsoil distinguishes them from the Matapeake soils.

Mattapex silt loam, 0 to 2 percent slopes (MqA).—The profile of this soil is the one described as representative of the soil series. Inclusions of a somewhat poorly drained soil make up 10 to 15 percent of the acreage mapped. In these included areas the soil profile is more gray than the one described and water stands on the surface in wet weather.

Drainage of this Mattapex soil is needed if vegetable crops of high value are grown, especially if the crops are irrigated. This soil is suited to common field crops, hay, pasture, sod, and nursery crops. Surface drainage or smoothing is needed in some places to reduce ponding of water. The included areas of somewhat poorly drained soil must have adequate drainage if alfalfa, fruit, or nursery plants are grown. (Capability unit IIw–13; woodland suitability group 1)

Mattapex silt loam, 2 to 5 percent slopes (MqB).—This soil has a profile similar to the one described for the Mattapex series. It is gently sloping, and the hazard of erosion is moderate. There is some hazard of wetness.

This soil is suitable for more crops than Mattapex silt loam, 0 to 2 percent slopes, because generally there are no large areas where water stands on the surface. In high places where air drainage is good, the soil is suited to apples. There is some hazard of losing trees by windthrow. Either open ditches or underdrains may be used to lower the water table.

The lower parts of long slopes tend to be wetter than the upper parts, and wetter than the tops of the gently sloping divides.

The recharge rate in ponds on this soil is likely to be too slow to provide water for irrigation. Ponds for wildlife or recreation generally are satisfactory. (Capability unit IIw–13; woodland suitability group 1)

Mattapex silt loam, 5 to 10 percent slopes (MqC).—This soil has a profile similar to the one described as representative of the series. It is sloping and is limited by a severe erosion hazard. For the most part, it is better drained than the less sloping Mattapex soils. Slopes are, for the most part, closer to 5 than to 10 percent, and some slopes of less than 5 percent are included in the areas mapped. Other inclusions are areas of well-drained Matapeake soils. Erosion has thinned the soil profile in some places. Slopes are generally short, and excess water is likely to come from lateral seeps.

Both drainage and control of erosion are needed in managing this soil. Intercepting underdrains can be used to improve the seepy spots. (Capability unit IIIe–13; woodland suitability group 1)

Mattapex silt loam, clayey substratum, 0 to 2 percent slopes (MsA).—This Mattapex soil has a silty clay or clay substratum beginning at a depth of 3 to 4 feet beneath the normal sandy substratum. Included in mapping this soil were some small areas in which the silt loam is only 12 to 18 inches thick. This soil becomes saturated with water in fall and during wet seasons more rapidly than the Mattapex soils that are underlain by sand and gravel, because the substratum is more slowly permeable. It remains wetter for a longer time, and ponding occurs on the surface in some places.

Ponds in this soil do not supply enough water for irrigation, because of the slow recharge rate. Ponds for wild-

life or recreation are satisfactory. The soil has severe limitations for septic fields. (Capability unit IIw–13; woodland suitability group 1)

Mattapex silt loam, clayey substratum, 2 to 5 percent slopes (MsB).—This soil has a substratum of silty clay or clay and is gently sloping. Wetness and a moderate erosion hazard are limitations to be considered when the soil is managed. The soil is suited to more crops than Mattapex silt loam, clayey substratum, 0 to 2 percent slopes, because there is less ponding of water on the surface.

If the clayey substratum is thick, the recharge rate in ponds is likely to be too slow to supply water for irrigation. Ponds for wildlife and recreation are generally satisfactory. (Capability unit IIw–13; woodland suitability group 1)

Mattapex silt loam, clayey substratum, 5 to 10 percent slopes (MsC).—This soil has a clayey substratum and is moderately sloping. It has a thinner solum than the one described for a representative Mattapex soil. Slopes in most places are nearer 5 percent than 10 percent. In some places the slope is less than 5 percent. Included in the areas mapped are some areas of Matapeake soils, which are well drained. Also included are small areas where the surface soil has been thinned by erosion. In these small areas the slopes are short.

Probably most of the excess water in this soil comes from lateral flow above the fine-textured, deep layers. Interceptor drains may be helpful to improve the wet places. The wettest areas are the lower parts of the slopes. (Capability unit IIIe–13; woodland suitability group 1)

Mattapex silt loam, glauconitic substratum, 0 to 2 percent slopes (MtA).—This soil is underlain at a depth of 40 to 60 inches by geologic material that contains a large amount of glauconite. Otherwise, its profile is similar to the one described as representative of the Mattapex series. The glauconitic substratum is generally olive clay or clay loam. In some places the glauconite extends upward into the silt mantle and gives an olive color to the soil.

Included in the mapping of this soil were some small areas, most of them in low places, where the substratum is sandy loam that has only a low to moderate content of glauconite. Also included were areas of a somewhat poorly drained soil in the low places.

This soil remains wet for longer periods than do the Mattapex soils that do not have a clayey substratum. Drainage is needed if this soil is farmed. The need for drainage is greatest on the included areas of somewhat poorly drained soil. If underdrains are installed, they should be placed above the clayey substratum.

The substratum of clay or clay loam severely limits the use of this soil for septic fields and causes slow recharge of ponds. (Capability unit IIw–13; woodland suitability group 1)

Mattapex silt loam, glauconitic substratum, 2 to 5 percent slopes (MtB).—This soil is similar to Mattapex silt loam, glauconitic substratum, 0 to 2 percent slopes, but the slope is slightly greater and there is a greater hazard of erosion when it is used. In some places there are gravelly knolls where erosion has thinned the silty mantle to expose the underlying glauconitic layer. Those eroded areas are difficult to plow and cultivate. (Capability unit IIw–13; woodland suitability group 1)

Muck, Shallow

Muck, shallow (Mu) is composed of organic matter. It lies mostly in areas that are along the streams or estuaries that flow into the Maurice River but are far enough upstream so that the water is fresh, not brackish. The thickness commonly is about 30 inches. The common range in thickness is from 12 to 36 inches, and the extreme range is from 12 to 72 inches. The organic layer is underlain in most places by coarse sand, but in some places by gravel, clay, or silt.

In winter the water table is at the surface, and generally it does not drop much in summer. Flooding is frequent.

The vegetation on Muck, shallow, consists of cattails, phragmites, red maple, bay magnolia, Atlantic white-cedar, pitch pine, and buttonball.

The organic layer shrinks considerably after drying. The water table is difficult to lower. The soil is extremely acid. Mainly for these reasons, the areas have not been cleared for cultivation.

Muck areas generally make good sites for irrigation ponds. The water in the ponds may be too acid for fish. (Capability unit VIIw–30; woodland suitability group 5)

Othello Series

The Othello series consists of poorly drained soils that have a high content of silt. They are nearly level soils in rounded depressions or at the foot of long slopes. Othello soils occupy extensive flats in a belt running from Hancocks Bridge to Elmer. They are easily recognized by their gray color and silt loam texture.

In the woods the surface soil consists of about 5 inches of very dark gray silt loam over 4 inches of dark-gray silty clay loam. The subsoil is gray throughout but is firm silty clay loam in the upper 19 inches and friable to firm silt loam below about 28 inches. It is normally mottled with brown. Below the subsoil is coarse-textured material.

These soils are moderately slowly permeable. The water table is perched over the subsoil in many places late in winter, in spring, and during long wet periods in summer. These soils have high water-holding capacity. Organic-matter content is high, and natural fertility is moderate. The areas are not easily drained. Roots generally do not extend below the 30-inch mantle. Frost action is severe.

The natural vegetation is mostly oak or sweetgum.

Othello soils are wet in spring when crops are to be planted and often are wet in fall when crops are to be harvested. Much of the acreage is idle or is wooded, but some acreage is used for hay, pasture, corn, and soybeans.

Othello soils have severe limitations for residential, commercial, and agricultural uses. The wetness and slow permeability cause wet cellars, failures of septic systems, and periodic flooding.

Representative profile of an Othello silt loam, 1 mile northeast of Pole Tavern, in woods:

O—2 inches to 0, decayed leaves and stems.

A1—0 to 5 inches, very dark gray (10YR 3/1) silt loam; moderate, fine, granular structure; friable; slightly plastic; clear, wavy boundary; 3 to 8 inches thick.

B1—5 to 9 inches, dark-gray (10YR 4/1) silty clay loam; weak, medium, prismatic structure breaking to strong, fine to medium, blocky structure; slightly sticky when wet; rustlike coloration around roots; 0 to 5 inches thick.

B2tg—9 to 28 inches, gray (10YR 5/1) silty clay loam; color covers ped surfaces and 60 percent of the ped interiors; mottles of dark yellowish brown (10YR 4/4) and of brighter colors; weak, medium, prismatic structure breaking to weak, medium, subangular blocky structure; sticky when wet; widely spaced cracks present—these cracks and prisms continue from the horizon above; in lower part, some surfaces of openings and some fillings in cracks appear waxy and, generally, dark gray; clear, wavy boundary; 15 to 25 inches thick.

B3tg—28 to 38 inches, gray (10YR 5/1) silt loam; color covers ped surfaces and 70 percent of the interiors; interiors of peds are mottled with strong brown (7.5YR 5/8) and yellowish red (5YR 4/8), the latter color being around roots; brown coloring decreases with depth; massive; firm in place, friable in hand, slightly sticky; cracks 4 to 6 inches apart contain heavy concentration of roots and are thickly coated with dark organically stained gel; 0 to 12 inches thick.

IIC1g—38 to 46 inches, gray (10YR 5/1) gravelly very fine sandy loam; massive; firmer than the horizon above and slightly panlike; roots continuing in cracks; pebbles bleached white; abrupt boundary.

IIC2g—46 to 62 inches, light-gray (10YR 7/1) coarse sand; single grain; loose; no roots.

Thickness of the solum ranges from 20 to 50 inches and in most places is about 35 inches. In most places the solum is uniformly silty.

Texture of the A horizon is silt loam, loam, or, in some places, fine sandy loam. The color ranges from dark gray to gray and is lightest where the soil has been cultivated.

Texture of the B horizon is silt loam, loam, or light silty clay loam. Mottles range in number from few to many and, in contrast, from faint to prominent.

The Othello soils are the poorly drained soils of the Matapeake drainage sequence, which includes the well drained Matapeake soils and the moderately well drained Mattapex soils. Othello soils are associated with the Matapeake, Mattapex, Woodstown, Dragston, Fallsington, and Pocomoke soils. Othello soils contain more silt than the other soils named. They are grayer than Matapeake or Mattapex soils.

Othello silt loam, 0 to 3 percent slopes (OtA).—This soil has the profile that is described as representative of the series. In small areas along the Delaware River, coarser textured materials have been washed or blown over the surface. In some places in the Harmersville area, the silt mantle rests directly on a clay substratum. These two kinds of inclusions in the areas mapped are small, and they do not differ enough from this Othello soil to be managed differently.

Excess water in the soil severely limits the use of this soil for farming. Open ditches are generally faster and more satisfactory than underdrains for removing the excess water. Surface drainage is needed where ponding is a problem.

This soil is not suited to alfalfa, fruit, nursery crops, potatoes, or snap beans. When the soil is adequately drained, corn, soybeans, red clover, hay, and pasture can be grown, although there is still a hazard that some crops will be lost in extremely wet periods.

This soil generally offers good sites for ponds for irrigation, wildlife, and recreation. It has severe limitations for septic fields and for homesites if cellars are to be dug. In some areas flooding is a severe limitation to commercial or industrial uses. (Capability unit IIIw–20; woodland suitability group 4)

Peat, Shallow

Peat, shallow (Pe) consists of undecayed, fibrous organic material that was preserved under water. The Peat in this county is underlain by mineral soil at a depth that ranges from 12 to 60 inches but is mostly about 30 inches.

Areas of Peat, shallow, vary in nature of the organic matter, thickness of the organic layer, and nature of the underlying mineral soil materials.

Most of the Peat, shallow, is in low-lying flats adjoining the Delaware River or its tributaries. This soil is sometimes referred to as marsh, since much of it occurs in association with Tidal marsh and may have once been Tidal marsh.

Vegetation is rushes, reeds, cattails, shrubs, and occasional trees, such as willow and red maple.

Peat soils are flooded by abnormally high tides. Flooding and poor stability of the soil are severe limitations for nearly all uses. (Capability unit VIIw–30; not classified in a woodland suitability group)

Pocomoke Series

The Pocomoke series consists of very poorly drained, moderately coarse textured soils. They have a substratum of loose, sandy material that in some places is mixed with gravel. They are in low-lying flats, principally on the eastern and western sides of the county.

A typical profile of a Pocomoke soil has a surface soil of black sandy loam about 6 inches thick over about 5 inches of light-gray, mottled sandy loam. The subsoil is mottled, gray or light-gray sandy clay loam that extends to about 26 inches below the surface and is underlain by the gray substratum of gravelly loamy sand.

Permeability is generally moderate. Organic-matter content is high, and natural fertility is moderate. Where the soil has not been artificially drained, the water table rises to the surface in fall, winter, and spring and drops to 3 or more feet below the surface in summer. If drained, the soil has high water-holding capacity.

The natural vegetation is a forest of pin oak, willow oak, swamp oak, red maple, and sweetgum. A dense understory of blueberries is common. Little of the acreage has been cleared.

If cleared and drained, the Pocomoke soils are suitable for hay, corn, soybeans, pasture, and highbush blueberries. They can be drained by open ditches or underdrains.

These soils generally make good sites for dugout ponds. They have severe limitations for commercial, residential, and farming uses because of the high water table and a flooding hazard.

Representative profile of Pocomoke sandy loam, 1 mile south of Willow Grove, in woods:

O1—7 to 4 inches, loose leaves.

O2—4 inches to 0, peaty leaf and root material.

A1—0 to 6 inches, black (10YR 2/1) sandy loam; single grain; friable; abrupt, wavy boundary; 6 to 12 inches thick.

A2—6 to 11 inches, light-gray (10YR 6/1) sandy loam; few, fine, dark reddish-brown (5YR 3/4) and reddish-yellow (7.5YR 6/6) mottles; weak, fine, granular structure; firm in place, friable when removed; sand grains clean; clear, wavy boundary; 0 to 6 inches thick.

B2tg—11 to 26 inches, light-gray (2.5Y 6/1) light sandy clay loam; common, fine to medium, brownish-yellow (10YR 6/6) mottles; weak, subangular blocky structure; firm in place, friable when removed; clay bridges between sand grains; abrupt, smooth boundary; 10 to 20 inches thick.

Cg—26 to 60 inches, gray (10YR 6/1) gravelly loamy sand; single grain; friable.

Thickness of the solum ranges from 16 to 38 inches and in most places is about 25 inches.

Texture of the A horizon ranges from sandy loam to loam. In some wooded areas the surface layer is mucky loam. Color of the A horizon ranges from black to dark gray. Texture of the B horizon ranges from sandy loam to sandy clay loam.

In some places the C horizon is stratified loamy sand and sandy loam mixed with varying amounts of quartzose gravel.

The Pocomoke soils are the very poorly drained soils of the Sassafras drainage sequence, which includes the well drained Sassafras, the moderately well drained Woodstown, the somewhat poorly drained Dragston, and the poorly drained Fallsington soils. Pocomoke soils occur near areas of those soils and also near areas of Othello and Berryland soils. Pocomoke soils are grayer than Sassafras, Woodstown, and Dragston soils. Their surface soil is darker than that of the Fallsington soils. They contain more sand than Othello soils but are not so sandy as the Berryland soils.

Pocomoke-Berryland loamy sands (Pr).—This mapping unit is about 60 percent Pocomoke soils and 40 percent Berryland and other soils. The soils are nearly level, having slopes of 0 to 2 percent. The surface soil in most places is loamy sand, but in some places it is sandy loam or loam. The Pocomoke soil has a profile similar, except for texture of the surface layer, to the representative one described for its series. The Berryland soil has a profile similar to the representative one described for that series. Included in the areas mapped are small areas of a soil that has some characteristics of each of these soils, including a fine-textured subsoil similar to that of the Pocomoke soils and an organic layer similar to the one in Berryland soils. The soils in this mapping unit form such an intricate pattern that it is not practical to map them separately at the scale of the soil map.

Most areas of this mapping unit are in forest. These soils are suited to highbush blueberries if the water level is managed.

The high water table and a flooding hazard are severe limitations for use of these soils for farming, residential, commercial, or industrial purposes. The soils generally furnish good sites for ponds for irrigation, wildlife, or recreation. (Capability unit IIIw–25; woodland suitability group 4)

Pocomoke sandy loam (Ps).—This soil has a profile similar to the one described as representative of the series, except for minor variations in texture and in thickness of the horizons. It is nearly level. In a few areas the surface soil is mucky and thicker than normal. Some small areas in which the surface soil is loam or silt loam were included in mapping this soil. In other included areas the subsoil contains sandy pockets and resembles the subsoil of Berryland soils. Inclusions of Fallsington soils are also common in the areas mapped. The included areas of all kinds are not extensive enough to be managed separately.

Drainage is needed if this soil is farmed. When the soil is drained, corn, soybeans, hay, and pasture are crops that grow well. (Capability unit IIIw–25; woodland suitability group 4)

Sand Pits

Sand pits (Sa) are pits from which sand has been taken. They are in areas of Galestown, Sassafras, Evesboro, and Aura soils. Some were at first opened for gravel, and after the gravel was removed, the pits were worked for sand. The sand and gravel are taken from the Cape May and Cohansey formations as indicated on the Geologic Map of New Jersey (*6*).

The edges of the pits are steep when freshly cut. The floors are generally sloping, although they may be cut in steps. In general, the pits have not been excavated below the water table. Active pits are changed in size and shape as the work proceeds. Natural revegetation is very slow. Permeability of the soil material in most places is rapid.

After the pits are abandoned, they are eyesores and nuisances. Measures to restore the mined-out areas may include grading, control of erosion, and revegetation. Recreational, industrial, or commercial uses of the pits are feasible in many places. Pits that have been excavated below the water table can be made into ponds for irrigation, wildlife, or recreation. Sand pits are not classified in a capability unit or a woodland suitability group.

Sandy and Clayey Land, Glauconitic Materials, Gently Sloping

Sandy and clayey land, glauconitic materials, gently sloping (ScB) is a land type that has surface soil and subsoil of variable texture. Texture of the surface soil ranges from sandy loam to clay loam; that of the subsoil, from sandy loam to sandy clay. The areas of sandy loam are more extensive than those of finer texture. The areas of this land type are in intermediate positions where the water table rises into the subsoil in winter and drops in summer. Open ditches or underdrains are effective in lowering the water level so that farming can be carried on without severe problems. (Capability unit IIw–14; woodland suitability group 2)

Sandy Land, Downer and Sassafras Materials, Steep

Sandy land, Downer and Sassafras materials, steep (SdF) is a complex of materials similar to those of the Downer and Sassafras soils. Slopes range from 15 to 30 percent. In many places the normal soil layers cannot be recognized. In some places erosion has cut gullies through the soil profile and the gullies have been filled by pushing in their sides. In about 60 to 70 percent of the acreage of this mapping unit, the soils are similar to those of the Downer series. The other soils are similar to those of the Sassafras or other series.

On the steep slopes of this mapping unit, the erosion hazard is so severe that permanent cover is needed to control erosion. The soil materials are too sandy for profitable pasture. They are best suited to trees or as wildlife habitat. The slopes limit the land severely for residential, commercial, and industrial uses. (Capability unit VIIs–8; woodland suitability group 3)

Sassafras Series

The Sassafras series consists of well-drained soils that have loamy subsoil over a substratum of loose sand, gravelly sand, or sandy loam. These soils developed in moderately coarse textured to moderately fine textured sediments. They are in the eastern part of the county, where they lie immediately downslope from areas of Aura soils. They also are on the gently undulating knolls in the northwestern and south-central parts of the county. Except for one

sizable area in the northwestern part of the county, the areas of Sassafras soils are generally small.

In a typical profile, the surface soil is dark-gray to yellowish-brown sandy loam about 14 inches thick. The subsoil is strong-brown heavy sandy loam about 26 inches thick. The substratum is stratified loamy sand and sandy loam.

Sassafras soils are moderately permeable. Free water does not remain in them more than a few days after a heavy rain. Water-holding capacity ranges from moderate to high. Organic-matter content ranges from low to moderate, and natural fertility, from low to moderate; both tend to be low if the surface layer is loamy sand.

The natural vegetation is mixed oak forest and scattered pine trees.

The gently sloping Sassafras soils have slight limitations or none for commercial, residential, or recreational uses. The moderately sloping and strongly sloping soils are subject to erosion. The steep soils have severe limitations for most uses.

Representative profile of idle Sassafras sandy loam, 0 to 2 percent slopes, 1 mile north on Lehigh Road from Fort Mott Road:

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) sandy loam; weak, fine, granular structure; friable; gradual, wavy boundary; 8 to 12 inches thick.

A2—10 to 14 inches, light yellowish-brown (10YR 6/4) sandy loam; very weak, fine, granular structure; slightly firm in place, friable when removed; sand grains clean; gradual, wavy boundary; 2 to 6 inches thick.

B1—14 to 18 inches, strong-brown (7.5YR 5/6) sandy loam; very weak, subangular blocky structure; slightly firm in place, friable when removed; gradual, wavy boundary; 3 to 6 inches thick.

B2t—18 to 30 inches, strong-brown (7.5YR 5/6) heavy sandy loam; moderate, medium, subangular blocky structure; slightly firm in place, friable when removed; thin clay films on ped faces; gradual, wavy boundary; 10 to 20 inches thick.

B3—30 to 43 inches, strong-brown (7.5YR 5/6) sandy loam; very weak, subangular blocky structure; friable; clay bridges on sand grains; gradual lower boundary; 0 to 10 inches thick.

IIC—43 to 60 inches, strong-brown (7.5YR 5/6) alternating layers of loamy sand and sandy loam; massive; very friable.

Thickness of the solum ranges from 24 to 54 inches and in most places is about 30 inches.

The range in texture of the A horizon includes loam, loamy sand, and sandy loam.

Texture of the B horizon ranges from heavy sandy loam to sandy clay loam.

In the C horizon there are varying amounts of quartzose gravel.

The Sassafras soils are the well drained soils of the drainage sequence that includes the moderately well drained Woodstown, the somewhat poorly drained Dragston, the poorly drained Fallsington, and the very poorly drained Pocomoke soils. Sassafras soils occur with Woodstown, Dragston, Matapeake, Mattapex, Downer, Aura, Galestown, and Klej soils. Sassafras soils are coarser textured than Matapeake and Mattapex soils but not so coarse textured as Downer, Galestown, or Klej soils. They do not have the firm lower subsoil that is present in the Aura soils.

Sassafras loamy sand, 0 to 5 percent slopes (SfB).—This soil has a surface layer of loamy sand about 18 inches thick. The thick, coarse-textured surface layer holds less moisture than does that of the more loamy Sassafras soils. The soil is too droughty for high yields of hay, pasture, corn, or small grain. Extensive cleanly tilled areas are subject to wind erosion, and crops are subject to sandblasting.

This soil is best suited to fruit and vegetables, especially sweetpotatoes. Normally, all high-value crops grown on it are irrigated. (Capability unit IIs–6; woodland suitability group 3)

Sassafras loamy sand, 5 to 10 percent slopes (SfC).—This soil has a profile that differs somewhat from the one described as representative of the Sassafras series. It has a surface layer of loamy sand, is moderately sloping, and is subject to erosion. In some places erosion has thinned the surface layer to a thickness of about 15 inches. Runoff is moderately rapid, and care is needed to maintain the content of organic matter. The soil is best suited to fruit and vegetables. (Capability unit IIIe–6; woodland suitability group 3)

Sassafras loamy sand, 10 to 15 percent slopes (SfD).—Except for a surface layer of loamy sand about 12 inches thick, this soil has a profile similar to the one described for the Sassafras series. Included in mapping were small areas of soils that have thinner and lighter textured subsoil and are more droughty than this soil. The hazard of water erosion is very severe if this soil is cultivated. The soil should have a cover of grass, trees, or shrubs most of the time. The loose sand washes readily. The soil can be planted to fruit trees and kept in sod; it is generally too droughty for good yields of hay or pasture. Wildlife plantings and woods are alternate uses.

Because of the slope, this soil has moderate limitations for use for septic fields. (Capability unit IVe–6; woodland suitability group 3)

Sassafras sandy loam, 0 to 2 percent slopes (SrA).—This soil has the profile described as representative of the Sassafras series. Some of the areas mapped include small bodies of Downer and Aura sandy loams and of Sassafras and Downer loamy sands. The included soils are more droughty than this soil, but they are generally not so extensive that special management is required. Also included in the mapping were areas of Woodstown sandy loam, which is moderately well drained. Spot drainage of these areas may be needed, especially if high-value crops are grown.

This Sassafras soil is suited to nearly all crops and uses. High-value crops growing on it generally are irrigated. Sod and nursery stock are special crops suited to this soil.

This soil has slight limitations for septic fields, homesites, and commercial or industrial uses. (Capability unit I–5; woodland suitability group 1)

Sassafras sandy loam, 2 to 5 percent slopes (SrB).—This soil resembles Sassafras sandy loam, 0 to 2 percent slopes, except that it is gently sloping and is subject to a moderate erosion hazard. The surface layer in many of the farmed areas has been thinned by erosion to about 10 inches. Small areas of Downer sandy loam and of Aura sandy loam are included in the areas mapped.

This soil is suited to many crops. Crops may not grow quite so well as they do on the nearly level Sassafras soil, but they do not need different management.

There are slight limitations or none to use of this soil for septic fields, homesites, or commercial or industrial uses. (Capability unit IIe–5; woodland suitability group 1)

Sassafras sandy loam, 5 to 10 percent slopes (SrC).—This soil is more sloping and has thinner surface soil than Sassafras sandy loam, 0 to 2 percent slopes. It is limited by a severe erosion hazard. Gullies have been formed in a few places.

This soil is suitable for most of the crops commonly grown in the county, but the crops do not grow so well as they do on the more gently sloping Sassafras soils. It is difficult to maintain organic matter in cultivated areas of this soil. (Capability unit IIIe–5; woodland suitability group 1)

Sassafras sandy loam, 5 to 10 percent slopes, eroded (SrC2).—This soil is sloping to strongly sloping and has thinner surface soil than Sassafras sandy loam, 0 to 2 percent slopes. Normal plowing mixes some subsoil with the surface layer. The mixed plow layer is more sticky and more difficult to work than the uneroded surface soil. Germination of seeds is poorer and yields are lower on this soil than on the more gently sloping, less eroded Sassafras soils. Organic-matter content is low. In some places gullies have been formed. The hazard of further erosion is severe.

The soil is suited to fruit, vegetables, and general crops, but erosion control measures are needed if crops are grown. (Capability unit IIIe–5; woodland suitability group 1)

Sassafras sandy loam, 10 to 15 percent slopes (SrD).—This soil is strongly sloping and has a slightly shallower profile than the one described as representative of the series. In cultivated areas the surface soil has been thinned by erosion. Runoff is medium, and water-holding capacity is moderate.

The erosion hazard is very severe on this soil. A rotation that includes mostly sod or close-growing crops is needed to control runoff and erosion. Small grains or fruit trees interplanted with sod are suitable crops. (Capability unit IVe–5; woodland suitability group 1)

Sassafras sandy loam, 10 to 15 percent slopes, eroded (SrD2).—This soil is strongly sloping. Runoff is medium, and the hazard of erosion is very severe. As a result of erosion, plowing mixes some of the more clayey subsoil with the remaining surface soil. When wet, the subsoil is more sticky than the surface soil. Yields are lower on this soil than on the gently sloping Sassafras soils.

This soil is suited to occasional cultivation and to close-growing crops. Small grains and fruit trees interplanted with sod are suitable crops. (Capability unit IVe–5; woodland suitability group 1)

Sassafras-Aura loams, 0 to 5 percent slopes (SfB).—The areas of this soil complex are about 50 percent Sassafras loam and 30 to 50 percent Aura loam. Minor amounts of other Sassafras and Aura soils are in some of the delineations.

Sassafras loam has higher water-holding capacity and a slightly lower infiltration rate than Sassafras sandy loam. A profile of Sassafras sandy loam was described as representative for the series.

The Aura loam in this complex has a profile similar to the one described for the Aura series.

Smoothing and leveling of the Aura soil for farming is restricted by a firm subsoil that resists penetration by roots. The Aura soil has moderate limitations for septic fields because of the firm subsoil. (Capability unit IIe–4; woodland suitability group 1)

Sassafras-Aura sandy loams, 0 to 5 percent slopes (SuB).—Areas of this complex are about 50 percent Sassafras sandy loam and 30 to 50 percent Aura sandy loam. Some have in them smaller amounts of other soils. The soils form a pattern so intricate that separate mapping of them was not practical at the scale of the soil map.

The Sassafras soil has a profile similar to the representative one described for that series. The Aura soil has a surface layer of sandy loam. The Aura soil has lower water-holding capacity than the Sassafras soil, and it crusts more readily than the Sassafras soil.

The soils are suited to vegetables, fruit, and general crops. Aura soils have some limitations for smoothing and leveling of fields, because the firm subsoil restricts the rooting depth of most plants. The rate of irrigation should be adapted to the Aura soil. The Aura soil has moderate limitations for septic fields because of slow percolation in the firm subsoil. (Capability unit IIe–5; woodland suitability group 1)

Sassafras-Galestown-Woodstown loamy sands, 0 to 5 percent slopes (SwB).—Soils in this complex have a surface layer of loamy sand. About 35 percent of the complex is Sassafras soil, and the rest is Galestown, Woodstown, Fort Mott, and other soils. These soils form such an intricate pattern that it was impractical to map them separately at the scale of the soil map. Not all of the different soils of the complex are present in each of the areas mapped.

All these soils are droughty, and all are subject to wind erosion. Crops on them are subject to sandblasting. Drainage is likely to be needed on the Woodstown soils.

The soils of this complex are suited to vegetables and fruits. Irrigation should be available for high-value crops. (Capability unit IIs–6; woodland suitability group 3)

Sassafras-Woodstown sandy loams, 0 to 5 percent slopes (SyB).—About 60 percent of this complex is Sassafras sandy loam. Most of the rest is Woodstown sandy loam, but in some delineations there are small amounts of other soils. The complex occupies areas in the gently rolling landscape in Lower Penns Neck Township.

The Sassafras and Woodstown soils have profiles similar to those described for the Sassafras and Woodstown series, respectively. Management is similar to that given for the other Sassafras and Woodstown soils. Woodstown soil is generally in lower positions than the Sassafras soil. (Capability unit IIw–14; woodland suitability group 3)

Tidal Marsh

Tidal marsh (Tm) consists of flats along Delaware Bay that are flooded twice daily by tides. The soil material is mostly organic matter and alluvial silts over beds of sand, clay, or gravel. The deposits range in thickness from 1 to 30 feet or more but are mostly between 5 and 10 feet thick. The organic matter near the surface is peaty and is brownish in color. The deeper layers are finer, more decomposed, and more like muck.

Vegetation on the marshes is governed in large measure by the salt content of the water. Salt-tolerant plants predominate. Salt hay was formerly harvested extensively for many uses.

Tidal marsh is similar to much of the Fresh water marsh, except that its salt content is much higher. Tidal marsh has been extensively ditched by the Salem County Mosquito Exterminating Commission to reduce the size of ponds where mosquitoes breed.

Some areas have been diked and drained to permit cultivation. Maintenance of the dikes is difficult, especially during hurricanes when tides are extremely high.

Most Tidal marsh is best suited to habitats of waterfowl and muskrats. Shooting and trapping have helped significantly the economy of the county. Because there

is a severe flooding hazard and the marsh is an unstable site for buildings, the areas have severe limitations for most other uses. Detailed onsite investigations are needed to determine the value of the marsh for any use that is proposed. Marsh gas formed from the decaying organic matter is a problem. (Capability unit VIIIw–29; not classified in a woodland suitability group)

Woodstown Series

The Woodstown series consists of moderately well drained soils that have a loamy subsoil and a substratum of bedded loose sand, gravelly sand, and sandy loam. In the natural condition of these soils, the water table rises to about 2 feet below the surface late in fall and drops late in spring.

The soils are mostly in intermediate positions in the landscape. South of Quinton they are in high positions and are underlain by clay.

A representative, cultivated Woodstown soil has a plow layer of brown to yellowish-brown sandy loam and a subsoil of strong-brown or yellowish-brown sandy loam. The lower subsoil is mottled with grayish brown. Beneath the subsoil are layers of sandy loam and loamy sand.

Woodstown soils are moderately permeable. They have moderate water-holding capacity. Organic-matter content and natural fertility range from low to moderate. Either open ditches or underdrains can be used to lower the water level. If the root zone becomes saturated, fruit trees can be blown over by high wind.

The natural vegetation is forest, mostly oak trees.

If adequately drained, Woodstown soils are suited to vegetables, fruit, and most of the other crops grown in the county.

Wetness of the Woodstown soils limits their commercial and residential uses. The seasonal high water table is a moderate limitation for septic fields and for homesites if cellars are desired. Woodstown soils generally make good sites for dugout ponds, although the water level is likely to drop in irrigation ponds in dry years, and the recharge rate is slow in the areas where the substratum is clayey.

Representative profile of a Woodstown sandy loam that has slopes of 0 to 2 percent, near Ponchantoula Lake, approximately 50 yards east of the entrance to the association area:

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) sandy loam; very fine, crumb structure; very friable; clear, wavy boundary; 2 to 4 inches thick.

A2—3 to 13 inches, yellowish-brown (10YR 5/4) sandy loam; massive, tending toward very weak, subangular blocky structure in lower part; friable; lowest 6 inches transitional toward B2t horizon; gradual, smooth boundary; 9 to 14 inches thick.

B2t—13 to 23 inches, strong-brown (7.5YR 5/6) heavy fine sandy loam; moderate, fine to medium, subangular blocky structure; firm in place, friable when removed; some clay coatings; gradual, smooth boundary; 10 to 20 inches thick.

B3t—23 to 32 inches, yellowish-brown (10YR 5/6) heavy fine sandy loam; common, distinct, grayish-brown (10YR 5/2) mottles; moderate, fine and medium, subangular blocky structure; firm in place, friable when removed; clear, smooth boundary; 7 to 10 inches thick.

C1—32 to 44 inches, strong-brown (7.5YR 5/6) sandy loam; many, medium, prominent mottles of grayish brown (2.5Y 5/2) and light brownish gray (2.5Y 6/2); weakly stratified; generally firm, especially in the browner bands; friable; grains clearly clay coated in brown bands, some coating in grayer bands; gradual, smooth boundary.

C2—44 to 60 inches, grayish-brown (2.5Y 5/2) light sandy loam and loamy sand; strong-brown (7.5YR 5/8) flecks; stratified; firm in place, friable to loose when removed.

Thickness of the solum ranges from 28 to 48 inches and in most places is about 30 inches.

Texture of the A horizon is sandy loam or loamy sand. Texture of the B horizon is sandy loam or sandy clay loam. Mottles of low chroma normally are present in the lower part of the B horizon. Mottles of higher chroma are present in the upper B horizon in some places.

The C horizon is composed of stratified layers of loamy sand and sandy loam and varying amounts of quartzose gravel. In some places the substratum is clayey.

The Woodstown soils are the moderately well drained soils of the Sassafras drainage sequence, which includes the somewhat poorly drained Dragston soils, the poorly drained Fallsington soils, and the very poorly drained Pocomoke soils. Woodstown soils are not so gray as the Dragston, Fallsington, and Pocomoke soils. Woodstown soils are associated with other members of the Sassafras drainage sequence and with Mattapex, Klej, and Keyport soils. Woodstown soils are more sandy than Mattapex and Keyport soils, but they are not so sandy as Klej soils.

Woodstown loamy sand, 0 to 5 percent slopes (WkB).—This soil has a surface layer of loamy sand about 20 inches thick. In summer, after the water table has dropped, this soil is somewhat more droughty than Woodstown sandy loam.

After it is drained and irrigation is provided, this soil is suited to production of vegetables and fruits. The surface soil is subject to blowing, and crops are subject to sandblasting. (Capability unit IIw–15; woodland suitability group 3)

Woodstown loamy sand, clayey substratum, 0 to 5 percent slopes (WlB).—This soil has a thick surface layer of loamy sand and a clayey substratum that normally begins between 40 and 60 inches below the surface.

This soil has moderate water-holding capacity. It is subject to wind erosion.

After it is adequately drained, this soil is suited to vegetables and fruit. Irrigation should be available for high-value crops.

The recharge rate is slow in dugout ponds. The clayey substratum is a severe limitation for septic disposal fields. (Capability unit IIw–15; woodland suitability group 3)

Woodstown sandy loam, 0 to 5 percent slopes (WmB).—This soil has the profile described as representative of the series. Included in the mapping were some areas where the subsoil is light sandy loam instead of heavy sandy loam. The soil in these included areas is more rapidly permeable and has lower water-holding capacity than this soil. Also included in the areas mapped are some small areas of Dragston sandy loam in low, nearly level places. There is a greater need for drainage on Dragston sandy loam than on this soil.

If drained, this Woodstown soil is suited to fruit, vegetables, sod, nursery crops, corn, small grain, soybeans, hay, and pasture. Control of erosion is needed on some of the long slopes. (Capability unit IIw–14; woodland suitability group 1)

Woodstown sandy loam, 5 to 10 percent slopes (WmC).—This soil is moderately sloping and is limited by a moderate erosion hazard. Included in mapping were some areas of a soil having short slopes slightly greater than 10 percent, and some areas of a Sassafras soil. Mostly as a result of lateral movement of water, this soil is wet in

some places. The wet places are normally at the foot of long slopes. Interceptor drains generally help to reduce the wetness.

If adequately drained, this soil is suited to fruit, general crops, hay, and pasture. (Capability unit IIIe–14; woodland suitability group 1)

Woodstown sandy loam, clayey substratum, 2 to 5 percent slopes (WnB).—This soil lies on the tops of narrow, irregular ridges of low relief in the vicinity of Alloway, Quinton, and Woodstown. It has a profile more shallow than the one described as representative of the Woodstown series. The solum is underlain by clay beginning 40 to 50 inches below the surface. Included in mapping were some areas of a soil having slopes of less than 2 percent and some areas in which the subsoil is light sandy loam.

This soil is suited to fruit, vegetables, and general crops. The recharge rate in dugout ponds on this soil is likely to be too slow to supply water for irrigation. Its underlying clay layer severely limits the use of this soil for disposal of waste from septic tanks. (Capability unit IIw–14; woodland suitability group 1)

Woodstown-Dragston loamy sands, 0 to 5 percent slopes (WoB).—This complex contains about 70 percent Woodstown loamy sand and 30 percent Dragston loamy sand and other soils. Except for more sandy texture and greater thickness of the surface layer, each soil has a profile similar to the one that is described as representative of its series. Included in mapping of this complex were some areas of Woodstown sand and some areas of Dragston sand. The Dragston soil of this complex normally is in lower positions than the Woodstown soil.

The surface layer of each soil in this complex is about 20 inches thick. Both soils are subject to wind erosion, and crops on them are subject to sandblasting. The soils normally are too droughty for hay and pasture. If drained they are best suited to fruit and vegetables. (Capability unit IIw–15; woodland suitability group 3)

Woodstown-Dragston sandy loams, 0 to 5 percent slopes (WsB).—This complex is 75 to 80 percent Woodstown sandy loam and 15 to 25 percent Dragston sandy loam. A small percentage is other soils, including Mattapex silt loam and Klej loamy sand. The areas of Mattapex and Klej soils are too small to be managed separately. The Klej soils are subject to blowing and are more droughty than any of the other soils in this complex.

In some places there is a clayey substratum beginning 40 to 60 inches below the surface. Its texture generally is clay, sandy clay, or sandy clay loam. The clayey substratum, where it is present, is likely to limit severely the use of the areas of this complex for septic fields. The recharge rate in dugout ponds is likely to be too slow to provide the water that is needed for irrigation in a dry season. (Capability unit IIw–14; woodland suitability group 1)

Woodstown-Fallsington-Klej complex, 0 to 3 percent slopes (WtA).—This complex is about 50 percent Woodstown soils and 20 to 30 percent Fallsington soils. The rest is Klej and other soils. The Woodstown soils have a surface layer more sandy than the one in the profile described as representative of the Woodstown series. The Fallsington and Klej soils have profiles similar to those described as representatives of their series.

Woodstown and Klej loamy sands are subject to wind erosion. These soils are moderately well drained, and the Fallsington soils are poorly drained. Some artificial drainage is needed in all areas of this complex. Drainage is especially needed on the Fallsington soils, for they are the wettest. If adequately drained, the soils of this complex are suited to production of fruit and vegetables. (Capability unit IIw–15; woodland suitability group 3)

Woodstown-Klej-Sassafras loamy sands, 0 to 3 percent slopes (WwA).—This complex is about 50 percent Woodstown loamy sand, 20 to 40 percent Klej loamy sand, and 10 to 30 percent Sassafras loamy sand. The soils are in patterns so intricate that they cannot be mapped separately at the scale of the soil map. Descriptions of their profiles are given in descriptions of the respective soil series.

The Sassafras soils occur at the highest positions in this complex. They are well drained. All three soils of the complex are subject to wind erosion, and crops on them are subject to sandblasting. The soils are droughty in summer after the water level drops. High-value crops need irrigation. (Capability unit IIw–15; woodland suitability group 3)

Use and Management of the Soils

The soils in Salem County are used mainly for cultivated crops, pasture, and trees. This section explains how the soils can be used for those purposes, and it rates the soils according to their productivity for the principal crops. Also discussed are the uses of soils in wildlife management; in building highways, farm ponds, and other engineering structures; and in community developments.

Use and Management of Soils for Crop Production

This subsection tells the important characteristics of the soils in the county that affect growth of crops, explains the system of grouping soils according to their capability for farming uses, and discusses management of the groups of soils. Also in the subsection is a table that assigns to each of the soils an estimated productivity rating for the principal crops when they are grown under two levels of management.

In general, the soils of Salem County have medium or low natural fertility. Through good management, however, high production can be attained. General management practices that apply to most of the soils are listed here to avoid repeating them for each soil.

Liming and fertilizing are needed on nearly all the soils. (Soils are not limed for blueberries.) The soils should be tested frequently and treated according to their needs. Fertilizing recommendations vary according to soil texture, kind of crop, and level of management.

Organic-matter content needs to be maintained by plowing in cover crops or by growing a sod crop in the rotation. Cover crops can be effective in maintaining organic-matter content if they are fertilized and managed well. Many farmers are growing cover crops with good success.

Tillage is needed to prepare a good seedbed and to control weeds. It is not needed nearly so much, however, as was once believed. By the use of herbicides for control of weeds, and plow-plant methods for preparing a seedbed, the amount of tillage can be greatly reduced. If a plowpan

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is formed, however, it needs to be broken so that movement of water and air is not blocked.

Control of insects and diseases is needed for most crops if high yields are to be obtained.

Drainage is needed for growth of crops on about one-third of the soils. Some of these soils have been greatly improved by drainage, some have been partly improved, and others have not been drained at all. Drainage of these soils is needed to increase plant growth and to permit equipment to be moved at the right time.

Control of erosion involves protection from the action of both wind and water. Although cover crops are effective if the hazard is not too great, other control measures are needed if clean-tilled crops are grown on sloping soils. The length and steepness of slope, the crop rotation, the management practices followed, and the effectiveness of erosion control practices all need to be considered.

Irrigation is needed for most high-value crops, except asparagus. It is such an early crop that the harvest is complete before the soil becomes dry.

Capability Groups of Soils

Capability classification is the grouping of soils to show their suitability for most kinds of farming. It is a practical classification based on the limitations of the soils, the risk of damage when they are used for ordinary field crops or sown pastures, and the way they respond to treatment. The classification does not apply to most horticultural crops, or to cranberries and other crops that have special requirements for production. The soils are classified according to degree and kind of permanent limitations, but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soils; and without consideration of possible major reclamation.

In the capability system, all soils are grouped at three levels, the capability class, the subclass, and the unit. These are discussed in the following paragraphs.

Capability Classes, the broadest groupings, 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 some limitations that reduce the choice of plants or require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.

Class IV soils have very severe limitations that restrict the choice of plants, require very careful management, or both.

Class V soils are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife food and cover.

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture, woodland, or wildlife food and cover.

Class VII soils have very severe limitations that make them generally unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife.

Class VIII soils and landforms have limitations that preclude their use for commercial plant production without major reclamation and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes.

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 or droughty; and *c* is used in those areas where climate is the chief limitation to the production of common cultivated crops. (There are no *c* subclasses in Salem County.)

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only subclasses indicated by *w*, *s*, and *c*, because the soils in it are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, woodland, wildlife, or recreation.

Capability Units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–1 or IIIe–4. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation, and the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph. The Arabic numeral specifically identifies the capability unit within each subclass. The numbers assigned are part of a statewide system and hence are not consecutive in this county.

Management by capability units

In this subsection the soils of the county are placed in capability units. Suggested for each unit are suitable uses and management practices. Soils that are in the same capability unit have about the same limitations and similar risks of damage. They also are suited to about the same crops and need about the same kind of management. Clay pits, Gravel pits, Made land, sanitary land fill, and Sand pits were not placed in capability units.

The names of the soil series represented are mentioned in the description of each capability unit, but this does not mean that all the soils of a given series appear in the unit. To find the names of all the soils and the capability unit in which each soil has been placed, refer to the "Guide to Mapping Units" at the back of this survey.

CAPABILITY UNIT I–4

This unit consists of nearly level, well-drained soils that have a surface soil of silt loam or loam. They are soils of the Aura, Chillum, and Matapeake series. These soils have

moderately slow permeability and moderate to high water-holding capacity. They are easily worked. They have few or no limitations.

The soils of this unit are good for a wide variety of crops, including peas (fig. 6), lima beans, snap beans, asparagus, corn, small grains, soybeans, potatoes, nursery stock, hay, and pasture.

Good soil structure can generally be maintained if cover crops are grown. Irrigation is normally profitable on high-value crops. Spot drainage is needed in some of the small, depressed areas if high-value crops are grown.

CAPABILITY UNIT I–5

This unit consists of a nearly level, well-drained soil, Sassaras sandy loam, 0 to 2 percent slopes. This soil has a sandy loam surface and a subsoil slightly heavier than the surface soil. The soil is moderately permeable and has moderate water-holding capacity. It is easily worked.

This soil is suitable for a wide variety of crops, such as vegetables, corn, small grain, nursery stock, hay, pasture, and fruit. It has few or no limitations.

High-value crops are generally irrigated. Cover crops, if they are plowed under, will normally maintain the organic-matter content and porous structure of the plow layer.

CAPABILITY UNIT IIe–1

This unit consists of gently sloping, moderately well drained, deep soils that have clay subsoil. They are soils of the Keyport and Marlton series. They are slowly permeable in the subsoil and have high water-holding capacity. These soils are difficult to work. They dry out slowly in spring. If worked when wet, they clod severely. Because of slow permeability, runoff is medium and the erosion hazard is moderate. The soils contain excess water late in winter and early in spring.

The soils of this unit will produce small grain, corn, soybeans, hay, pasture, and late-planted vegetables. Some areas are in woods.

On the soils of this unit, contour farming, field terraces, stripcropping, or diversion terraces are needed to control erosion. These practices also help to keep surface water from accumulating in channels where it might cut gullies. Open ditches are needed in some places to remove excess water from the soils.

CAPABILITY UNIT IIe–3

This unit consists of deep, nearly level to gently sloping, moderately well drained soils, mapped together as Howell soils, 0 to 5 percent slopes. These soils in most places have an 18-inch surface layer of loamy sand, but in some areas it is sandy loam. The soils are moderately slowly permeable and have moderate to high water-holding capacity.

Where the surface soil is loamy sand, tillage is easy, but the hazard of wind erosion is severe. In those areas where the surface soil is sandy loam that contains more clay than silt, tillage is more difficult, runoff is greater, and the haz-

Figure 6.—**Irrigated peas on Chillum silt loam, 0 to 2 percent slopes, a soil in capability unit I–4.**

ard of water erosion is greater than in areas where the surface layer is loamy sand.

Howell soils, 0 to 5 percent slopes, is suited to many kinds of vegetables and to corn. Windbreaks, windstrips, and cover crops reduce the hazard of wind erosion. Contour farming helps control water erosion. If high-value crops are grown, drainage, at times, is needed in some spots.

CAPABILITY UNIT IIe–4

This unit consists of gently sloping, well-drained soils that have a surface soil of silt loam or loam. They are soils of the Aura, Chillum, Matapeake, and Sassafras series. These soils have moderately slow or moderate permeability and high water-holding capacity. They are easily worked. The slopes are gentle but enough to cause a slight hazard of water erosion.

These soils will produce a wide variety of crops, such as peas, lima beans, spinach, other vegetables, corn, small grain, soybeans, potatoes, nursery stock, hay, and pasture (fig. 7).

Cover crops and hay crops in the rotation normally are enough to maintain the organic-matter content and a porous structure in the plow layer. Contour farming and stripcropping are needed for control of erosion on some of the long slopes. Irrigation is normally profitable for most of the high-value crops.

CAPABILITY UNIT IIe–5

This units consists of nearly level and gently sloping, well-drained soils that have a surface soil of sandy loam and a subsoil of heavier texture. They are soils of the Downer, Sassafras, and Aura series. These soils are moderately permeable and have moderate water-holding capacity. They are easily worked. Excess water runs off these gentle slopes at a moderate rate but will erode the soils if they are left bare.

The soils will produce a wide variety of crops, such as vegetables, corn, small grain, soybeans, nursery stock, hay, pasture, and fruit.

Cover crops and hay crops in the rotation normally are enough to maintain the organic-matter content and a porous structure in the plow layer. Contour farming and stripcropping are needed on the longer slopes to reduce the hazard of water erosion. Irrigation is generally practiced for the high-value crops. Crops on the Downer soils need more frequent applications of water than those on the Sassafras soils, because the Downer soils have lower water-holding capacity.

Figure 7.—**Spinach on Matapeake silt loam, 2 to 5 percent slopes, a soil in capability unit IIe–4.**

CAPABILITY UNIT IIs–6

This unit consists of nearly level and gently sloping soils that have a surface soil of loamy sand. They are soils of the Downer, Sassafras, Galestown, and Woodstown series. Most of the soils have a subsoil of sandy loam or sandy clay loam, but small areas that have a subsoil of loamy sand are in this unit also. The soils are well drained. These soils are moderately permeable and have moderate or moderately low water-holding capacity. They are easy to till, but the surface soil is so loose that they are subject to wind erosion, and crops on them are subject to sandblasting. They warm early in spring, and fruit grown on them is subject to damage by scalding in the heat of summer.

Because the soils are droughty, they are best suited to deep-rooted perennial crops, early crops, or crops able to withstand drought. Small fruit, peaches, apples, asparagus, sweetpotatoes, and pumpkins are most commonly grown. Irrigation is needed for all crops, except asparagus. Cover crops, windbreaks, or windstrips can be used to reduce the hazards of wind erosion and sandblasting. Some drainage is needed in low places that are moderately well drained.

CAPABILITY UNIT IIs–9

This unit consists of nearly level to gently sloping soils that have a surface soil of sandy loam or gravelly sandy loam and a heavier subsoil that is hard enough to restrict roots. They are soils of the Aura series. They are moderately slowly permeable and have moderate to moderately low water-holding capacity. These soils crust readily after a rain, and they become compacted easily. They are difficult to till because of the gravel and because the surface soil tends to harden when it dries. Water runs off the gentle slopes fairly rapidly and produces a moderate hazard of erosion. Crop roots are mainly restricted to 18 to 24 inches of surface and subsurface soil above the hard, brittle subsoil.

These soils are suited to apples, peaches, small grain, corn, soybeans, strawberries, and many vegetables. Surface crusting reduces the germination of some small seeds.

Cover crops are needed to maintain the organic-matter content and the porosity of the plow layer. Contour farming is needed on many of the longer slopes to reduce water erosion. Irrigation is needed for high-value crops. Irrigation is needed more frequently on the Aura gravelly sandy loam than on the Aura sandy loam, because the Aura gravelly sandy loam has lower water-holding capacity.

CAPABILITY UNIT IIw–11

This unit consists of Keyport sandy loam, 0 to 5 percent slopes, a soil that is moderately well drained. It has a sandy loam surface soil and a clay subsoil. Its water-holding capacity is high, but it is slowly permeable. If worked when wet, the soil clods severely and is difficult to work into a fine seedbed.

If drained, this soil is suited to corn, soybeans, pasture, hay, and late-planted vegetables. Some areas are in woods.

Drainage is needed where this soil is farmed. Open ditches are more efficient in removing water than are underdrains.

CAPABILITY UNIT IIw–13

This unit consists of nearly level and gently sloping, moderately well drained soils that have a surface soil of silt loam. They are soils of the Mattapex series, including some that have a clayey substratum and some that have a glauconitic substratum. Erosion has thinned the silt mantle of Mattapex silt loam, glouconitic substratum, 2 to 5 percent slopes. The glauconitic layer exposed as a result of the erosion makes cultivation of this soil difficult.

The soils of this unit generally have moderately slow permeability, but where the substratum is clayey, the permeability is slow. They have high water-holding capacity. The soils normally contain excess water in winter and spring, when the water table rises to about 2 feet from the surface. The water restricts root development, and when the soils are saturated they will not support farm machinery. Plowing and planting are sometimes delayed in spring by wet soils. Frost heaving is a hazard on these soils. In places where the soils are underlain by finer materials, there is considerable lateral movement of water in the soil horizons.

If adequately drained, these soils are well suited to corn, soybeans, small grain, vegetables, hay, pasture, and nursery stock. If drainage is considered too costly, the crops are restricted to those that can be planted late.

Drainage can be accomplished by either open ditches or underdrains. If high-value crops are grown, bed drainage to remove surface water is needed in the areas that receive much runoff from the adjacent slopes. Some high-value crops are irrigated after the soils have been adequately drained. Cover crops or hay in the rotation normally will maintain the organic-matter content and porosity of the plow layer.

CAPABILITY UNIT IIw–14

This unit consists of nearly level and gently sloping soils that in most places have a sandy loam surface soil and a slightly heavier subsoil. They are soils of the Woodstown, Dragston, and Sassafras series and one mapping unit of Sandy and clayey land. Most of the soils are moderately well drained or somewhat poorly drained, but some small areas of well drained soils are also in this unit. The well-drained soils do not need artificial drainage. All the soils have moderate to moderately slow premeability and moderate water-holding capacity. They are easy to till.

The soils of this unit generally receive runoff water from the slopes above, and in some places there is lateral movement of water above the subsoil. The soils contain excess water in winter and spring. Water rises to a depth of 2 feet or less from the surface in the Woodstown soils and to about 1½ feet in the Dragston soils. The water delays spring plowing and planting.

If adequately drained, the soils are suited to corn, small grain, soybeans, hay, pasture, fruit, and vegetables. If drainage is considered too costly, crops are restricted to late-planted corn, soybeans, hay, pasture plants, or trees. Drainage can be accomplished by either open ditches or underdrains.

Cover crops or hay in rotation, as a rule, will maintain the organic-matter content and the porosity of the plow layer.

CAPABILITY UNIT IIw–15

This unit consists of nearly level and gently sloping, moderately well drained and somewhat poorly drained soils that have a loamy sand surface soil and a sandy loam or sandy clay loam subsoil. They are soils of the Woodstown series, in many places mapped as complexes with soils of the Dragston, Fallsington, Klej, and Sassafras series. Most of these soils are moderately permeable and have

moderate water-holding capacity. They are easy to till. The loamy surface soil is subject to wind erosion, and plants are subject to sandblasting.

The soils contain excess water in winter and spring that restricts plant roots and makes the soil unable to support farm machinery. Spring plowing and planting are sometimes delayed in the lower lying areas.

If adequately drained, the soils are suited to vegetables and fruit. If drainage cannot be accomplished, crops are normally restricted to late-planted vegetables. Drainage can be accomplished by either underdrains or open ditches.

Irrigation is normally applied to high-value crops after the soil has been drained. Cover crops, windbreaks, or windstrips are practices to reduce wind erosion and sandblasting.

CAPABILITY UNIT IIIe-1

This unit consists of moderately sloping, moderately well drained, thick soils that are clayey in some part of the subsoil. They are eroded soils of the Keyport and Marlton series. These soils are slowly permeable and have high water-holding capacity. Workability is difficult because clay lies close to the surface. When the surface soil is eroded, the clay becomes mixed into the plow layer. Runoff is high, and the erosion hazard is severe. In some places gullies have been cut in the fields.

Where carefully managed, the soils are suited to small grain, corn, soybeans, hay, pasture, and trees.

Contour farming, field terraces, diversion terraces, stripcropping, and grass waterways are practices that help control erosion. Drainage-type terraces can be used to get distribution of the surface water. Gullies need to be filled and the land surface smoothed.

CAPABILITY UNIT IIIe-4

This unit consists of moderately sloping soils of the Matapeake series. These soils are well-drained silt loams that have moderately slow permeability and high water-holding capacity. They are easily worked.

On these moderately sloping soils, runoff is rapid and the hazard of water erosion is a problem. In some fields erosion has removed part of the surface soil and has cut some gullies.

These soils are suited to corn, small grain, soybeans, hay, pasture, some vegetables, and trees.

In cropped fields on these soils, contour farming, field terraces, diversion terraces, stripcropping, and grass waterways are the chief practices needed to control erosion. A cover crop should be planted after each row crop, and hay in strips might be needed to reduce the hazard of erosion. In some places gullies need to be filled and the land surface smoothed to ease farming operations. If these soils are irrigated, special care is needed to control runoff and erosion.

CAPABILITY UNIT IIIe-5

This unit consists of moderately sloping, well-drained soils that have a sandy loam surface soil and a slightly heavier subsoil. They are soils of the Sassafras series. They are easy to till, are moderately permeable, and have moderate water-holding capacity.

On these slopes, runoff is rapid and the hazard of erosion is a problem. If the soils are cultivated, they are subject to moderate erosion. In some fields erosion has already thinned the surface soil and started gullies.

These soils are suited to corn, small grain, soybeans, hay, pasture, and fruit.

Control of erosion is needed on cropped fields. Contour farming, field terraces, diversion terraces, stripcropping, and grass waterways are good practices. Permanent cover can be planted in apple orchards. Hay in strips is needed in some cultivated fields to control runoff and erosion. A cover crop should follow each row crop. Filling of gullies and some land smoothing are needed to ease the use of farm machines. If the soils are irrigated, special care is needed to control erosion.

CAPABILITY UNIT IIIe-6

This unit consists of moderately sloping, well-drained soils that have a loamy sand surface soil and a slightly heavier subsoil. They are soils of the Downer and Sassafras series. These soils are easy to till, are moderately permeable, and have only moderate to moderately low water-holding capacity. They are subject to both wind and water erosion. The soils warm early in spring.

These soils are suited to fruit and vegetables, including asparagus, sweetpotatoes, and early vegetables.

Protection against both water and wind erosion is needed if these soils are farmed. Contour farming, field terraces, diversion terraces, and grass waterways reduce the hazard of water erosion. Cover crops, windbreaks, and windstrips reduce the hazard of wind erosion. If the soils are irrigated, care is needed to control runoff and water erosion.

CAPABILITY UNIT IIIe-9

This unit consists of moderately sloping, well-drained soils that have a surface soil of sandy loam or gravelly sandy loam and a subsoil that is moderately fine textured and firm enough to restrict roots. They are two soils of the Aura series. These soils have moderately slow permeability and only moderate to moderately low water-holding capacity. The soils tend to harden when they dry. In some places they are difficult to till because of the gravel content or the hardness when dry. In some places erosion has thinned the surface soil and has started gullies.

If managed with care, these soils produce grain, grass, fruit, vegetables, and woodland products, and are good wildlife habitats. Peaches are grown more commonly than apples on these soils.

In cropped fields control of water erosion is needed. Contour farming, field terraces, diversion terraces, stripcropping, and grass waterways are good practices. A cover crop should follow each row crop. Permanent cover can be planted in apple orchards. Gullies need to be filled so that the fields can be worked efficiently. Land smoothing should be restricted to shallow cuts because of the hard subsoil. If the soils are irrigated, special care is needed to control runoff and erosion.

CAPABILITY UNIT IIIe-13

This unit consists of two moderately sloping, moderately well drained silt loams. They are soils of the Mattapex series, and one of them has a clayey substratum. They have moderately slow or slow permeability and high water-holding capacity. Permeability is slow in the soil that has a clayey substratum. The soils are easy to till.

On these slopes, runoff is high and the erosion hazard is severe. In some spots the soils contain excess water in

spring and winter. With adequate drainage and control of erosion the soils are suited to grain, hay, pasture, and vegetables. They are also suited to trees and wildlife habitats.

Control of erosion is needed in cropped fields. Contour farming, field terraces, diversion terraces, stripcropping, and grass waterways are good practices. A cover crop should follow each row crop, and hay in strips is needed in many cropped fields to reduce erosion. Intercepting underdrains help to reduce the amount of excess water. If the soils are irrigated, care is needed to control runoff and erosion.

CAPABILITY UNIT IIIe–14

This capability unit consists of one moderately sloping, moderately well drained soil that has a sandy loam surface soil and a slightly heavier subsoil. It is Woodstown sandy loam, 5 to 10 percent slopes. The soil is easy to till, is moderately permeable, and has moderate water-holding capacity.

On cropped fields runoff is rapid and the hazard of erosion is severe. The soil contains excess water in winter and spring. If the farming includes drainage and control of erosion, the soil is suited to grain, hay, pasture, vegetables, and fruit.

Control of erosion is needed on cropped fields. Contour farming, field terraces, diversion terraces, stripcropping, and grass waterways are suitable practices. A cover crop should follow each row crop. Intercepting underdrains help to remove excess water. If this soil is irrigated, special care is needed to control erosion.

CAPABILITY UNIT IIIw–11

This unit consists of a complex of two nearly level soils, Lenoir-Keyport silt loams, 0 to 2 percent slopes. Both soils have a surface layer of silt loam and are clayey in some part of the subsoil. The Lenoir soil is somewhat poorly drained, and the Keyport soil is moderately well drained. Both soils are slowly permeable and have high water-holding capacity. These soils remain wet late in spring and for some time after a wet period. Water stands on the surface, and runoff is slow. If the soils are plowed when too wet or too dry, they clod and are difficult to work into a good seedbed. Germination of seeds is poor in many places because of excess water. The soils are subject to frost heaving.

If drained, these soils are suited to corn, soybeans, hay, pasture, and late-planted vegetables. Some areas are in woods.

Drainage of these soils is needed if they are farmed. Open ditches are more effective than underdrains. Bedding or smoothing is also needed in many places to speed up surface runoff.

CAPABILITY UNIT IIIw–16

This unit consists of nearly level loamy sands. One mapping unit is a soil of the Klej series. The other is a complex of Klej soils with soils of the Woodstown and Galestown series. The Klej soils are moderately well drained. The water table rises to about 2 feet late in winter or in spring, but drops below 5 feet in summer. The soils have rapid permeability and moderately low water-holding capacity. The soils are easily worked, and they warm early in spring. They are subject to wind erosion, and crops on them are subject to sandblasting.

The Klej soils are used mostly for fruit and vegetables. Crops are generally irrigated, and if the crops have high value, the soils generally should be drained also. Open ditches or underdrains are effective for drainage, and they can be widely spaced. Cover crops, windbreaks, or windstrips will reduce wind erosion and sandblasting.

These soils have very low natural fertility. Fertilizer and lime leach readily.

CAPABILITY UNIT IIIw–19

This unit consists of Elkton-Bayboro sandy loams, 0 to 2 percent slopes. These soils are nearly level, are poorly and very poorly drained, and have a surface soil of sandy loam and a subsoil of clay. They have slow permeability and high water-holding capacity.

In some places water is ponded on the surface much of the time. Most areas remain wet for a long time. Plowing and planting in spring are delayed by wetness. Germination of seeds is poor because of wet soils. Losses of crops due to excess surface water are severe. The soils occur normally in frost pockets.

If drained, these soils are suited to corn, soybeans, hay, and pasture. Many areas are in woods.

Open ditches are most effective for removing excess water. Bed drainage or shallow V-ditches are needed in many places to speed up surface runoff.

CAPABILITY UNIT IIIw–20

This unit consists of the nearly level silt loam of the Othello series and of Made land, dredged river materials. Natural drainage is poor in the Othello soil and variable in Made land, dredged river materials. Permeability of all the areas is moderately slow, and the water-holding capacity is high. The Othello soil has water on the surface for long periods in many places, and it normally remains wet for a long time after heavy rains. The soils of this unit are subject to severe frost heaving.

With adequate drainage, the soils are suited to corn, soybeans, small grain, hay, and pasture. If adequate drainage cannot be obtained, pasture is generally the most practical use.

Surface drainage by bedding or by smoothing is needed on most areas of the Othello soil if crops are to be grown. Open ditches or underdrains are also needed to lower the water table. On Made land, dredged river materials, the need for drainage is variable. Where the fill is shallow, underdrains are likely to be needed and are generally effective.

CAPABILITY UNIT IIIw–21

This unit consists mostly of nearly level, poorly drained soils that have a sandy loam surface soil and a slightly heavier subsoil. They are soils of the Fallsington series and complexes of Fallsington soils with Othello or with Pocomoke and Berryland soils. Fallsington soils are moderately permeable and have high water-holding capacity.

If these soils have not been drained, they have a high water table that rises within 1 foot of the surface late in winter and in spring. Growth of crop roots is restricted, and work with farm machines is difficult. Plowing and planting often must be delayed. Germination of seeds is poor, and losses of crops caused by excess water are severe.

The soils can be drained either by open ditches or underdrains.

If adequately drained, the soils are suited to corn, soybeans, hay, pasture, and late-planted vegetables. Blueberries can be grown if the water level is controlled. Much of the area of these soils remains in woods.

CAPABILITY UNIT IIIw–23

This unit consists of poorly and very poorly drained, nearly level and gently sloping soils that have a silt loam surface soil and a clay subsoil. They are soils of the Elkton and Bayboro series. They have high water-holding capacity but are slowly permeable. These soils generally receive large amounts of water from the slopes above them. Water is temporarily ponded on the surface in some places, or makes the surface soil wet for long periods after heavy rains. Plowing and planting are severely delayed in spring. Germination of seeds is poor, and losses of crops from wetness are severe. The soils occur in natural frost pockets and are subject to severe frost heaving.

If drained, the soils are suited to corn, soybeans, hay, and pasture. Many areas are in woods.

Open ditches are most efficient for providing the necessary drainage. Bed drainage or shallow V-ditches also are useful in improving surface runoff.

CAPABILITY UNIT IIIw–25

This unit consists of nearly level, very poorly drained soils. They are soils of the Pocomoke series, some of which are mapped in a complex with Berryland soils. They have mostly a sandy loam or loamy sand surface soil and a slightly heavier subsoil. These soils are moderately permeable and have high moisture-holding capacity.

If the soils have not been drained, the water table rises to the surface late in winter and in spring. Then the soils will not support farm machinery. The water drops slowly, and the soils remain saturated late in spring. Growth of crop roots is restricted, and germination of seeds is poor. Losses of crops from excess water are severe.

If drained, the soils are suited to corn, soybeans, hay, pasture, late-planted vegetables, and blueberries. Much of the acreage is in woods.

Drainage can be provided by either open ditches or underdrains. Moderate spacing of deep ditches is normally best if the outlet ditches permit. Surface drainage is generally not needed, except where the surface soil is mucky or fine textured. If the soil is mucky, subsidence after drainage should be expected.

If blueberries are grown, a system to control the water level should be installed.

CAPABILITY UNIT IIIs–7

This unit consists of a nearly level to gently sloping soil, Fort Mott loamy sand, 0 to 5 percent slopes. It has a thick, coarse-textured surface layer, and is easy to till and moderately permeable, but has low water-holding capacity. The Fort Mott soil is well drained, but small areas of a moderately well drained soil are included in some of the areas mapped.

If left bare, this soil is highly subject to wind erosion and crops on it are subject to sandblasting. The soil warms very early in spring and sometimes reflects enough heat in summer to damage crops.

This soil is best suited to vegetables and fruit. Asparagus, tomatoes, sweetpotatoes, peaches, and early vegetables are extensively grown. Much of the area is in woods.

Frequent irrigation is needed for most crops. Cover crops, windbreaks, and windstrips are practices needed to reduce wind erosion and sandblasting.

CAPABILITY UNIT IIIs–10

This unit consists of a nearly level to gently sloping soil, Aura loamy sand, 0 to 5 percent slopes. It has a subsoil that is moderately fine textured and so firm that it generally restricts growth of crop roots. This soil has moderately slow permeability and moderately low water-holding capacity. The soil is easy to till, and it warms early in spring. It is highly subject to wind erosion.

This soil is suited to fruit and vegetables. Irrigation is needed if crops are grown. Wind erosion and sandblasting can be reduced by the use of cover crops, windbreaks, and windstrips.

CAPABILITY UNIT IVe–1

This unit consists of strongly sloping soils that are moderately well drained and are clayey in some part of the subsoil. They are eroded soils of the Keyport and Marlton series. They are slowly permeable and have high water-holding capacity.

Runoff is rapid, and the erosion hazard is severe. In fields, the surface layer has been thinned by erosion. In some places the clay subsoil has been mixed with the surface soil in normal plowing. The clay soil material is generally cloddy, and preparation of a seedbed is difficult.

The soils are best suited to hay or pasture. Small grain and corn can be grown in strips if much of each slope is kept in hay. Cover crops, field terraces, diversion terraces, and grass waterways are also needed to control erosion.

CAPABILITY UNIT IVe–5

This unit consists of strongly sloping, well-drained soils that have a sandy loam surface soil and a slightly heavier subsoil. They are soils of the Sassafras series. These soils are moderately permeable and have moderate water-holding capacity. Because they are strongly sloping, runoff is high and the erosion hazard is severe. In some fields erosion has already thinned the surface soil and started gullies. The gullies need to be filled.

The soils are best suited to hay, pasture, or trees. Small grain and corn can be grown in strips if much of each slope is kept in hay. Apples can be grown also on these strongly sloping soils if permanent cover is planted. Cover crops, field terraces, diversion terraces, and grass waterways are practices needed to control erosion on these soils.

CAPABILITY UNIT IVe–6

This unit consists of Sassafras loamy sand, 10 to 15 percent slopes. This is a strongly sloping, well-drained soil that has a surface soil of loamy sand and a subsoil that is slightly heavier. This soil is moderately permeable and has moderate water-holding capacity. Because it is strongly sloping, this soil is subject to high runoff and severe erosion.

This soil is best suited to hay, pasture, and trees. Corn and small grain can be grown in strips if much of each slope is kept in hay. Apples can be grown if the soil is planted to permanent sod.

Cover crops, field terraces, diversion terraces, and grass waterways are practices needed to help control erosion.

CAPABILITY UNIT IVs–7

This unit consists of nearly level to moderately sloping, deep, coarse-textured soils. They are soils of the Fort Mott and Galestown series, and Galestown soils mapped in a complex with Sassafras and Klej soils. They are easy to till, and they have moderately rapid to rapid permeability and moderately low to low water-holding capacity. They are highly subject to wind erosion, and crops on them are subject to sandblasting.

If water is available for irrigation, these soils can be used for fruit and vegetables. Because their water-holding capacity is low, the intervals between irrigations must be short.

On the gentler slopes, cover crops, windbreaks, or windstrips are needed to reduce the hazards of wind erosion and sandblasting. If the sloping soils are irrigated, special care is needed to control erosion.

These soils have low natural fertility. Fertilizer and lime leach readily.

CAPABILITY UNIT Vw–26

This unit consists of soils of the Berryland series, and a Berryland soil mapped in a complex with an Othello soil. The soils of this capability unit are nearly level, very poorly drained, and sandy.

If these soils have not been drained, the water table rises to the surface late in winter and in spring. It drops several feet in summer. The water level needs to be lowered if the soils are to be farmed. The soils are sandy, have moderately low water-holding capacity, and range from rapidly to moderately slowly permeable. If drained, they are subject to wind erosion. Plowing and planting are delayed by excess water. Subsidence is common after drainage wherever the surface layer is mucky.

Much of the acreage of these soils is in woods. If drained, these soils are suitable for blueberries and for some late vegetables. Control of the water level is needed if blueberries are to be grown. Open ditches or underdrains will provide the needed drainage. Wide spacing of ditches or tile lines is normally adequate.

CAPABILITY UNIT Vw–28

This unit consists of the nearly level, poorly drained Bibb silt loam, mucky stratum. It is subject to annual overflow by streams. This soil is moderately slowly permeable and has high water-holding capacity. Drainage is generally impractical, because suitable outlets are not available. This soil is best left in natural vegetation of swamp maple and other water-tolerant trees and shrubs. Development of pasture is practical on some sites, but the soil needs to be cleared, ditched, and protected from floods.

CAPABILITY UNIT VIe–4

This unit consists of Matapeake silt loam, thin solum, 10 to 15 percent slopes. This soil is well drained and shallow. It has moderately slow permeability and moderate to high water-holding capacity.

On this strongly sloping soil, the amount of runoff is high and the hazard of erosion is severe. Gullies have been formed in some fields, and these should be filled if pasture is to be planted.

Because the soil is thin and subject to severe erosion, it is not suited to crops. It is best suited to pasture, trees, or wildlife habitats.

296–562—69——4

CAPABILITY UNIT VIIe–1

This unit consists of steep Clayey land. The areas are moderately well drained.

These soil materials are slowly permeable and have high water-holding capacity. On these steep slopes, much water runs off and the erosion hazard is severe. Permanent cover of vegetation is needed to protect these land types from erosion. These land types can be used for pasture, trees, or wildlife habitats.

Guillies in fields should be filled. If renovation or seeding of pasture is needed, the work can be done in strips to reduce the risk of erosion.

CAPABILITY UNIT VIIw–30

This unit consists of nearly level organic soils, Muck and Peat, that lie next to the large streams and estuaries. They are nearly always saturated with water and are subject to overflow. They are extremely acid. They have very high water-holding capacity. The organic layer is generally about 2 feet thick, and subsidence takes place if the soils are drained. Protection from overflow is needed if the soils are farmed. Some of the similar soils in neighboring counties have been drained and planted to blueberries.

CAPABILITY UNIT VIIs–8

This unit consists of sands that are mostly deep and that have slopes ranging from nearly level to steep. Four mapping units are soils of the Evesboro series, one is an Evesboro-Aura complex, and the two others are Sandy land, Downer and Sassafras materials, steep, and Dune land. These soils and land types are rapidly permeable and have low water-holding capacity. They are droughty, and nearly all of them are subject to severe leaching. The coarse-textured surface soil is loose and very erodible. Severe wind erosion and sandblasting of crops are likely to occur on all the areas, including those that are nearly level or gently sloping. This capability unit includes some steep soils that have a loamy subsoil; they are susceptible to water erosion.

Sweetpotatoes, peaches, and melons are special crops produced on some of the gently sloping areas.

Management of crops, including irrigation, is so costly, and normal yields are so low, that farming of these soils generally is not profitable. The soils are better suited to trees, wildlife habitats, and recreation than to field crops.

CAPABILITY UNIT VIIIw–29

This unit consists of nearly level Tidal marsh and Fresh water marsh. In some places the tidal waters are brackish, but in others they are fresh. The soil materials can hold a large amount of water after they are drained. Sediment is deposited from time to time along drainageways in Tidal marsh and along streams in Fresh water marsh. In some salty marshes the soil material contains sulfides and becomes extremely acid if drained. In Tidal marsh, flooding by tidewater is a continual hazard. Destructive storms of hurricane strength are a great hazard to any buildings.

Extensive diking, tide gates, and pumping are necessary to drain these land types. In their natural state the materials are suitable for wildlife habitats. Diking is often necessary to provide fresh water for the wildlife.

Some areas of Fresh water marsh have a stand of water-tolerant trees, such as sweetgum, red maple, and sweetbay magnolia.

Estimated Yields

An estimated index, or rating, of expected yields, is given in table 2 for the principal crops grown on the soils of the county. The lowest rating is 1, and the highest is 10. Yields per acre that correspond to the ratings for different crops are given in table 3 as of the year 1965.

Omitted from table 2 are 15 soil mapping units that are not suitable for the crops named. These are Bibb silt loam, mucky stratum (Bs); Clay pits (Ca); Clayey land, Keyport materials, steep (CbE); Clayey land, Marlton materials, steep (CcF); Dune land (Dz); Evesboro sand, 10 to 15 percent slopes (EvD); Evesboro sand, 15 to 30 percent slopes (EvF); Fresh water marsh (Fw); Gravel pits (Gp); Made land, sanitary land fill (Mg); Muck, shallow (Mu); Peat, shallow (Pe); Sand pits (Sa); Sandy land, Downer and Sassafras materials, steep (SdF); and Tidal marsh (Tm).

Ratings are given for two levels of management. Those listed in the A columns are for yields expected under the management used by most growers in the county. Ratings listed in the B columns represent the highest yields attainable at a given time by following all suggested practices. Yields in both columns are average yields to be expected for at least 5 years, so they take into account variations caused by weather.

A high level of management is most likely the level that will produce profitable yields. Listed here are the practices considered best, at the time this survey was written, for the principal crops of corn, asparagus, alfalfa, tomatoes, soybeans, white potatoes, and peppers.[2] Research and development bring frequent changes in management practices for crops. Therefore, growers should obtain recommendations periodically from the County Extension Agent.

Best current management practices that apply to most of the crops are: (1) Using recommended varieties; (2) fertilizing in amounts determined by soil tests; (3) maintaining soil pH of 6.0 to 6.5; (4) controlling insects, diseases, and weeds by dusting, spraying, and cultivation (when applicable); (5) draining soil adequately to a depth of 30 inches; and (6) maintaining a cover crop after harvest of an annual row crop.

Special practices for certain crops are as follows: For alfalfa, maintain a pH range of 6.5 to 7.5 and inoculate seed. Irrigate tomatoes, lima beans, snap beans, white potatoes, and peppers. For white potatoes, maintain a pH range of 4.5 to 5.5. Plant barley before October 1, and wheat after the announced fly-free date (Hessian fly) but not later than October 20.

Presently, there is a trend to increase the plant population for some row crops. The limits are regulated primarily by the available moisture capacity of the soil. On the better soils of Salem County, 10,000 to 14,000 corn plants per acre should be maintained. Soybeans are planted in rows 18 to 32 inches apart.

Sound conservation measures are also needed to maintain yields. Contour planting on slopes of 5 percent or more is especially important for asparagus.

[2] Information supplied by ROBERT GARDNER, senior agricultural agent, Salem County.

Use of Soils as Woodland [3]

Originally, all of Salem County, except the tidal marshes, was forested. In the south-central and eastern parts of the county, where the soils are considerably more sandy, drier, and less fertile than in other parts, the forest was predominantly one of pitch pine mixed with oak, shortleaf pine, chestnut, and scattered hickories. In swamps the dominant trees were Atlantic white-cedar, red maple, blackgum, and sweetbay magnolia.

In the other parts of the county, the more loamy and more fertile soils supported a forest of mixed hardwoods made up mostly of oaks, yellow-poplar, chestnut, hickory, beech, ash, sweetgum, and redcedar, but there were a few scattered Virginia pines. Some mature trees were more than 120 feet high and 5 feet or more in diameter. At first, the large trees were cut to supply lumber for export. Later, all areas were repeatedly cut over to supply local residents and people of nearby towns with fuel for their homes and for iron furnaces, glass factories, canning plants, and other industries. The demand for wood fuel and charcoal fell off rapidly after 1870, but cutting, even for those products, has continued. On sites that were not cleared for farming, most woodlands have been heavily cut over six times or more since settlement. About 1904 the chestnut blight killed all the stems of chestnut trees in the area, although the roots still produce sprouts, some of which bear fruit before they die. By 1966 most of the small amounts of saw logs produced came from farm wood lots.

In the sandier sections, after the land was cleared and then abandoned, many areas reseeded to pines. On the sandier soils pines produce far more merchantable timber than oaks, which need better growing conditions to produce high-quality timber.

Because the native pitch pine, and, to a lesser degree, shortleaf pine are more fire resistant than other kinds of trees, these conifers dominate in areas where there have been repeated wildfires. Because they have been damaged, however, these pines, as a rule, are of low quality and do not indicate the rate of growth possible in stands undamaged by wildfires. Adjacent to the large streams, where the water table is constantly high and where organic matter has accumulated, there were dense forests of Atlantic white-cedar. These trees have always been valuable because they produce a high volume per acre and their wood is good for a variety of uses. Some of the uses are for boat boards, poles, posts, shingles, boxes, crates, and rustic furniture.

Present conditions in much of the woodland of Salem County reflect the history of repeated cutting and fires or the early clearing. Some of the second-growth and later stands contained highly desirable trees. Many of the present stems are of good quality; examples are those of the yellow-poplar and the sweetgum thickets that developed on some abandoned fields or pastures. Too frequently, however, species of low value, or sprouts of poor quality, form the present-day stands. These stands of low quality do not reflect the potential productivity of the soils.

[3] DR. SILAS LITTLE of the U.S. Forest Service and GORDON BAMFORD and CHARLES HOLSWORTH of the New Jersey Bureau of Forestry assisted in preparing this section.

TABLE 2.—*Estimated average yield ratings of principal crops under two levels of management*

[Ratings are from 1, the lowest, to 10, the highest. Yield equivalents for ratings are listed in table 3. Ratings in columns A are for common management; those in columns B, for the best current management. Absence of a rating indicates crop generally is not grown on the soil]

Soil	Corn		Asparagus		Alfalfa		Tomatoes		Soybeans		Barley		Wheat		Lima beans		Snap beans		White potatoes		Peppers	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Aura gravelly sandy loam, 0 to 5 percent slopes	5	6	4	5	4	6	5	7	4	6	5	6	5	6	4	6	5	6	1	4	4	8
Aura gravelly sandy loam, 5 to 10 percent slopes, eroded	5	6	4	5	4	6	4	6	3	4	5	6	5	6	3	5	4	5	1	3	3	7
Aura loam, 0 to 2 percent slopes	6	8	6	8	6	8	7	9	6	7	8	9	8	9	7	9	6	7	3	5	4	8
Aura loam, 2 to 5 percent slopes	6	8	6	8	6	8	7	9	6	7	8	9	8	9	7	9	6	7	3	5	4	8
Aura loamy sand, 0 to 5 percent slopes	4	5	4	5	2	4	4	6	3	4	4	5	4	5	2	4	5	6	----	----	3	6
Aura sandy loam, 0 to 5 percent slopes	5	7	5	6	5	7	6	8	4	5	6	7	6	7	4	6	6	7	2	4	4	8
Aura sandy loam, 5 to 10 percent slopes, eroded	4	6	4	5	5	7	6	8	3	4	6	7	6	7	3	5	5	6	1	3	3	7
Berryland sand, heavy subsoil variant	3	6	----	----	----	----	1	4	----	4	----	----	----	----	----	----	1	4	----	----	2	5
Berryland sand	3	5	----	----	----	----	1	4	----	4	----	----	----	----	----	----	1	4	----	----	2	5
Berryland-Othello complex	3	5	----	----	----	----	1	5	----	4	----	----	----	----	----	----	1	4	----	----	1	4
Chillum silt loam, 0 to 2 percent slopes	9	10	8	10	7	9	8	10	8	10	8	10	8	10	7	10	6	7	5	10	5	10
Chillum silt loam, 2 to 5 percent slopes	9	10	8	10	7	9	8	10	8	10	8	10	8	10	7	10	6	7	5	10	5	10
Downer loamy sand, 0 to 5 percent slopes	4	5	5	6	2	4	4	6	3	4	4	5	4	5	3	5	5	6	----	----	3	7
Downer loamy sand, 5 to 10 percent slopes	4	5	5	6	2	4	4	6	3	4	4	5	4	5	3	5	4	5	----	----	2	6
Downer-Sassafras loamy sands, 0 to 5 percent slopes	4	5	5	6	2	4	4	6	3	4	4	5	4	5	3	5	5	6	----	----	3	7
Downer-Sassafras sandy loams, 0 to 5 percent slopes	5	6	6	8	4	6	5	7	4	5	5	6	5	6	4	6	6	7	1	4	4	8
Dragston-Woodstown sandy loams, clayey substrata, 2 to 5 percent slopes	5	7	6	8	4	7	5	8	6	8	4	7	4	7	3	6	5	7	1	4	3	8
Elkton silt loam, 2 to 5 percent slopes	4	6	----	----	1	3	2	4	3	6	3	5	3	6	----	----	----	----	----	----	----	----
Elkton-Bayboro sandy loams, 0 to 2 percent slopes	3	5	----	----	----	----	2	4	3	6	2	5	2	5	----	----	----	----	----	----	----	----
Elkton-Bayboro silt loams, 0 to 2 percent slopes	2	5	----	----	----	----	1	4	3	6	2	4	2	4	----	----	----	----	----	----	----	----
Evesboro sand, 0 to 5 percent slopes	1	1	4	5	----	----	2	4	2	3	2	3	2	3	----	----	2	4	----	----	1	4
Evesboro sand, 5 to 10 percent slopes	1	1	3	4	----	----	2	4	2	3	2	3	2	3	----	----	1	3	----	----	1	3
Evesboro-Aura complex, 10 to 15 percent slopes	1	1	----	----	----	----	----	----	----	----	1	3	2	3	----	----	----	----	----	----	----	----
Fallsington sandy loam 0 to 3 percent slopes	5	8	3	6	2	5	4	7	4	8	2	5	2	5	3	6	2	5	----	----	2	6
Fallsington-Othello complex, 0 to 2 percent slopes	5	7	3	5	2	5	4	7	4	7	2	5	2	6	3	6	2	5	----	----	2	5
Fallsington-Pocomoke-Berryland complex	4	6	----	----	----	----	3	5	3	6	2	4	2	4	----	----	1	4	----	----	2	6
Fort Mott loamy sand, 0 to 5 percent slopes	4	5	5	6	2	5	5	7	3	4	4	5	4	5	2	4	5	6	----	----	3	7
Fort Mott loamy sand, 5 to 10 percent slopes	4	5	4	5	2	4	4	6	3	4	4	5	4	5	2	4	4	5	----	----	2	6
Galestown sand, 0 to 5 percent slopes	2	3	5	6	1	3	4	6	3	4	3	4	3	4	2	4	3	5	----	----	2	5

TABLE 2.—*Estimated average yield ratings of principal crops under two levels of management*—Continued

Soil	Corn		Asparagus		Alfalfa		Tomatoes		Soybeans		Barley		Wheat		Lima beans		Snap beans		White potatoes		Peppers	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Galestown-Sassafras-Klej complex, 0 to 5 percent slopes	3	4	5	6	1	3	4	6	3	4	3	4	3	4	2	4	4	6	----	----	2	6
Howell soils, 0 to 5 percent slopes	5	6	6	7	3	5	5	7	4	5	4	5	4	5	3	5	5	6	----	----	3	7
Keyport loam, 2 to 5 percent slopes, eroded	5	7	----	----	4	6	3	5	6	7	6	8	6	8	3	5	3	5	----	----	1	5
Keyport loam, 5 to 10 percent slopes, eroded	4	5	----	----	3	5	3	5	5	6	5	7	5	7	2	4	2	4	----	----	1	4
Keyport loam, 10 to 15 percent slopes, eroded	3	4	----	----	2	4	----	----	----	----	4	6	4	6	----	----	----	----	----	----	----	----
Klej loamy sand, 0 to 3 percent slopes	2	3	4	6	1	3	4	6	3	4	4	5	4	5	2	4	3	5	----	----	3	6
Klej-Woodstown-Galestown loamy sands, 0 to 3 percent slopes	3	4	4	6	1	4	4	6	3	4	4	5	4	5	2	4	3	5	----	----	3	6
Keyport sandy loam, 0 to 5 percent slopes	5	6	----	----	4	6	4	6	4	6	5	7	5	7	3	5	3	5	----	----	3	6
Keyport soils, 5 to 10 percent slopes, eroded	4	5	----	----	3	5	3	5	3	5	4	6	4	6	2	4	2	4	----	----	2	5
Keyport soils, 10 to 15 percent slopes, eroded	3	4	----	----	2	4	----	----	----	----	3	5	3	5	----	----	----	----	----	----	----	----
Lenoir-Keyport silt loams, 0 to 2 percent slopes	4	6	----	----	2	5	3	5	4	7	3	6	3	6	2	5	2	4	----	----	1	5
Made land, dredged river materials	5	7	----	----	----	----	4	6	6	8	----	----	----	----	----	----	----	----	----	----	1	5
Marlton soils, 2 to 5 percent slopes	5	7	4	6	4	6	3	5	4	6	4	6	4	6	3	5	3	4	2	4	3	7
Marlton soils, 2 to 5 percent slopes, eroded	4	6	4	6	4	6	3	5	4	6	4	6	4	6	2	4	3	4	1	3	3	6
Marlton soils, 5 to 10 percent slopes, eroded	4	6	3	5	3	5	2	4	3	5	3	5	3	5	1	3	2	3	1	3	2	5
Marlton soils, 10 to 15 percent slopes, eroded	3	5	----	----	3	5	----	----	----	----	2	4	2	4	----	----	----	----	----	----	----	----
Matapeake silt loam, 0 to 2 percent slopes	9	10	8	10	8	10	8	10	8	10	8	10	8	10	8	10	6	7	5	10	5	10
Matapeake silt loam, 2 to 5 percent slopes	9	10	8	10	8	10	8	10	8	10	8	10	8	10	8	10	6	7	5	10	5	10
Matapeake silt loam, 5 to 10 percent slopes	8	9	7	9	7	9	7	9	7	9	7	9	7	9	7	9	5	6	4	9	4	9
Matapeake silt loam, 5 to 10 percent slopes, eroded	6	8	7	9	6	8	6	8	6	8	6	8	6	8	6	8	4	5	3	8	3	8
Matapeake silt loam, thin solum, 10 to 15 percent slopes	5	7	----	----	6	8	----	----	----	----	6	8	6	8	----	----	----	----	----	----	3	8
Mattapex silt loam, 0 to 2 percent slopes	7	10	6	9	7	10	7	01	6	9	7	9	7	9	5	8	4	6	3	7	4	8
Mattapex silt loam, 2 to 5 percent slopes	8	10	6	9	7	10	7	10	6	9	7	9	7	9	5	8	4	6	3	7	4	8
Mattapex silt loam, 5 to 10 percent slopes	7	9	6	9	7	9	6	9	5	8	6	8	6	8	4	7	3	5	4	6	3	7
Mattapex silt loam, clayey substratum, 0 to 2 percent slopes	7	10	5	8	7	9	7	10	6	9	7	9	7	9	5	8	4	6	3	6	3	7
Mattapex silt loam, clayey substratum, 2 to 5 percent slopes	7	10	5	8	7	9	7	10	6	9	7	9	7	9	5	8	4	6	3	6	3	7
Mattapex silt loam, clayey substratum, 5 to 10 percent slopes	7	9	5	8	7	9	6	9	5	8	6	8	6	8	4	7	3	5	3	5	2	6
Mattapex silt loam, glauconitic substratum, 0 to 2 percent slopes	7	10	5	8	7	9	7	10	6	9	7	9	7	9	5	8	4	6	3	6	3	7
Mattapex silt loam, glauconitic substratum, 2 to 5 percent slopes	7	10	5	8	7	9	7	10	6	9	7	9	7	9	5	8	4	6	3	6	3	7

TABLE 2.—*Estimated average yield ratings of principal crops under two levels of management*—Continued

Soil	Corn		Asparagus		Alfalfa		Tomatoes		Soybeans		Barley		Wheat		Lima beans		Snap beans		White potatoes		Peppers	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
Othello silt loam, 0 to 3 percent slopes	4	7	3	7	2	5	3	6	4	7	3	5	3	5	1	4	1	4	----	----	1	4
Pocomoke-Berryland loamy sands	3	6	----	----	----	----	2	5	3	6	2	4	2	4	----	----	1	4	----	----	2	6
Pocomoke sandy loam	4	7	----	----	----	----	2	5	3	6	3	5	3	5	1	4	2	4	----	----	2	6
Sandy and clayey land, glauconitic materials, gently sloping	5	7	4	6	3	5	3	5	3	5	3	5	3	5	2	4	3	5	1	3	3	6
Sassafras loamy sand, 0 to 5 percent slopes	5	6	6	7	3	5	5	7	3	4	4	5	4	5	2	4	5	6	----	----	4	8
Sassafras loamy sand, 5 to 10 percent slopes	4	5	5	6	3	5	5	7	3	4	4	5	4	5	1	3	5	6	----	----	3	7
Sassafras loamy sand, 10 to 15 percent slopes	----	----	----	----	2	4	----	----	----	----	3	4	3	4	----	----	4	5	----	----	----	----
Sassafras sandy loam, 0 to 2 percent slopes	6	7	7	9	5	7	7	9	6	7	6	7	6	7	4	6	6	7	2	4	5	10
Sassafras sandy loam, 2 to 5 percent slopes	6	7	7	9	5	7	7	9	6	7	6	7	6	7	4	6	6	7	2	4	5	10
Sassafras sandy loam, 5 to 10 percent slopes	5	7	6	8	4	6	6	8	5	6	5	6	5	6	3	5	5	6	1	3	4	9
Sassafras sandy loam, 5 to 10 percent slopes, eroded	4	6	5	7	4	6	6	8	4	5	5	6	5	6	2	4	4	5	1	3	3	8
Sassafras sandy loam, 10 to 15 percent slopes	4	6	----	----	3	5	----	----	----	----	4	5	4	5	----	----	----	----	----	----	----	----
Sassafras sandy loam, 10 to 15 percent slopes, eroded	3	4	----	----	3	5	----	----	----	----	3	4	3	4	----	----	----	----	----	----	----	----
Sassafras-Aura loam, 0 to 5 percent slopes	6	8	6	8	6	8	7	9	6	7	8	9	8	9	7	9	6	7	3	5	5	9
Sassafras-Aura sandy loams, 0 to 5 percent slopes	6	7	7	9	5	7	6	8	5	6	6	7	6	7	4	6	6	7	2	4	5	9
Sassafras-Galestown-Woodstown loamy sands, 0 to 5 percent slopes	4	5	6	7	3	5	4	6	3	4	4	5	4	5	2	4	5	6	----	----	5	8
Sassafras-Woodstown sandy loams, 0 to 5 percent slopes	5	7	6	9	5	7	6	9	5	7	4	6	4	6	4	6	5	7	1	4	5	8
Woodstown loamy sand, 0 to 5 percent slopes	5	6	5	7	3	6	4	7	4	5	4	6	4	6	2	4	5	6	----	----	4	7
Woodstown loamy sand, clayey substratum, 0 to 5 percent slopes	5	6	5	7	3	6	4	7	4	5	4	6	4	6	4	6	5	6	----	----	3	6
Woodstown sandy loam, 0 to 5 percent slopes	5	7	6	9	4	7	6	9	5	7	5	7	5	7	3	6	5	7	1	4	4	9
Woodstown sandy loam, 5 to 10 percent slopes	5	7	6	9	5	7	5	8	5	7	5	6	5	6	3	5	5	6	1	3	3	8
Woodstown sandy loam, clayey substratum, 2 to 5 percent slopes	5	7	6	8	4	7	5	8	5	7	5	7	5	7	4	6	5	7	1	4	4	8
Woodstown-Dragston loamy sands, 0 to 5 percent slopes	5	6	5	7	3	6	4	7	4	5	4	6	4	6	3	5	4	6	----	----	4	8
Woodstown-Dragston sandy loams, 0 to 5 percent slopes	5	7	6	9	4	7	5	8	5	7	5	7	5	7	3	5	5	7	1	4	4	8
Woodstown-Fallsington-Klej complex, 0 to 3 percent slopes	5	6	5	8	3	6	4	7	4	5	4	6	4	6	2	4	4	6	----	----	3	6
Woodstown-Klej-Sassafras loamy sands, 0 to 3 percent slopes	5	6	5	7	3	5	4	7	4	5	4	6	4	6	2	4	4	6	----	----	3	6

TABLE 3.—*Rating-yield per acre conversion table* [1]

Rating [2]	Crop										
	Corn	Asparagus	Alfalfa	Tomatoes	Soybeans	Barley	Wheat	Lima beans	Snap beans	White potatoes	Peppers
	Bu.	*100 lb.*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Bu.*	*100 lb.*	*100 lb.*	*100 lb.*	*Bu.*
1	<20	<12	<1. 8	<6	<11	<10	<10	<15	<32	<120	<50
2	20–30	12–14	1. 8–2. 0	6–9	11–14	10–20	10–15	15–20	32–34	120–150	50–100
3	30–40	14–16	2. 0–2. 3	9–12	14–17	20–30	15–20	20–25	34–36	150–180	100–150
4	40–50	16–18	2. 3–2. 5	12–15	17–20	30–40	20–25	25–30	36–38	120–210	150–200
5	50–60	18–20	2. 5–2. 8	15–18	20–23	40–50	25–30	30–35	38–40	210–240	200–250
6	60–70	20–22	2. 8–3. 0	18–21	23–26	50–60	30–35	35–40	40–42	240–270	250–300
7	70–80	22–24	3. 0–3. 3	21–24	26–29	60–70	35–40	40–45	42–44	270–300	300–350
8	80–90	24–26	3. 3–3. 5	24–27	29–32	70–80	40–45	45–50	44–46	300–330	350–400
9	90–100	26–28	3. 5–3. 8	27–30	32–35	80–90	45–50	50–55	46–48	330–360	400–450
10	>100	>28	>3. 8	>30	>35	>90	>50	>55	>48	>360	>450

[1] ROBERT GARDNER, senior agricultural agent in Salem County, helped prepare this table.

[2] A rating of 1 is less than the yield shown, and a rating of 10 is more than the yield shown; for example, a soil with a rating of 1 for corn produces less than 20 bushels per acre.

Woodland suitability grouping

Management of woodland can be planned more easily if soils are grouped according to those characteristics that affect the growth of trees and management of the stands. For this reason, the soils of Salem County have been placed in seven woodland suitability groups. For this purpose, the soils are grouped according to their potential productivity, or site index, and their management limitations or hazards. Although much more information is needed for an accurate and complete grouping, that which is available has been used to rate each soil mapping unit. The soils are first rated separately, and then those that have similar ratings are placed in the same woodland suitability group. In these discussions yield estimates and information about use and management of the soils for woodland are given for each soil group. The site index for various kinds of trees on soils of each group, the hazards and limitations that affect management of the soils, and the suitability of species for planting in each group are listed. The terms used are explained in the following paragraphs.

The potential productivity of a soil for trees is rated by means of the average *site index*. Site index for a given soil is expressed as the total height, in feet, that the dominant or codominant trees of a given species, growing in an even-aged, well-stocked stand, will attain in 50 years.

The site index is obtained by measuring the height of trees, determining their age by counting the rings, and determining the kind of soil at the site. Then, from height-age curves for each species, the height of a specified tree at 50 years of age can be determined. The height is determined for at least four trees at a site, and the average height of the trees at an age of 50 years is the site index.

Because the site index needs to reflect normal growth, sites should be selected that have not been damaged by fire, disease, insects, grazing, or other adverse factors. As a rule, there is a close relationship between the site index and the volume produced per acre, as expressed in board feet or cords. In New Jersey the relationship between the soil and the site index for sweetgum and yellow-poplar has been studied (*4*, *13*). This information for other species has been estimated from scattered observations in the State and from information obtained elsewhere.

Seedling mortality refers to the expected loss of natural or planted seedlings as a result of unfavorable soil characteristics. A rating of *slight* means that adequate natural regeneration ordinarily will take place if the seedbed and seed sources are adequate. On old field sites losses resulting from the effect of the soil are ordinarily less than 25 percent. Normally, satisfactory restocking by initial planting can be expected. A rating of *moderate* means that there is a regeneration problem. In old field sites losses resulting from the effect of the soil are ordinarily between 25 and 50 percent. Normally, some replanting to fill openings will be necessary. Natural regeneration cannot be relied on for adequate and immediate restocking, even if seedbeds, seed sources, and weather are reasonably favorable. A rating of *severe* means that losses from the effect of the soil are ordinarily more than 50 percent. Natural regeneration can be relied on only if seedbeds, seed sources, and the weather are favorable.

Plant competition refers to the rate that undesirable plants invade the site when openings are made in the canopy. The rating *slight* means that there are no special prolems of plant competition. The rating *moderate* means that plant competition develops but can be controlled by site preparation, weeding, or other simple management. The rating *severe* means that plant competition prevents adequate restocking of designated species, unless controlled burning, diking, use of chemical sprays, girdling, or other special management practices are used.

The ratings for windthrow hazard are based on soil characteristics or qualities that enable trees to resist the force of the wind. Windthrow damage is most severe on soils that remain wet for long periods, particularly the muck soils and soils in very low positions that receive much surface water. The ratings are *slight*, *moderate*, and *severe*, depending on the expected hazard of windthrow.

The trees that are most suitable for favoring in the stand or for planting are listed for each group. These trees will provide the most valuable timber crop. In general, conifers are better suited to the sandy soils. Yellow-poplar, sweetgum, and oaks, however, are better suited to the finer textured, relatively moist soils. Only the species of pine that are available locally are listed as suitable for plant-

ing. Other species of pine, spruce, fir, and other trees for special products are given for some woodland suitability groups. In some groups, however, no planting is suggested, because of severe competition from other plants or because of successive failures caused by animals.

For specific information on what trees to plant or how to manage woodlands, landowners should consult their district forester of the New Jersey Bureau of Forestry, Department of Conservation and Economic Development. For general information concerning forestry, they should consult the extension forester of the Agricultural Extension Service.

Descriptions of woodland suitability groups

In this section the seven woodland suitability groups of soils in Salem County are discussed. Several of the land types and the areas of Peat are not suitable or are not generally used as woodland. They were not placed in woodland suitability groups. These mapping units are Clay pits (Ca); Dune land (Dz); Fresh water marsh (Fw); Gravel pits (Gp); Made land, dredged river materials (Mf); Made land, sanitary land fill (Mg); Peat, shallow (Pe); Sand pits (Sa); and Tidal marsh (Tm). Sand pits and Gravel pits will generally support plantings of trees, but the growth rate is not generally predictable and the management problems are variable.

The names of soil series represented are mentioned in the description of each woodland group, but this does not mean that all the soils of a given series appear in the group. To find the names of all the soils and the woodland group in which they have been placed, refer to the "Guide to Mapping Units" at the back of this survey.

WOODLAND SUITABILITY GROUP 1

This group consist of loams, silt loams, and sandy loams that have high moisture-holding capacity and moderate natural fertility. Slopes range from nearly level to strongly sloping. The texture of the subsoil ranges from sandy loam or loam to sandy clay loam. The soils are members of the Aura, Chillum, Dragston, Howell, Matapeake, Mattapex, Sassafras, and Woodstown series. Most of the soils are well drained or moderately well drained, but the Dragston soils are somewhat poorly drained. The Dragston soils that are in this group were mapped in two complexes with Woodstown soils.

The soils of this group are well suited to high-quality hardwoods, especially oaks and yellow-poplar (fig. 8). The site index for yellow-poplar ranges from 80 to 110.

Plant competition is moderate on most of the soils but is severe on many of those that have a surface horizon of silt loam. Windthrow hazard is slight, but is a little more severe on the somewhat poorly drained Dragston soils than on the others. Seedling mortality is slight.

Special-purpose plantings, such as those of conifers for Christmas trees, black locust for posts, and holly for Christmas greens, are likely to succeed on the soils of this group.

When a harvest cutting is made, erosion generally is not a major problem. Even on the steep, erodible soils, a cover of shrubs protects the soil, and little erosion occurs.

WOODLAND SUITABILITY GROUP 2

This group consists of soils that have a clayey subsoil and high available moisture capacity. In natural fertility these soils range from moderate to high. They are well drained to somewhat poorly drained. The soils in this group are members of the Keyport, Lenoir, and Marlton series; two mapping units of Clayey land; and one unit of Sandy and clayey land.

Figure 8.—**Fast-growing yellow-poplar on Mattapex silt loam.**

Soils of this group are well suited to high-quality hardwoods, especially oaks; and, in the better drained places, to yellow-poplar. The site index for yellow-poplar ranges from 80 to 110, and for oaks from 65 to 85 or higher. Seedling mortality is slight to severe on the eroded soils. Plant competition is moderate.

In old fields plantings of white pine and yellow-poplar are likely to be successful. Among the special products that can be grown on soils of this group are Christmas trees, black locust for fence posts, holly, and laurel.

WOODLAND SUITABILITY GROUP 3

This group consists of soils that are droughty and have low natural fertility. Downer, Dragston, Fallsington, Fort Mott, Galestown, Klej, Sassafras, and Woodstown soils are in this group, and Sandy land. The texture of their subsoil ranges from coarse to moderately fine. Most of the soils range from well drained to moderately well drained. They are nearly level to strongly sloping. Texture of the surface soil ranges from sandy loam to loamy sand.

The soils of this group are suitable for mixed oaks or pines. The site index ranges from 40 to 70 for oaks, and

from 55 to 70 for pines. Pines normally should be favored. Plant competition, seedling mortality, and windthrow hazard are slight. Among the species suitable for special plantings are shortleaf, pitch, and white pines.

WOODLAND SUITABILITY GROUP 4

This group consists of wet, low-lying soils that range in texture from fine to coarse. They are soils of the Berryland, Bayboro, Bibb, Elkton, Fallsington, Othello, and Pocomoke series. Most of the soils are poorly drained or very poorly drained, loamy, mineral soils. The Bibb soil has a mucky stratum. Natural fertility of the soils ranges from low to moderate.

These soils are well suited to hardwoods, especially sweetgum, ash, willow, pin oak, and swamp oak. The site index for sweetgum and for the oaks is estimated to range from 70 to 90. On the Berryland soils, pitch pine is more common than oaks and sweetgum.

Holly could be planted or developed from natural stands. On these soils competition from other plants is severe. Seedling mortality is moderate, and the windthrow hazard is moderate. There is a constant flooding hazard. Excessive wetness limits the use of some equipment late in spring.

WOODLAND SUITABILITY GROUP 5

The soil in this group is Muck, shallow, which is a very wet organic soil. Atlantic white-cedar is the principal commercial species that grows well. Its site index ranges from 35 to 55. Defective, poorly shaped red maple and sweetbay magnolia trees are likely to occupy the areas after Atlantic white-cedar has been cut. On this soil excessive browsing by deer frequently prevents the survival and growth of enough white-cedar seedlings to maintain the stand. In some places pitch pine is abundant enough to be favored in the stand.

The use of equipment is severely limited by a high water table and by the unstable, saturated muck. Corduroy roads are generally necessary. Windthrow hazard is severe, plant competition is severe, and seedling mortality is slight.

WOODLAND SUITABILITY GROUP 6

This group consists of droughty and somewhat infertile, level to steep soils. They are soils of the Aura, Evesboro, Galestown, Klej, and Sassafras series.

In this group are the common upland soils in an area called the New Jersey pine region. These soils are best suited to pitch and shortleaf pines. The site index for these pines ranges from at least 50 to 70.

Plant competition is slight to moderate and is from scrub oak and other oaks. Scrub oak is prevalent in areas where wildfires have been numerous. Productivity of trees on these soils has been limited mostly by wildfires.

WOODLAND SUITABILITY GROUP 7

This group consists of the nearly level, very wet, infertile, sandy soils of the Berryland series and one Berryland-Othello complex. These very wet soils are best suited to pitch pine. Atlantic white-cedar is the species to favor in the stand. The windthrow hazard is moderate. In wet periods there are severe equipment limitations.

Use of Soils for Wildlife

In this section the suitability of the soils for specific wildlife habitats and for kinds of wildlife is discussed. Suitability ratings for eight kinds of wildlife habitats and three kinds of wildlife are given in table 4. The ratings, 1, 2, 3, and 4, are defined in the table.

Most managed wildlife habitats are created, improved, or maintained by: (1) Planting suitable vegetation; (2) manipulating existing vegetation; (3) inducing natural establishment of desired plants; or (4) by combinations of such measures. Allan, Garland, and Dugan (*1*) hold that the behavior of soils can be predicted from knowledge of their properties. The growth habits and characteristics of plants that comprise a wildlife habitat are affected by properties of the soils. Interpretations of the growth habits of plants can be applied to a variety of habitat elements. From the appraisal of those elements, the suitability of soils in a site for various kinds of wildlife can be approximated.

Several purposes can be served in wildlife conservation by wildlife habitat-soils ratings. First, such ratings provide an aid in the selection of sites for habitats. Second, they furnish indications of the extent or degree of management needed to produce satisfactory results. Third, the ratings provide a means of grouping known soil conditions for broad-scale planning of wildlife land use, for acquisition of wildlife land, and for development of parks and other recreation places. The ratings are an aid in showing landowners, on soil-survey maps of their properties, places where management measures for desired wildlife can be applied, and in helping them select practices. The ratings are also useful in showing why measures to encourage certain kinds of wildlife, pheasants, for example, may not be feasible.

Some principles involved in making the ratings should be made clear. Present land use and present vegetation are not considered in the ratings of soils. These factors are subject to change. Although they are important to the wildlife manager in detailed planning, there is no practical method of determining them from a soil survey.

The soil areas outlined on the soil map are rated without regard to their position or their relation to adjoining or nearby soil areas. The size, shape, or location of an outlined area is not considered in its rating.

The ability of wildlife to move from place to place is also disregarded. The rating is one of suitability of the soil for the stated kind of habitat, not a direct rating of the suitability of the soil for the species of wildlife.

Suitability of soils for wildlife habitats

In this section the various wildlife habitats are discussed, and the soils of the county are rated for their suitability for the establishment, improvement, or maintenance of each kind of habitat. The suitability ratings are given in table 4. These ratings are defined in the table. Ratings are not made for Clay pits (Ca), Made land (Mf and Mg), Sand pits (Sa), or Gravel pits (Gp), because the soil materials in those mapping units are so variable that ratings would not be reliable.

Soil ratings for the elements of habitats listed in the table are explained as follows:

Grain and seed crops: The soils are rated according to their suitability for producing corn, sorghum, millet, soybeans, wheat, barley, oats, and other grains used as food by wildlife.

TABLE 4.—*Suitability of the soils for wildlife habitats and for kinds of wildlife*

[Soils rated 1 are well suited; 2, suited; 3, poorly suited; and 4, unsuited. Land types not suitable for wildlife and not listed are Clay pits (Ca), Gravel pits (Gp), Made land (Mf, Mg), and Sand pits (Sa)]

Soil series or land type and map symbols	Elements of wildlife habitat								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland wildlife	Woodland wildlife	Wetland wildlife
Aura:											
AlA	1	1	1	2	2	4	4	4	1	2	4
AgB, AgC2, AlB, AmB, ArB, ArC2	2	1	1	2	2	4	4	4	1	2	4
Berryland:											
Be, Bp, Br	4	3	3	3	1	2	1	1	4	3	2
Bibb:											
Bs	4	4	3	1	1	1	2	1	4	1	2
Chillum:											
ChA, ChB	1	1	1	1	3	4	4	4	1	1	4
Clayey land:											
CbE, CcF	4	3	1	1	3	4	4	4	2	2	4
Downer:											
DoB, DoC, DuB, DvB	2	2	2	2	2	4	4	4	2	2	4
Dragston-Woodstown:											
DwB	2	2	1	1	3	2	2	2	1	2	2
Dune land:											
Dz	4	3	3	4	3	4	4	4	4	4	4
Elkton:											
EkB, ElA, EnA	3	2	2	1	2	1	1	1	2	1	1
Evesboro:											
EvB, EvC	3	3	3	3	1	4	4	4	3	3	4
EvD, EvF, EwD	4	3	3	3	1	4	4	4	4	3	4
Fallsington:											
FdA, FeA, Fp	3	2	2	1	2	1	1	1	2	1	1
Fort Mott:											
FrB, FrC	3	3	3	3	1	4	4	4	3	3	4
Fresh water marsh:											
Fw	4	4	4	4	4	1	1	1	4	4	1
Galestown:											
GaB, GbB	3	3	3	3	1	4	4	4	3	3	4
Howell:											
HoB	2	2	2	2	2	4	4	4	2	2	4
Keyport:											
KlB2, KpB, KlC2, KpC2	2	1	1	1	3	4	4	4	1	1	4
KlD2, KpD2	3	2	1	1	3	4	4	4	2	2	4
Klej:											
KmA, KnA	3	2	2	3	1	3	3	3	2	3	3
Lenoir:											
LkA	2	2	1	1	1	3	2	2	1	2	2
Matapeake:											
MoA	1	1	1	1	3	4	4	4	1	1	4
MoB, MoC, MoC2	2	1	1	1	3	4	4	4	1	1	4
MpD	3	2	1	1	3	4	4	4	2	2	4

TABLE 4.—*Suitability of the soils for wildlife habitats and for kinds of wildlife*—Continued

Soil series or land type and map symbols	Elements of wildlife habitat								Kinds of wildlife		
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Excavated ponds	Openland wildlife	Woodland wildlife	Wetland wildlife
Mattapex:											
MtA, MqA, MsA, MqB, MsB	2	1	1	1	3	3	3	3	1	1	3
MtB, MqC, MsC	2	1	1	1	3	4	4	4	1	1	4
Marlton:											
MrB, MrB2, MrC2	2	1	1	1	3	4	4	4	1	1	4
MrD2	3	2	1	1	3	4	4	4	2	1	4
Muck:											
Mu	4	4	4	4	4	1	1	1	4	4	4
Othello:											
OtA	3	2	2	1	2	1	1	1	2	1	1
Peat:											
Pe	4	4	4	4	4	1	1	1	4	4	4
Pocomoke:											
Pr, Ps	4	3	3	1	1	1	1	1	3	1	1
Sandy and clayey land:											
ScB	2	1	1	1	3	4	4	4	1	1	4
Sandy land:											
SdF	4	4	3	3	3	4	4	4	3	3	4
Sassafras:											
SfB, SfC, SrB, SrC, SrC2, SwB	2	2	2	2	2	4	4	4	2	2	4
SfD, SrD, SrD2	3	3	2	2	2	4	4	4	3	2	4
SrA, StB, SuB, SyB	2	1	1	1	3	4	4	4	1	1	4
Tidal marsh:											
Tm	4	4	4	4	4	1	3	4	4	4	2
Woodstown:											
WtA, WwA	2	1	1	1	3	3	3	3	1	1	3
WkB, WlB, WoB, WmB, WmC, WnB, WsB (See also Dragston-Woodstown)	2	1	1	1	3	4	4	4	1	1	4

Grasses and legumes: The soils are rated according to their suitability for producing introduced grasses, herbaceous legumes, and other forage commonly grown in the area. Cultivated grasses and legumes valuable for wildlife food and cover include alfalfa, clover, lespedeza, bluegrass, bromegrass, redtop, fescue, and orchardgrass.

Wild herbaceous upland plants: The soils are rated according to their suitability for producing native or introduced perennial grasses and forbs (weeds) that provide food and cover principally for upland wildlife and that are established mainly through natural processes. Examples of these plants are lespedeza, beggarweed, wild bean, goldenrod, and dandelion.

Hardwood woody plants: The soils are rated according to their suitability for producing hardwood trees and shrubs that make vigorous growth and produce fruit or seed. In the uplands the most common seed-producing trees are the oaks, beech, hickory, yellow-poplar, holly, dogwood, sassafras, and black birch. Among the shrubs and vines are lowbush blueberry, sumac, and grape. In the lowlands the most common trees are pin, willow, and swamp oaks, and beech, yellow-poplar, maple, holly, gum, sassafras, and birch. Among the shrubs and vines are high-bush blueberry, sweet pepperbush, viburnum, elderberry, bayberry, and greenbrier. The food produced consists of fruit, nuts, buds, catkins, twigs, or foliage.

Coniferous woody plants: The soils are rated according to their suitability for producing coniferous trees. In the uplands, coniferous species are pitch pine, shortleaf pine, Virginia pine, and redcedar. Examples of lowland conifers are Atlantic white-cedar and pitch pine. A rating of 1 means that the plants are suited to the soil, but closure of the canopy is delayed. In areas where closure of the canopy is rapid, the soil is poorly suited and is rated 3.

Wetland food and cover plants: The soils are rated ac-

cording to their suitability for producing food and cover for waterfowl and fur-bearing animals. Annual and biennial plants are especially important in this habitat. Examples are smartweed, wildrice, wild millet, reed, burreed, three-square, bulrush, sedge, switchgrass, cordgrass, rice cutgrass, pondweed, duckweed, and cattail.

Shallow water developments: The soils are rated according to their suitability for the construction of impoundments or excavations, or for control of water, generally to a depth not exceeding 5 feet. Examples are low dikes or levees, shallow dugout ponds, level ditches, and devices to control the water level of marshy areas.

Excavated ponds: The soils are rated according to their suitability for dugout ponds or a combination of dugout ponds and low dikes that provide water of suitable quality, of suitable depth, and of ample quantity for fish or wildlife. Depth should average 6 feet over at least one-fourth of the areas. The soils should have a permanent high water table or should provide some other dependable source of unpolluted water no more acid than pH 5.0.

Suitability of soils for different kinds of wildlife

The ratings of soils showing their suitability for the different kinds of wildlife were made by evaluating their ratings for the different kinds of habitats. For example, the kinds of habitats that were considered most important for openland wildlife are grain and seed crops, grasses and legumes, wild herbaceous upland plants, and hardwood woody plants. Therefore, weighted values based on the relative importance of each of these habitats were used in rating the soils for openland wildlife.

The kinds of wildlife, as listed in table 4, are defined as follows:

Openland wildlife: Birds and mammals that normally frequent cropland, meadows, lawns, and areas overgrown with grasses, herbs, and shrubby growth. Examples are quail, pheasants, meadowlarks, field sparrows, redwinged blackbirds, cottontail rabbits, red foxes, and woodchucks.

Woodland wildlife: Birds and mammals that normally frequent areas wooded with hardwood trees and shrubs, coniferous trees and shrubs, or a mixture of such plants. Examples are ruffed grouse, thrushes, vireos, scarlet tanagers, towhees, gray and red squirrels, gray foxes, white-tailed deer, and raccoons.

Wetland wildlife: Birds and mammals that normally frequent wet areas, such as ponds, marshes, and swamps. Examples are black ducks, wood ducks, herons, shore birds, minks, muskrats, and beavers.

Engineering Uses of the Soils [4]

Some soil properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, foundations, facilities for water storage, erosion control structures, drainage systems, and sewage disposal systems. The properties most important to the engineer are permeability, compaction characteristics, shrink-swell characteristics, grain-size distribution, liquid limit, plasticity index, and pH. The topography, the depth to seasonally high water, and the flooding hazard are also important.

This soil survey contains information about the soils of Salem County that can be used by engineers to—

1. Make general soil and land use studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Make preliminary estimates of the engineering properties of soils for use in the planning of agricultural drainage systems, impoundments, irrigation systems, and other agricultural practices.
3. Make preliminary evaluations of soil conditions that will aid in selecting highway, airport, pipeline, and cable locations and in planning detailed soil investigations at the site.
4. Correlate preformance of engineering structures with soil mapping units to develop information for planning that will be useful in designing and maintaining engineering practices and structures.
5. Evaluate the suitability of soils for cross-country movement of vehicles and construction equipment.
6. Supplement the information obtained from other published maps and reports and aerial photographs to make maps and reports that can be used readily by engineers.
7. Develop other preliminary estimates for construction purposes pertinent to the particular site.

It is not intended that this survey will eliminate the need for onsite sampling and testing of sites for design and construction of specific engineering works and uses. The interpretations in this soil survey should be used primarily in planning more detailed field investigations to determine the condition of soil material in place at the proposed site for engineering work.

Much of the information useful to engineers is given in tables 5, 6, and 7. These tables contain a summary of properties of the soils that are significant to engineers, and some engineering interpretations. Preliminary evaluation of the engineering properties of the soils at any location in the county can be obtained from the detailed soil map at the back of this survey and from the data in these tables.

Some of the terms used by soil scientists are used in the technical sense and have special meaning that differs from the meaning in common usage. Examples are gravel, sand, silt, clay, topsoil, subsoil, and substratum. These terms are defined in the Glossary.

A comparison of the particle-size limits of gravel, sand, silt, and clay used by several agencies or groups is given in the PCA Soil Primer (*9*).

The engineering classification systems used to classify soil materials in tables 5 and 7 are discussed briefly in this section.

Additional information of special interest in engineering can be found in other parts of this survey. Detailed descriptions of a typical soil profile for each series are given in the section "Descriptions of the Soils." Ratings of soil limitations for foundations of buildings, disposal of septic effluent, and other uses are given in table 8 in the section "Soils and Community Developments."

[4] This section was written by KENNETH S. WERKMAN, State conservation engineer, Soil Conservation Service.

TABLE 5.—*Estimated*

Soil and map symbol [1]	Depth to seasonally high water table [2]	Depth from surface	Classification		
			USDA texture	Unified	AASHO
	Feet	*Inches*			
Aura gravelly sandy loam (AgB, AgC2).	10+	0–14	Gravelly sandy loam	SM	A–2
		14–24	Gravelly sandy clay loam	SM or SC	A–2
		24–60	Gravelly sandy loam	SM or SC	A–2
Aura loam (AlA, AlB).	10+	0–17	Loam	ML or CL	A–4
		17–39	Gravelly sandy clay loam	ML or CL	A–4
		39–62	Gravelly sandy loam	SM or SC	A–2
Aura loamy sand (AmB).	10+	0–20	Loamy sand	SM	A–2
		20–36	Sandy clay loam	SM or SC	A–2
		36–60	Sandy loam	SM or SC	A–2
Aura sandy loam (ArB, ArC2).	10+	0–14	Sandy loam	SM	A–2
		14–24	Sandy clay loam	SM or SC	A–2, A–4
		24–60	Sandy loam	SM or SC	A–2
Bayboro sandy loam and Bayboro silt loam. Mapped only with Elkton soils.	0–1	0–10	Silt loam	SC, ML, or CL	A–4 or A–6
		10–60	Clay	MH, CL, or CH	A–6 or A–7
Berryland sand (Bp, Br). For Othello part of Br, refer to Othello silt loam.	0	0–60	Sand	SP–SM or SM	A–2 or A–3
Berryland sand, heavy subsoil variant (Be).	0	0–35	Sand	SP–SM or SM	A–2 or A–3
		35–50	Silt loam	SM, SC, or ML	A–4 or A–6
Bibb silt loam, mucky stratum (Bs).	[4] 0	0–30	Silt loam	ML	A–4
		30–60	Muck		
Chillum silt loam (ChA, ChB).	10+	0–36	Silt loam	ML or CL	A–4 or A–6
		36–50	Sandy clay loam	SM or SC	A–2
Clayey land, Keyport materials (CbE). For Keyport part, refer to Keyport loam.	2	0–14	Silt loam to sandy loam	ML, CL, or SM	A–4
		14–40	Silty clay loam or clay	ML, CL, or CH	A–6 or A–7
Clayey land, Marlton materials (CcF). For Marlton part, refer to Marlton soils.	2	0–11	Sandy loam, loam, or clay loam.	SM, SC, or ML	A–2 or A–4
		11–32	Sandy clay	CL or CH	A–7
		32–60	Sandy loam	SC, CL, or CH	A–4 or A–6
Downer loamy sand (DoB, DoC, DuB, DvB). For Sassafras part of DuB and DvB, refer to Sassafras loamy sand.	10+	0–19	Loamy sand or sandy loam	SM or SP–SM	A–2
		19–38	Sandy loam	SM	A–2
		38–60	Loamy sand	SM or SP–SM	A–2
Dragston-Woodstown sandy loams, clayey substrata (DwB). For Woodstown part, refer to Woodstown sandy loam.	2	0–15	Sandy loam	SM	A–2 or A–4
		15–30	Sandy clay loam	SM or SC	A–4
		30–40	Sandy loam	SP–SM or SM	A–2
		40–60	Clay loam	SM, SC, or ML	A–4
Dune land (Dz).	[5]	0–60	Sand	SP	A–3
Elkton silt loam (EkB, EnA). Elkton-Bayboro sandy loams (ElA). For Bayboro part of ElA and EnA, refer to Bayboro sandy loam and Bayboro silt loam.	0–1	0–10	Silt loam	SC, ML, or CL	A–4 or A–6
		10–60	Clay	MH, CL, or CH	A–6 or A–7
Evesboro sand (EvB, EvC, EvD, EvF, EwD). For Aura part of EwD, refer to Aura loamy sand.	10+	0–60	Sand	SP or SM	A–2 or A–3
Fallsington sandy loam (FdA, FeA, Fp). For Othello part of FeA, refer to Othello silt loam; for Pocomoke part of Fp, refer to Pocomoke sandy loam; and for Berryland part of Fp, refer to Berryland sand.	0–1	0–15	Sandy loam	SM	A–2 or A–4
		15–32	Heavy sandy loam	SM or SC	A–2 or A–4
		32–54	Alternating sand and sandy loam.	SM or SP–SM	A–2 or A–4

See footnotes at end of table

properties of the soils

Percentage passing sieve—				Permeability	Available moisture capacity	Reaction (untreated)[3]	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)						
				Inches per hour	*Inches per inch of soil*	*pH*	*Percent*	*Lbs. per cu. ft.*	
75–85	70–90	40–60	20–30	0. 2–0. 63	0. 10–0. 14	4. 0–4. 5			Low.
70–90	70–90	50–70	25–35	0. 63–2. 0	0. 10–0. 14	4. 5–5. 0	14–18	110–118	Low.
70–95	70–90	30–50	15–35	0. 2–2. 0	0. 04–0. 06	4. 5–5. 0	12–16	116–126	Low.
95–100	95–100	80–95	50–80	0. 2–0. 63	0. 18–0. 20	4. 0–4. 5			Low.
80–100	70–90	60–80	50–85	0. 63–2. 0	0. 12–0. 14	4. 5–5. 0	14–18	110–118	Low.
75–95	70–90	30–50	15–35	0. 2–2. 0	0. 04–0. 06	4. 5–5. 0	12–16	116–126	Low.
90–100	80–100	40–70	15–25	2. 0–6. 3	0. 10–0. 14	4. 0–4. 5			Low.
90–100	80–100	50–80	20–30	0. 63–2. 0	0. 14–0. 16	4. 5–5. 0	14–18	110–118	Low.
75–95	70–90	30–50	15–35	0. 2–2. 0	0. 04–0. 06	4. 5–5. 0	12–16	116–126	Low.
90–100	85–100	50–70	25–35	0. 2–0. 63	0. 14–0. 16	4. 0–4. 5			Low.
90–100	85–100	50–70	30–40	0. 63–2. 0	0. 14–0. 16	4. 5–5. 0	13–18	110–118	Low.
75–95	70–90	30–50	15–35	0. 2–2. 0	0. 04–0. 06	4. 5–5. 0	10–15	116–126	Low.
95–100	90–100	50–90	40–70	0. 2–0. 63	0. 18–0. 22	4. 0–4. 5	17–22	90–100	Moderate.
98–100	95–100	80–90	70–90	<0. 2	0. 16–0. 18	4. 5–5. 0	23–28	85–100	Moderate.
90–100	80–100	50–80	5–15	>6. 3	0. 09–0. 11	4. 0–5. 0	10–14	108–114	Low.
90–100	80–100	50–80	5–15	2. 0–6. 3	0. 09–0. 11	4. 0–4. 5	10–14	108–114	Low.
80–100	70–90	60–80	40–60	0. 2–0. 63	0. 18–0. 22	4. 5–5. 0	10–18	100–110	Low.
95–100	95–100	80–100	70–100	0. 2–0. 63	0. 20–0. 28	4. 0–5. 0	12–18	110–120	Low.
98–100	98–100	80–90	60–90	0. 2–0. 63	0. 21–0. 23	4. 0–4. 5	12–18	110–120	Low.
75–95	70–90	30–50	15–35	0. 2–2. 0	0. 14–0. 16	4. 5–5. 0	10–14	108–112	Low.
95–100	90–100	50–90	40–70	0. 2–2. 0	0. 15–0. 20	4. 0–4. 5	20–25	90–100	Moderate.
95–100	95–100	80–100	65–90	<0. 2	0. 15–0. 18	4. 5–5. 0	22–30	85–110	Moderate.
90–100	80–90	70–90	20–70	0. 2–0. 63	0. 15–0. 22	4. 0–4. 5			Moderate.
95–100	90–100	80–100	50–80	<0. 2	0. 16–0. 18	4. 5–5. 0	18–32	85–115	Moderate.
90–100	80–100	70–90	40–70	0. 2 –2. 0	0. 12–0. 16	4. 5–5. 0	14–28	95–115	Moderate.
80–100	70–95	40–80	10–30	0. 63–6. 3	0. 10–0. 14	4. 0–4. 5			Low.
80–100	60–95	30–45	15–35	0. 63–2. 0	0. 12–0. 16	4. 5–5. 0	12–16	108–114	Low.
75–100	60–90	30–40	10–20	2. 0–6. 3	0. 08–0. 10	4. 5–5. 0	10–14	108–112	Low.
95–100	95–100	60–85	30–50	0. 63–2. 0	0. 15–0. 18	4. 0–4. 5			Low.
95–100	90–100	60–80	40–50	0. 63–2. 0	0. 15–0. 18	4. 5–5. 0	10–14	110–120	Low.
90–100	85–100	50–70	10–25	2.0–6. 3	0. 10–0. 15	4. 5–5. 0	10–14	115–125	Low.
95–100	90–100	60–90	30–60	0. 2–0. 63	0. 18–0. 22	4. 5–5. 0	14–18	100–115	Low.
100	95–100	60–90	0–5	>6. 3	0. 05–0. 07	6. 0–8. 0	10–15	90–100	Low.
95–100	90–100	50–90	40–70	0. 2–0. 63	0. 18–0. 22	4. 0–4. 5	17–22	90–100	Moderate.
98–100	95–100	80–90	70–90	<0. 2	0. 16–0. 18	4. 5–5. 0	23–28	85–100	Moderate.
90–100	80–100	50–80	2–15	>6. 3	0. 06–0. 08	4. 0–5. 0	10–14	105–110	Low.
95–100	95–100	60–80	20–40	0. 63–2. 0	0. 14–0. 18	4. 0–4. 5			Low.
95–100	90–100	60–80	30–50	0. 63–2. 0	0. 14–0. 18	4. 5–5. 0	10–14	105–115	Low.
90–100	80–90	50–70	10–40	2. 0–6. 3	0. 10–0. 15	4. 5–5. 0	10–14	110–120	Low.

TABLE 5.—*Estimated*

Soil and map symbol [1]	Depth to seasonally high water table [2]	Depth from surface	Classification		
			USDA texture	Unified	AASHO
	Feet	*Inches*			
Fort Mott loamy sand (FrB, FrC).	10+	0–30	Loamy sand	SP–SM or SM	A–2
		30–52	Sandy loam	SM	A–2
		52–55	Loamy sand	SP–SM or SM	A–2
Galestown sand (GaB, GbB). For Sassafras part of GbB, refer to Sassafras loamy sand; and for Klej part of GbB, refer to Klej loamy sand.	10+	0–52	Sand	SP–SM or SM	A–2
Howell soils (HoB).	2	0–18	Loamy sand	SM	A–2
		18–34	Clay loam	ML or CL	A–4 or A–6
		34–75	Sandy clay loam	SC or ML	A–4
Keyport loam (K1B2, K1C2, K1D2).	2	0–14	Silt loam to sandy loam	ML, CL, or SM	A–4
Keyport sandy loam (KpB).		14–40	Silty clay loam or clay	ML, CL, or CH	A–6 or A–7
Keyport soils (KpC2, KpD2).					
Klej loamy sand (KmA, KnA). For Woodstown part of KnA, refer to Woodstown loamy sand; and for Galestown part of KnA, refer to Galestown sand.	2	0–60	Loamy sand or sand	SP–SM or SM	A–2 or A–3
Lenoir-Keyport silt loams (LkA). For Keyport part of LkA, refer to Keyport loam.	2	0–14	Silt loam to sandy loam	ML, CL, or SM	A–4
		14–40	Silty clay loam or clay	ML, CL, or CH	A–6 or A–7
Marlton soils (MrB, MrB2, MrC2, MrD2).	2	0–11	Sandy loam, loam, or clay loam.	SM, SC, or ML	A–2 or A–4
		11–32	Sandy clay	CL or CH	A–7
		32–60	Sandy loam	SC, CL, or CH	A–4 or A–6
Matapeake silt loam (MoA, MoB, MoC, MoC2).	10+	0–10	Silt loam	ML	A–4
Matapeake silt loam, thin solum (MpD).		10–36	Silt loam	ML or CL	A–4 or A–6
		36–60	Alternating gravelly sand and sandy loam.	SM or SC	A–2 or A–4
Mattapex silt loam (MqA, MqB, MqC).	2	0–32	Silt loam	ML or CL	A–4
		32–60	Alternating sandy loam and sand.	SM or SC	A–2 or A–4
Mattapex silt loam, clayey substratum (MsA, MsB, MsC).	2	0–40	Silt loam	ML or CL	A–4 or A–6
		40–60	Clay	CL or CH	A–6 or A–7
Mattapex silt loam, glauconitic substratum (MtA, MtB).	2	0–40	Silt loam	ML or CL	A–4 or A–6
		40–60	Clay loam	SM, SC, CL, or CH	A–4 or A–6
Muck, shallow (Mu).	[4] 0	0–30	Muck	Pt	[6]
		30	Sandy loam to gravelly sand	SM, SP–SM	A–2 or A–3
Othello silt loam (OtA).	1	0–9	Silt loam	ML or CL	A–4
		9–28	Silty clay loam	ML or CL	A–4 or A–6
		28–60	Alternating gravelly sandy loam and sand.	SM or SC	A–2 or A–4
Peat, shallow (Pe).	[4] 0	0–30	Peat	Pt	[6]
		30	Sandy loam to gravelly sand	SM, SP–SM	A–2 or A–3
Pocomoke sandy loam (Ps).	0	0–11	Sandy loam	SM	A–2 or A–4
Pocomoke-Berryland loamy sands (Pr). For Berryland part of Pr, refer to Berryland sand.		11–26	Sandy clay loam	SM or SC	A–2 or A–4
		26–60	Gravelly loamy sand	SM, SC, or SP–SM	A–2 or A–4

See footnotes at end of table.

properties of the soils—Continued

Percentage passing sieve—				Permeability	Available moisture capacity	Reaction (untreated)[3]	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)						
				Inches per hour	*Inches per inch of soil*	*pH*	*Percent*	*Lbs. per cu. ft.*	
98–100	90–100	60–90	10–20	>6. 3	0. 08–0. 10	4. 0–4. 5	10–14	105–110	Low.
95–100	90–100	60–80	20–35	0. 63–2. 0	0. 12–0. 15	4. 5–5. 0	10–14	110–120	Low.
90–100	80–90	50–70	10–20	2. 0–6. 3	0. 08–0. 10	4. 5–6. 0	10–14	105–120	Low.
90–100	90–100	50–90	10–20	>6. 3	0. 08–0. 10	4. 0–5. 0	10–14	105–115	Low.
95–100	95–100	70–90	15–25	2. 0–6. 3	0. 10–0. 16	4. 0–4. 5	----------	----------	Low.
90–100	90–100	80–90	50–70	0. 2–0. 63	0. 18–0. 22	4. 5–5. 0	26–30	85–100	Moderate.
90–100	90–100	70–80	40–60	0. 2–0. 63	0. 16–0. 20	4. 5–5. 0	24–28	90–110	Moderate.
95–100	90–100	50–90	40–70	0. 2–2. 0	0. 15–0. 20	4. 0–4. 5	20–25	90–100	Moderate.
95–100	95–100	80–100	65–90	<0. 2	0. 15–0. 18	4. 5–5. 0	22–30	85–110	Moderate.
90–100	80–100	50–80	5–15	>6. 3	0. 08–0. 10	4. 0–5. 0	10–14	105–115	Low.
95–100	90–100	50–90	40–70	0. 2–2. 0	0. 15–0. 20	4. 0–4. 5	20–25	90–100	Moderate.
95–100	95–100	80–100	65–90	<0. 2	0. 15–0. 18	4. 5–5. 0	22–30	85–110	Moderate.
90–100	80–90	70–90	20–70	0. 2–0. 63	0. 15–0. 22	4. 0–4. 5	----------	----------	Moderate.
95–100	90–100	80–100	50–80	<0. 2	0. 16–0. 18	4. 5–5. 0	18–32	85–115	Moderate.
90–100	80–100	70–90	40–70	0. 2–2. 0	0. 12–0. 16	4. 5–5. 0	14–28	95–115	Moderate.
98–100	98–100	80–95	60–85	0. 2–0. 63	0. 20–0. 24	4. 0–4. 5	----------	----------	Low.
98–100	98–100	80–95	65–90	0. 2–0. 63	0. 20–0. 24	4. 5–5. 0	15–22	100–115	Low.
80–100	70–95	40–70	20–50	0. 2–2. 0	0. 14–0. 18	4. 5–5. 0	10–15	110–125	Low.
98–100	98–100	80–95	60–90	0. 2–0. 63	0. 21–0. 23	4. 0–4. 5	15–22	100–120	Low.
80–100	70–90	40–70	20–50	0. 63–2. 0	0. 14–0. 18	4. 5–5. 0	10–16	110–125	Low.
98–100	98–100	80–95	60–90	0. 2–0. 63	0. 21–0. 23	4. 0–4. 5	12–18	100–120	Low.
95–100	90–100	80–100	70–90	<0. 2	0. 22–0. 25	4. 5–5. 0	14–20	100–110	Moderate.
98–100	98–100	80–95	60–90	0. 2–0. 63	0. 21–0. 23	4. 0–4. 5	12–20	100–120	Low.
90–100	80–100	70–90	40–70	0. 2–2. 0	0. 22–0. 25	4. 5–5. 0	16–28	90–110	Moderate.
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98–100	98–100	80–90	55–80	0. 2–0. 63	0. 22–0. 24	4. 0–4. 5	----------	----------	Low.
98–100	98–100	85–95	60–80	0. 2–0. 63	0. 20–0. 22	4. 5–5. 0	16–22	100–120	Low.
80–100	70–90	40–70	20–50	0. 63–2. 0	0. 10–0. 15	4. 5–5. 0	10–14	110–125	Low.
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(6)	----------	----------	----------	----------	----------	4. 5–5. 0	(6)	(6)	Low.
95–100	90–100	60–80	20–40	0. 63–2. 0	0. 20–0. 22	4. 0–4. 5	----------	----------	Low.
95–100	90–100	60–80	30–50	0. 63–2. 0	0. 15–0. 18	4. 5–5. 0	10–14	110–124	Low.
90–100	80–100	50–70	10–40	2. 0–6. 3	0. 10–0. 15	4. 5–5. 0	10–15	100–120	Low.

TABLE 5.—*Estimated*

Soil and map symbol [1]	Depth to seasonally high water table [2]	Depth from surface	Classification		
			USDA texture	Unified	AASHO
	Feet	*Inches*			
Sandy and clayey land, glauconitic materials (ScB).	2	0–14	Sandy loam or clay loam	SM, SC, or ML	A–2 or A–4
		14–30	Sandy clay loam	SC, SM, or CL	A–4
		30–60	Alternating sandy loam and loamy sand.	SM, SC, or ML	A–2 or A–4
Sandy land, Downer and Sassafras materials (SdF). For Downer part, refer to Downer loamy sand; and for Sassafras part, refer to Sassafras loamy sand.	10+	0–14	Loamy sand to loam	SM	A–2 or A–4
		14–40	Sandy loam	SM, SC, or CL	A–2 or A–4
		40–60	Alternating loamy sand and sandy loam.	SM, SC, or SP–SM	A–2 or A–4
Sassafras loamy sand (SfB, SfC, SfD, SwB). Sassafras sandy loam (SrA, SrB, SrC, SrC2, SrD, SrD2, SuB, SyB). Sassafras loam (StB). For Galestown part of SwB, refer to Galestown sand; for Woodstown part of SwB and SyB, refer to Woodstown loamy sand, clayey substratum; for Aura part of SuB, refer to Aura sandy loam; and for Aura part of StB, refer to Aura loam.	10+	0–14	Loamy sand to loam	SM	A–2 or A–4
		14–40	Sandy loam	SM, SC, or CL	A–2 or A–4
		40–60	Alternating loamy sand and sandy loam.	SM, SC, or SP–SM	A–2 or A–4
Woodstown loamy sand (WkB, WtA, WwA, WoB). Woodstown sandy loam (WmB, WmC, WsB). For Fallsington part of WtA, refer to Fallsington sandy loam; for Klej part of WtA and WwA, refer to Klej loamy sand; for Dragston part of WoB and WsB, refer to Dragston-Woodstown sandy loams, clayey substrata; and for Sassafras part of WwA, refer to Sassafras loamy sand.	2	0–13	Sandy loam	SM	A–2, A–4
		13–32	Sandy loam	SM or SC	A–2 or A–4
		32–60	Alternating sandy loam and loamy sand.	SM or SP–SM	A–2
Woodstown loamy sand, clayey substratum (WlB).	2	0–14	Sandy loam	SM	A–2, A–4
Woodstown sandy loam, clayey substratum (WnB).		14–26	Sandy loam	SM or SC	A–2 or A–4
		26–40	Loamy sand	SM, SP–SM	A–2
		40–60	Clay loam	SC, ML, or CL	A–4 or A–6

[1] Seven variable land types are omitted from this table. These are Clay pits (Ca), Gravel pits (Gp), Fresh water marsh (Fw), Made land, dredged river materials (Mf), Made land, sanitary land fill (Mg), Sand pits (Sa), and Tidal Marsh (Tm).

[2] The two Clayey land mapping units, the Keyport and the Marlton soils, and the soils in the Lenoir-Keyport complex all contain a perched water table.

TABLE 6.—*Engineering*

Soil and map symbol [1]	Suitability for winter grading	Susceptibility to frost action	Suitability as a source of—	
			Topsoil	Gravel
Aura gravelly sandy loam (AgB, AgC2).	Good	Low	Fair, but contains quartzose gravel.	Good source of road gravel in upper 3 to 5 feet.
Aura loam (AlA, AlB).	Good	High	Good, but is generally shallow.	Good source of road gravel, with fine binder in upper 3 to 5 feet.

See footnote at end of table.

properties of the soils—Continued

Percentage passing sieve—				Permeability	Available moisture capacity	Reaction (untreated)[3]	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)						
				Inches per hour	*Inches per inch of soil*	*pH*	*Percent*	*Lbs. per cu. ft.*	
90–100	85–100	80–100	20–60	0. 2–2. 0	0. 15–0. 20	4. 0–4. 5			Low to moderate.
95–100	90–100	85–95	40–70	0. 2–0. 63	0. 15–0. 20	4. 5–5. 0	14–20	100–110	Moderate.
95–100	90–100	75–90	35–60	0. 63–2. 0	0. 12–0. 17	4. 5–5. 0	12–18	100–110	Low.
90–100	80–100	60–80	20–50	0. 2–6. 3	0. 12–0. 18	4. 0–4. 5			Low.
90–100	80–100	60–80	30–60	0. 63–2. 0	0. 12–0. 16	4. 5–5. 0	10–14	115–125	Low.
80–100	70–100	50–70	10–40	2. 0–6. 3	0. 10–0. 15	4. 5–5. 0	10–16	105–125	Low.
90–100	80–100	60–80	20–50	0. 2–6. 3	0. 12–0. 18	4. 0–4. 5			Low.
90–100	80–100	60–80	30–60	0. 63–2. 0	0. 12–0. 16	4. 5–5. 0	10–14	115–125	Low.
80–100	70–100	50–70	10–40	2. 0–6. 3	0. 10–0. 15	4. 5–5. 0	10–16	105–125	Low.
95–100	90–100	60–80	20–45	0. 63–6. 3	0. 13–0. 16	4. 0–4–5			Low.
95–100	90–100	60–80	30–50	0. 63–2. 0	0. 13–0. 16	4. 5–5. 0	10–14	110–125	Low.
90–100	80–100	50–70	10–40	2. 0–6. 3	0. 10–0. 15	4. 5–5. 0	10–14	105–125	Low.
95–100	90–100	60–80	20–45	0. 63–6. 3	0. 13–0. 16	4. 0–4. 5			Low.
95–100	90–100	60–80	30–50	0. 63–2. 0	0. 13–0. 16	4. 5–5. 0	10–14	110–125	Low.
80–100	70–100	50–70	10–30	2. 0–6. 3	0. 10–0. 15	4. 5–5. 0	10–15	105–125	Low.
90–100	80–100	60–80	40–70	<0. 2	0. 20–0. 24	4. 5–5. 0	12–18	100–110	Moderate.

[3] The reaction listed is that of the untreated soil. Most farmed soils have been limed and are less acid.
[4] The soil is subject to overflow.
[5] Variable depths ranging from 1 to 10 feet.
[6] Variable.

interpretations of the soils

Soil features affecting suitability for engineering practices—					
Farm ponds			Agricultural drainage	Irrigation	Agricultural land grading and smoothing
Reservoir area	Embankment	Dugout			
Permeability below 5 feet moderate to moderately rapid.	All features favorable.	Low water table; not suitable.	Well drained	Root zone limited to 2 feet.	Shallow root zone.
Permeability below 5 feet moderate to moderately rapid.	All features favorable.	Low water table; not suitable.	Well drained	Root zone limited to 2 feet; moderately slow intake rate.	Shallow root zone.

TABLE 6.—*Engineering*

Soil and map symbol [1]	Suitability for winter grading	Susceptibility to frost action	Suitability as a source of—	
			Topsoil	Gravel
Aura loamy sand (AmB).	Good	Low	Poor; low fertility and moderately low water-holding capacity.	Good source of road gravel in upper 3 to 5 feet.
Aura sandy loam (ArB, ArC2).	Good	Low	Fair, but contains some quartzose gravel.	Good source of road gravel in upper 3 to 5 feet.
Bayboro sandy loam and Bayboro silt loam. Mapped only with Elkton soils.	Poor; plastic when wet, poorly drained.	High	Good; plastic subsoil, poorly drained.	Not suitable
Berryland sand (Bp, Br). For Othello part of Br, refer to Othello silt loam.	Poor; high water table.	Low	Poor; low fertility and moderately low water-holding capacity.	Not suitable
Berryland sand, heavy subsoil variant (Be).	Poor; high water table.	Low	Poor; low fertility and moderately low water-holding capacity.	Not suitable
Bibb silt loam, mucky stratum (Bs).	Poor; high water table.	High	Good, but high water table.	Not suitable
Chillum silt loam (ChA, ChB).	Good	High	Good	Fair at depth of 3 to 5 feet.
Clay pits (Ca).	Poor, high shrink-swell, highly plastic.	High	Poor; highly plastic	Not suitable
Clayey land, Keyport materials (CbE). For Keyport part, refer to Keyport loam.	Poor; highly plastic high clay content	High	Good, but plastic subsoil is close to surface.	Not suitable
Clayey land, Marlton materials (CcF). For Marlton part, refer to Marlton soils.	Poor; plastic material.	High	Fair, but plastic material is close to surface.	Not suitable
Downer loamy sand (DoB, DoC, DuB, DvB). For Sassafras part of DuB and DvB, refer to Sassafras loamy sand.	Good	Low	Loamy sand, poor because of low fertility and moderately low water-holding capacity; sandy loam, good.	Not suitable
Dragston-Woodstown sandy loams, clayey substrata (DwB). For Woodstown part, refer to Woodstown sandy loam, clayey substratum.	Poor; moderately high water table.	Low	Good, but water table may be a seasonal obstruction.	Not suitable
Dune land (Dz).	Fair; loose, traction poor.	Low	Poor; low fertility, low water-holding capacity.	Not suitable

See footnote at end of table.

interpretations of the soils—Continued

Soil features affecting suitability for engineering practices—					
Farm ponds			Agricultural drainage	Irrigation	Agricultural land grading and smoothing
Reservoir area	Embankment	Dugout			
Permeability below 5 feet moderate to moderately rapid.	All features favorable.	Low water table; not suitable.	Well drained	Root zone limited to 2 feet.	Shallow root zone.
Permeability below 5 feet moderate to moderately rapid.	All features favorable.	Low water table; not suitable.	Well drained	Root zone about 2 feet.	Shallow root zone.
Slow seepage	Plastic; cracks when dry; low strength and stability.	Recharge rate slow.	Slow permeability	High water-holding capacity; slow intake rate.	Plastic subsoil; slow permeability.
High water table; substratum rapidly permeable.	Rapid permeability; low cohesion.	Recharge rate rapid.	High water table; rapid permeability.	Moderately low water-holding capacity; high water table.	High water table.
High water table; slow seepage.	Rapid permeability to a depth of 30 inches.	Recharge rate generally slow.	High water table; rapid permeability to a depth of 30 inches.	Rapid permeability; moderately low water-holding capacity; high water table.	High water table.
High water table; permeability of substratum moderately rapid.	Mucky stratum; unsuitable.	Recharge rate variable; subject to overflow.	Subject to overflow; drainage not practical.	High water table; irrigation not practical; subject to flooding.	Subject to overflow; high water table.
Permeability below 5 feet moderate to moderately rapid.	All features favorable.	Low water table; not suitable.	Well drained	Intake rate moderately slow.	Deep, well drained; all features favorable.
Slow seepage	High shrink-swell ratio; low strength and stability.	Recharge rate slow.	Slow permeability	Slow permeability; infertile; in places extremely acid; not suitable.	Clay; workability difficult.
High clay content; slow seepage.	Plastic, subject to cracking; low strength and stability.	Recharge rate slow; some soils too sloping.	Water is seasonally perched over subsoil.	High water-holding capacity; slow intake rate; sloping and steep soils are subject to erosion.	Plastic subsoil close to surface; sloping and steep soils are erodible.
Slow permeability of subsoil; moderately slow permeability of substratum.	Plastic; moderate shrink-swell ratio.	Low water table; not suitable.	Water seasonally perched over subsoil on low slopes.	High water-holding capacity; slow intake rate; hazard of ponding.	Plastic subsoil close to surface.
Permeability below 30 inches is rapid.	All features favorable.	Low water table, rapid permeability; not suitable.	Well drained	Moderate to moderately low water-holding capacity; moderate to moderately rapid intake rate.	Deep, well drained; all features favorable.
Slow seepage	All features favorable.	Low water table in summer.	Moderate permeability.	Moderate water-holding capacity; moderate intake rate.	Deep soil; all features favorable.
Rapid permeability	Rapid permeability, low cohesion.	Low water table in summer.	Well drained or excessively drained.	Low water-holding capacity; rapid intake rate.	Loose; traction poor; grading not practical.

TABLE 6.—*Engineering*

Soil and map symbol [1]	Suitability for winter grading	Susceptibility to frost action	Suitability as a source of—	
			Topsoil	Gravel
Elkton silt loam (EkB, EnA). Elkton-Bayboro sandy loams (ElA). For Bayboro part in ElA and EnA, refer to Bayboro sandy loam and Bayboro silt loam.	Poor; plastic when wet, poorly drained.	High	Good; plastic subsoil, poorly drained.	Not suitable
Evesboro sand (EvB, EvC, EvD, EvF, EwD). For Aura part of EwD, refer to Aura loamy sand.	Fair; loose, traction poor.	Low	Poor; low fertility, low water-holding capacity.	Not suitable
Fallsington sandy loam (FdA, FeA, Fp). For Othello part of FeA, refer to Othello silt loam; for Pocomoke part of Fp, refer to Pocomoke sandy loam; and for Berryland part of Fp, refer to Berryland sand.	Poor; high water table.	Low	Good, but high water table.	Not suitable
Fort Mott loamy sand (FrB, FrC).	Fair; loose, traction poor.	Low	Poor; low fertility, low water-holding capacity.	Not suitable
Fresh water marsh (Fw).	Poor; flooded frequently.	High	Poor; flooded frequently	Not suitable
Galestown sand (GaB, GbB). For Sassafras part of GbB, refer to Sassafras loamy sand; and for Klej part of GbB, refer to Klej loamy sand.	Fair; loose, traction poor.	Low	Poor; low fertility, moderately low water-holding capacity.	Not suitable
Gravel pits (Gp).	Good	Low	Not suitable	Variable
Howell soils (HoB).	Poor; plastic subsoil	Low to moderate.	Variable	Not suitable
Keyport loam (KlB2, KlC2, KlD2). Keyport sandy loam (KpB). Keyport soils (KpC2, KpD2).	Poor; highly plastic, high clay content.	High	Good, but plastic subsoil is close to surface.	Not suitable
Klej loamy sand (KmA, KnA). For Woodstown part of KnA, refer to Woodstown loamy sand; and for Galestown part of KnA, refer to Galestown sand.	Fair; loose, traction poor; moderately high water table.	Low	Poor; low fertility, moderately low water-holding capacity.	Not suitable
Lenoir-Keyport silt loams (LkA). For Keyport part of LkA, refer to Keyport loam.	Poor; highly plastic, high clay content.	High	Good, but plastic subsoil is close to surface.	Not suitable
Marlton soils (MrB, MrB2, MrC2, MrD2)	Poor; plastic material.	High	Fair, but plastic material is close to surface.	Not suitable

See footnote at end of table.

interpretations of the soils—Continued

Soil features affecting suitability for engineering practices—					
Farm ponds			Agricultural drainage	Irrigation	Agricultural land grading and smoothing
Reservoir area	Embankment	Dugout			
Slow seepage	Plastic; cracks when dry; low strength and stability.	Recharge rate slow.	Slow permeability	High water-holding capacity; slow intake rate.	Plastic subsoil; slow permeability.
Rapid permeability	Rapid permeability, low cohesion.	Low water table; not suitable.	Well drained	Low water-holding capacity; rapid intake rate.	Loose; traction poor; sloping and steep soils are erodible.
High water table; permeability of substratum moderately rapid.	High water table	Recharge rate generally rapid.	High water table; moderate permeability.	High water table; moderate water-holding capacity; moderate intake rate; needs drainage before irrigation.	High water table.
Permeability of substratum rapid.	Surface layer too loose; mixture of surface layer with subsoil is stable.	Low water table	Well drained	Low water-holding capacity; rapid intake rate.	Deep soil; all features favorable.
Flooded frequently; substratum variable.	High organic-matter content.	Flooded frequently.	Flooded frequently; outlets are a problem.	Flooded frequently	Flooded frequently.
Permeability of substratum rapid.	Rapid permeability, low cohesion.	Low water table; not suitable.	Well drained	Moderately low water-holding capacity; moderately rapid intake rate.	Deep soil; all features favorable.
Rapid permeability	Rapid permeability.	Variable	Disturbed areas	Disturbed areas	Variable.
Permeability of substratum moderately slow.	Plastic subsoil; moderate shrink-swell ratio.	Low water table in summer.	Water in some places is seasonally perched over subsoil.	Variable intake rate	Plastic subsoil.
High clay content; slow seepage.	Plastic, subject to cracking; low strength and stability.	Recharge rate slow; some soils too sloping.	Water is seasonally perched over subsoil.	High water-holding capacity; slow intake rate; sloping and steep soils are subject to erosion.	Plastic subsoil close to surface; sloping and steep soils are erodible.
Rapid permeability	Rapid permeability; low cohesion.	Low water table in summer.	Rapid permeability.	Moderately low water-holding capacity; rapid intake rate.	Deep soil; all features favorable.
High clay content, slow seepage.	Plastic, subject to cracking; low strength and stability.	Recharge rate slow; some soils too sloping.	Water is seasonally perched over subsoil.	High water-holding capacity; slow intake rate; sloping and steep soils are subject to erosion.	Plastic subsoil close to surface; sloping and steep soils are erodible.
Slow permeability of subsoil; moderately slow permeability of substratum.	Plastic; moderate shrink-swell ratio.	Low water table; not suitable.	Water seasonally perched over subsoil on low slopes.	High water-holding capacity; slow intake rate; hazard of ponding.	Plastic subsoil close to surface.

TABLE 6.—*Engineering*

Soil and map symbol [1]	Suitability for winter grading	Susceptibility to frost action	Suitability as a source of—	
			Topsoil	Gravel
Matapeake silt loam (MoA, MoB, MoC, MoC2). Matapeake silt loam, thin solum (MpD)	Fair	High	Good	Not suitable
Mattapex silt loam (MqA, MqB, MqC)	Fair; moderately high water table.	High	Good, but water table is moderately high seasonally.	Not suitable
Mattapex silt loam, clayey substratum (MsA, MsB, MsC). Mattapex silt loam, glauconitic substratum (MtA, MtB).	Fair; moderately high water table.	High	Good, but water table is moderately high seasonally.	Not suitable
Muck, shallow (Mu)	Poor; high water table, low strength.	High	Poor; organic soils, low content of mineral matter.	Not suitable
Othello silt loam (OtA)	Poor; high water table.	High	Good, but water table is high.	Not suitable
Peat, shallow (Pe)	Poor; high water table, low strength.	High	Poor; organic soils, low content of mineral matter.	Not suitable
Pocomoke sandy loam (Ps). Pocomoke-Berryland loamy sands (Pr). For Berryland part of Pr, refer to Berryland sand.	Poor; high water table.	Low to moderate.	Fair; high water table, moderate fertility, high water-holding capacity.	Not suitable
Sand pits (Sa).	Good	Low	Not suitable; infertile, very low organic content, low moisture-holding capacity.	Not suitable
Sandy land, Downer and Sassafras materials (SdF). For Downer part, refer to Downer loamy sand; and for Sassafras part, refer to Sassafras loamy sand.	Good	Low	Loamy sand, poor because of low fertility and moderately low water-holding capacity; sandy loam, good.	Not suitable

See footnote at end of table.

interpretations of the soils—Continued

Soil features affecting suitability for engineering practices—					
Farm ponds			Agricultural drainage	Irrigation	Agricultural land grading and smoothing
Reservoir area	Embankment	Dugout			
Moderately slow permeability in the subsoil, but moderate permeability in the substratum.	Fairly stable	Low water table; not suitable.	Well drained	High water-holding capacity; slow intake rate.	Deep soil; all features favorable.
Moderately slow permeability in the subsoil, but moderate permeability in the substratum.	All features favorable.	Low water table in summer.	Water table moderately high seasonally; moderately slow permeability of subsoil.	High water-holding capacity; slow intake rate.	Seasonally moderately high water table.
Slow seepage	All features favorable.	Low water table in summer.	Water table moderately high seasonally; moderately slow permeability.	High water-holding capacity; slow intake rate.	Seasonally moderately high water table.
Permeability slow in organic layer; generally rapid but variable in substratum.	Unstable; very compressible; high shrink-swell ratio.	Recharge rate generally rapid.	Subsidence, few outlets.	High water table; high water-holding capacity.	Subsidence.
High water table; permeability in subsoil slow, and in substratum moderate.	High water table; fair stability; poor compaction.	Recharge rate generally rapid.	Moderately slow permeability.	High water-holding capacity; moderately slow intake rate; needs drainage before irrigation.	Seasonally high water table.
Permeability slow in organic layer; generally rapid but variable in substratum.	Unstable; very compressible; high shrink-swell ratio.	Recharge rate generally rapid.	Subsidence, few outlets.	High water table; high water-holding capacity.	Subsidence.
High water table; permeability of substratum moderate.	High water table; fair stability.	Recharge rate generally rapid.	High water table, moderate perability, few outlets.	High water-holding capacity; moderate intake rate; needs drainage before irrigation.	High water table.
Permeability generally rapid, locally variable.	Generally fair to good stability.	Where dug into water table, recharge is rapid.	Generally rapidly permeable but variable.	Intake and water-holding capacity variable.	
Permeability below 30 inches rapid.	All features favorable.	Low water table, rapid permeability; not suitable.	Well drained	Moderate to moderately low water-holding capacity; moderate to moderately rapid intake rate.	Deep, well drained; all features favorable.

TABLE 6.—*Engineering*

Soil and map symbol [1]	Suitability for winter grading	Susceptibility to frost action	Suitability as a source of—	
			Topsoil	Gravel
Sassafras loamy sand (SfB, SfC, SfD, SwB). For Galestown part of SwB, refer to Galestown sand; for Woodstown part of SwB, refer to Woodstown loamy sand.	Good	Low	Poor; low fertility, moderate water-holding capacity.	Not suitable
Sassafras sandy loam (SrA, SrB, SrC, SrC2, SrD, SrD2, StB, SuB, SyB). For Aura part of StB, refer to Aura loam; for Aura part of SuB, refer to Aura sandy loam. For Woodstown part of SyB, refer to Woodstown sandy loam.	Good	Low	Good	Not suitable
Tidal Marsh (Tm).	Poor; wet, flooded daily.	High	Flooded twice daily	Not suitable
Woodstown loamy sand (WkB, WtA, WwA, WoB). For Fallsington part of WtA, refer to Fallsington sandy loam; for Klej part of WtA and WwA, refer to Klej loamy sand; for Dragston part of WoB refer to Dragston-Woodstown sandy loams, clayey substrata; and for Sassafras part of WwA, refer to Sassafras loamy sand.	Poor; moderately high water table.	Low	Poor; low fertility, moderate water-holding capacity.	Not suitable
Woodstown loamy sand, clayey substratum (WlB).	Poor; moderately high water table.	Low	Poor; low fertility, moderate water-holding capacity.	Not suitable
Woodstown sandy loam (WmB, WmC, WsB).	Poor; moderately high water table.	Low	Good; water table moderately high seasonally.	Not suitable
Woodstown sandy loam, clayey substratum (WnB).	Poor; moderately high water table.	Low	Good; water table moderately high seasonally.	Not suitable

[1] Three of the land types are too variable to be rated or described in this table. They are Made land, dredged river materials (Mf), Made land, sanitary land fill (Mg), and Sandy and clayey land, glauconitic materials (ScB).

interpretations of the soils—Continued

Soil features affecting suitability for engineering practices—					
Farm ponds			Agricultural drainage	Irrigation	Agricultural land grading and smoothing
Reservoir area	Embankment	Dugout			
Permeability of substratum rapid.	Surface layer too loose; mixture of surface layer with subsoil is stable; permeability of substratum rapid.	Low water table; not suitable.	Well drained	Moderate water-holding capacity; moderate intake rate; sloping soils subject to erosion.	Sloping soils subject to erosion.
Permeability of substratum rapid.	Stable	Low water table; not suitable.	Well drained	Moderate water-holding capacity; moderate intake rate.	Sloping soils are erodible.
Flooded twice daily; slowly permeable; salinity variable.	Weak in foundations; shrinkage severe; subsidence severe in dikes.	Flooded daily; salinity variable.	Flooded daily; few outlets; slow permeability.	Flooded daily	Flooded daily.
Permeability of substratum rapid; water table low in summer.	Surface layer loose; mixture of surface layer with subsoil is stable.	Low water table in summer.	Moderate permeability.	Moderate water-holding capacity; moderately rapid or moderate intake rate.	Moderately high water table seasonally.
Permeability of substratum slow; slow seepage.	Surface layer loose; mixture of surface layer with subsoil and substratum is stable.	Low water table in summer; recharge rate may be slow.	Moderate permeability, moderately high water table seasonally.	Moderate water-holding capacity; moderately rapid intake rate.	Moderately high water table seasonally.
Permeability of substratum moderate.	Stable; water table moderately high seasonally.	Low water table in summer.	Moderate permeability; water table moderately high seasonally.	Moderate water-holding capacity; moderate intake rate.	Moderately high water table seasonally.
Permeability of substratum slow; slow seepage.	Stable	Low water table in summer; recharge rate may be slow.	Moderate permeability; water table moderately high seasonally.	Water table moderately high seasonally; moderate water-holding capacity; moderate intake rate.	Water table moderately high seasonally.

TABLE 7.—

[Tests performed by the College of Engineering, Rutgers University, in accordance with standard procedures of the

Soil type and symbol	Sampling site			Depth	Test results				
					Sieve analysis				
	Site number	Latitude	Longitude		Cumulative percentage passing—				
					¾ inch	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074mm.)
				Inches					
Aura sandy loam (ArB)	37	39°39′53″	75°15′35″	0–12	100	100	100	84	23
				12–32	100	100	98	86	47
				32–48	91	77	72	45	18
Dragston sandy loam (WsB)	61	39°38′05″	75°27′33″	0–8	100	100	100	89	46
				8–18	100	100	100	90	48
				18–36	100	99	98	70	44
Elkton silt loam (EkB)	78	39°37′20″	75°20′42″	0–8	100	94	89	81	72
				8–14					
				14–32	96	85	80	80	72
				32–44	100	99	99	97	95
				44–60	99	97	97	93	88
Evesboro sand (EvB)	19	39°30′40″	75°08′53″	0–4					
				4–36	100	100	99	56	2
				36–60	100	99	94	47	1
				60–72	100	98	91	50	3
				72–80	100	99	97	45	0
	16	39°32′14″	75°19′10″	0–24	100	100	99	93	11
				24–42	99	93	92	86	9
				42–54	88	71	68	64	8
				54–72	100	99	98	97	4
	65	39°30′01″	75°21′10″	0–2					
				2–20	100	100	99	89	9
				20–56	99	98	97	87	9
				56–84	100	100	99	87	8
Fort Mott loamy sand (FrB)	72	39°40′27″	75°22′50″	0–12	100	100	100	96	20
				12–36	100	100	100	96	24
				36–58	100	100	100	95	33
				58–72	100	100	100	96	72
				72–86	100	100	100	91	46
	73	39°41′03″	75°22′33″	0–14	100	100	100	93	14
				14–36	100	100	100	93	15
				36–50	100	100	100	93	23
				50–60	100	100	100	94	11
				60–66					
				66–84	100	100	100	98	13
Galestown sand (GaB)	3	39°28′48″	75°21′42″	0–2					
				2–20	92	64	54	20	10
				20–50	100	92	80	38	13
				50–140	100	99	96	74	13
				140–160	98	94	87	44	17
Keyport loam (K1B2)	81	39°34′58″	75°20′00″	0–18	100	98	98	88	79
				18–32	98	93	82	75	67
				32–46	97	86	78	72	66
				46–58	99	99	98	96	94
	28	39°30′20″	75°23′50″	0–18	100	99	98	88	56
				18–62	100	100	100	95	86
				62–84	100	100	99	89	56

See footnotes at end of table.

Engineering test data

American Association of State Highway Officials (AASHO) (*2*). Absence of data indicates the determination was not made]

Test results—Continued						Classification		
Hydrometer analysis		Liquid limit	Plasticity index	Maximum density	Optimum moisture content	AASHO		Unified [1]
0.05–0.005 mm.	<0.005 mm.					Group	Group index	
Percent	*Percent*	*Percent*	*Percent*	*Lbs. per cu. ft.*	*Percent*			
		[2] NL	[3] NP			A–2–4	0	SM
16	26	24	8	117	13	A–4	2	SC
		22	5	126	10	A–1–b	0	SM–SC
		20	3			A–4	2	SM
		18	4	119	10	A–4	3	SM–SC
		18	3	122	10	A–4	2	SM
		36	12			A–6	8	CL–ML
31	39	55	31	100	22	A–7–6	18	CH–MH
40	56	60	29			A–7–5	20	CH–MH
35	52	64	34	89	29	A–7–6	20	CH–MH
		NL	NP			A–3	0	SP
		NL	NP			A–1–b	0	SP
		NL	NP			A–1–b	0	SP
		NL	NP			A–1–b	0	SP
		NL	NP			A–2–4	0	SP–SM
		NL	NP			A–3	0	SP–SM
		NL	NP			A–3	0	SP–SM
		NL	NP			A–3	0	SP
		NL	NP			A–3	0	SP–SM
		NL	NP	109	11	A–3	0	SP–SM
		NL	NP	110	11	A–3	0	SP–SM
		NL	NP			A–2–4	0	SM
		NL	NP			A–2–4	0	SM
		NL	NP			A–2–4	0	SM
		23	3			A–4	7	ML
		NL	NP			A–4	2	SM
		NL	NP			A–2–4	0	SM
		NL	NP			A–2–4	0	SM
		NL	NP			A–2–4	0	SM
		NL	NP			A–2–4	0	SP–SM
		NL	NP			A–2–4	0	SM
		23	5			A–1–b	0	SP–SM
		NL	NP			A–1–b	0	SM
		NL	NP			A–2–4	0	SM
8	6	34	14			A–2–6	0	SM
		41	14			A–7–6	10	CL–ML
28	29	42	17			A–7–6	10	CL–ML
29	30	53	26			A–7–6	15	CH–MH
29	31	84	40			A–7–5	20	MH
		24	8			A–4	4	CL
45	36	41	20			A–7–6	12	CL
31	24	24	10			A–4	5	CL

TABLE 7.—*Engineering*

Soil type and symbol	Sampling site			Depth	Test results				
					Sieve analysis				
	Site number	Latitude	Longitude		Cumulative percentage passing—				
					¾ inch	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074mm.)
				Inches					
Klej loamy sand (KmA)	18	39°31′13″	75°09′09″	0–4					
				4–20	100	100	98	65	13
				20–45	100	100	99	62	10
				45–66	100	100	99	59	3
				66–80	100	99	99	59	2
Matapeake silt loam (MoA)	62	39°38′56″	75°21′44″	0–12	100	100	100	94	75
				12–30	99	99	98	96	86
				30–42	100	98	98	91	72
				42–52	95	90	88	72	37
	59	39°36′08″	75°26′07″	0–14	99	97	96	82	66
				14–36	100	99	99	94	86
				36–50	94	80	76	63	35
				50–60	98	90	82	41	17
	60	39°37′13″	75°25′50″	0–8	100	100	99	87	70
				8–30	99	98	98	91	76
				30–84	100	99	97	57	9
Mattapex silt loam (MqA)	38	39°37′47″	75°24′03″	0–12	100	100	99	89	61
				12–30	100	100	100	95	80
				30–50	100	100	99	90	65
				50–62	100	99	96	85	56
				62–84	100	100	100	79	20
	54	39°35′36″	75°24′01″	0–16	100	100	100	93	80
				16–48	100	100	100	96	88
				48–60	100	100	99	87	51
				60–84	99	97	95	83	43
	63	39°38′22″	75°24′56″	0–14	100	100	100	95	75
				14–36	100	100	100	97	78
				36–44	100	100	100	84	31
				44–50					
				50–68	100	99	98	80	10
				68–84	100	100	99	87	21
Marlton soils (MrB)	75	39°36′42″	75°24′01″	0–18	100	100	99	95	73
				18–30	100	100	100	97	74
				30–92	100	100	99	94	64
				92–128	100	98	95	80	43
	76	39°41′11″	75°18′30″	0–12	98	97	96	86	41
				12–42	100	100	100	99	91
				42–70	100	100	98	94	83
				70–106	100	100	92	65	26
Mattapex silt loam, glauconitic substratum (MtA).	74	39°39′56″	75°21′20″	0–12	100	100	99	90	75
				12–32	100	99	90	82	71
				32–44	99	98	92	81	68
				44–80	100	100	96	65	24

See footnotes at end of table.

test data—Continued

Test results—Continued						Classification		
Hydrometer analysis		Liquid limit	Plasticity index	Maximum density	Optimum moisture content	AASHO		Unified [1]
0.05–0.005 mm.	<0.005 mm.					Group	Group index	
Percent	*Percent*	*Percent*	*Percent*	*Lbs. per cu. ft.*	*Percent*			
		NL	NP			A–2–4	0	SM
		NL	NP			A–2–4	0	SP–SM
		NL	NP			A–3	0	SP
		NL	NP			A–3	0	SP
		25	3			A–4	8	ML
69	10	32	11			A–6	8	CL–ML
53	14	27	9			A–4	7	CL
		19	3			A–4	0	SM
		33	9			A–4	6	CL–ML
61	21	33	13			A–6	9	CL
24	7	22	7			A–2–4	0	SM–SC
		18	2			A–1–b	0	SM
		24	2			A–4	7	ML
54	18	28	9			A–4	8	CL–ML
		NL	NP			A–3	0	SP–SM
		22	3			A–4	5	CL
49	17	34	12			A–6	9	CL–ML
		25	6			A–4	6	CL–ML
		24	3			A–4	4	ML
7	11	25	7			A–2–4	0	SM–SC
		27	7			A–4	8	CL–ML
67	13	36	14	102	21	A–6	10	CL–ML
36	12	27	13	115	13	A–6	4	CL
28	10	27	9	112	16	A–4	2	SC
		28	7			A–4	8	CL–ML
56	18	28	10	112	15	A–4	8	CL
		NL	NP	126	10	A–2–4	0	SM
		NL	NP	114	13	A–3	0	SP–SM
		NL	NP			A–2–4	0	SM
		51	20			A–7–5	13	CH–MH
		45	14			A–7–5	10	ML
		42	16			A–7–6	9	CL–ML
		39	10			A–4	2	SM
		26	8			A–4	1	SC
		48	15	95	28	A–7–5	12	ML
		46	12	96	26	A–7–5	10	ML
		46	14	111	16	A–2–7	1	SM
		41	10			A–5	8	ML
37	29	37	16	106	19	A–6	10	CL
		55	29	93	28	A–7–6	17	CH
6	14	34	11	113	16	A–2–6	1	SM–SC

TABLE 7.—*Engineering*

Soil type and symbol	Sampling site			Depth	Test results				
					Sieve analysis				
					Cumulative percentage passing—				
	Site number	Latitude	Longitude		¾ inch	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074mm.)
Othello silt loam (OtA)	64	39°38′24″	75°26′14″	0–14	100	98	97	91	65
				14–22	100	99	98	91	70
				22–30	96	88	86	72	36
				30–36					
				36–60	100	98	96	86	45
				60–72	99	98	98	85	22
	57	39°37′01″	75°12′37″	0–8	100	100	100	93	54
				8–28	100	100	99	92	64
				28–60	100	100	99	88	42
				60–80	98	92	85	63	19
Sassafras loamy sand (SfB)	9	39°41′04″	75°27′50″	0–8	100	100	100	82	17
				8–30	100	100	99	84	31
				30–60	100	100	100	81	3
				60–84	100	98	92	72	10
Sassafras sandy loam (SrA)	69	39°42′17″	75°22′15″	0–18	100	99	99	85	23
				18–48	100	98	97	84	32
				48–60	100	96	94	78	12
				60–84	100	99	98	82	6
Woodstown sandy loam (WmC)	8	39°42′02″	75°27′57″	0–10	100	100	99	82	31
				10–36	100	100	100	85	35
				36–42					
				42–66	99	97	95	72	10
	29	39°33′16″	75°22′40″	0–20	100	99	98	81	46
				20–40	100	100	98	86	61
				40–84	100	100	99	77	13
				84–120	100	95	93	74	12

[1] SCS and BPR have agreed to consider that all soils having plasticity indexes within two points from the A-line are to be given a borderline classification. Examples of borderline classifications obtained by this use are SM–SC and CL–ML.

Engineering classification systems

Most highway engineers classify soil materials according to the system approved by the American Association of State Highway Officials (AASHO) (*2*). In this system soil materials are classified in seven principal groups. The groups range from A–1, consisting of gravelly and coarse sandy soils of high bearing capacity, to A–7, consisting of clayey soils having low strength when wet. Within each group the relative engineering value of the soil material is indicated by a group index number. These numbers range from 0 for the best material to 20 for the poorest. The AASHO classification of the soils in Salem County is given in tables 5 and 7.

Some engineers prefer to use the Unified Soil Classification System (*17*). In this system the soils are classified according to their grain size and plasticity. Soil materials are classified as coarse grained (8 classes), fine grained (6 classes), or highly organic. The Unified classification of the soils in the county is given in tables 5 and 7.

Soil properties significant to engineering

In table 5 the soils and map symbols are listed, and estimates are given of some of the soil properties significant to engineering. The information in this table is based on the test data in table 7 and other available data.

The shrink-swell potential given in table 5 is an estimate of the change in volume that takes place when a change occurs in the moisture content. It is based on the kinds of clay and the amount of organic matter. A rating of high is given only to soils that are organic or that contain clay known to be highly montmorillonitic.

Table 6 contains ratings of the soils regarding their suitability for winter grading, their susceptibility to frost action, and their suitability as possible sources of topsoil and of gravel. Table 6 also contains a summary of the features of the soils that affect most of their use for ponds, agricultural drainage, irrigation, and agricultural grading and smoothing. This table was prepared after study of the soil test data and the descriptions of the soils and observations of performance of the soils.

test data—Continued

Test results—Continued						Classification		
Hydrometer analysis		Liquid limit	Plasticity index	Maximum density	Optimum moisture content	AASHO		Unified [1]
0.05–0.005 mm.	<0.005 mm.					Group	Group index	
		37	12			A–6	7	CL–ML
34	33	36	9	95	21	A–4	7	CL–ML
		20	5			A–4	0	SM–SC
		20	4	123	11	A–4	2	SM–SC
		NL	NP	121	12	A–2–4	0	SM
		21	4			A–4	4	CL–ML
34	24	21	6			A–4	6	CL–ML
		NL	NP			A–4	1	SM
		NL	NP			A–2–4	0	SM
		NL	NP			A–2–4	0	SM
		15	3	124	9	A–2–4	0	SM
		NL	NP	108	12	A–3	0	SP
		NL	NP			A–3	0	SP–SM
		NL	NP			A–2–4	0	SM
		22	5	120	12	A–2–4	0	SM–SC
		NL	NP			A–2–4	0	SP–SM
		NL	NP	106	16	A–3	0	SP–SM
		NL	NP			A–2–4	0	SM
		16	5			A–2–4	0	SM–SC
		NL	NP			A–3	0	SP–SM
		19	6			A–4	2	SM–SC
38	18	27	9			A–4	5	CL
		NL	NP			A–2–4	0	SM
		NL	NP			A–2–4	0	SP–SM

[2] NL used in this column means nonliquid.
[3] NP used in this column means nonplastic.

Engineering test data

All engineering soil test data in this survey are based on sampling and testing by Rutgers University, College of Engineering (*7*, *10*). The results of the test data for soils at 27 different sites are given in table 7. The tested soils are classified according to the Unified and AASHO systems and the textural classification of the U.S. Department of Agriculture. Some of the soil names used in the original engineering study were changed to agree with current soil science classification.

Test data in table 7 have been interpreted and extended in table 5 to cover most of the mapping units. Because of variability no interpretations were made for the following mapping units: Clay pits (Ca), Fresh water marsh (Fw), Gravel pits (Gp), Made land, dredged river materials (Mf), Made land, sanitary land fill (Mg), Sand pits (Sa), and Tidal marsh (Tm). Table 5 also gives estimates of several physical properties of the soils.

Soils and Community Developments

This section is mainly for planners, developers, and zoning officials and for owners of land that might be used for buildings or for various community developments. The limitations of the soils for several uses in community developments are given in table 8. The table gives the degree of limitation and the chief soil properties that limit the soil for the uses named.

A rating of *slight* means that the soil factors are favorable. The soil has few or no limitations for the use named, other than those that can be overcome through the normal steps of planning and design. *Moderate* limitations require special attention. *Severe* limitations for any of the uses generally cannot be corrected at reasonable cost. If the rating of a soil for a desired use is severe, some alternate and more suitable use for it should be considered.

Planning and zoning officials should consider the merits

of competing uses for soils. Many of the soils that are the best for community developments are also among the best for farming. Capability of the soils for farm crops is given in the section "Use and Management of Soils for Crop Production."

The properties that limit the suitability of soils for the uses listed in table 8 are discussed briefly.

Disposal of septic effluent (onsite) (*16*) is limited chiefly by (1) slow permeability at a depth around 30 inches, (2) shallow depth to the water table or to perched water, (3) overflow of water, and (4) strong or steep slope.

Requirements of the New Jersey Department of Health were followed in making the ratings for disposal of septic effluent (*8*). Soils that are rated *slight* have an adequate percolation rate. Those that might permit pollution of the ground water are indicated by a footnote. Moderately well drained soils that have a moderately high water table for part of the year were rated *moderate*. It must be understood that such soils must be deeply drained before they can be used for year-round disposal of septic effluent. Drainage may not be needed for a system designed for a summer home. Soils that are rated *severe* have a percolation rate slower than 1 inch in 40 minutes, are subject to overflow, or have slope greater than 10 percent.

The ratings for foundations refer to low buildings that place no more than a normal load on the foundation. The ratings are based on properties of the undisturbed soil. Limiting soil properties are (1) low bearing capacity, (2)

TABLE 8.—*Estimated degree of limitation and limiting characteristics*

Soil and map symbol	Disposal of sewage effluent (onsite)	Foundations for low buildings [1]	Homesites (landscaping)
Aura gravelly sandy loam (AgB).	Severe; moderately slow permeability of substratum.[2]	Slight	Slight; root zone is 24 inches thick.
Aura gravelly sandy loam (AgC2). Aura sandy loam (ArC2).	Severe; moderately slow permeability of substratum.[2]	Slight	Slight; root zone is 24 inches thick.
Aura loam (AlA, AlB).	Severe; moderately slow permeability of substratum.[2]	Slight	Slight; root zone is 24 inches thick.
Aura loamy sand (AmB). Aura sandy loam (ArB).	Severe; moderately slow permeability of substratum.[2]	Slight	Slight; root zone is 24 inches thick.
Bayboro sandy loam and Bayboro silt loam. Mapped only with Elkton soils.	Severe; slow permeability, poorly drained.	Severe; poorly drained, low shear strength.	Severe; poorly drained
Berryland sand (Be, Bp, Br). For Othello part of Br, refer to Othello silt loam.	Severe; high water table	Severe; high water table, low shear strength in subsoil.	Severe; high water table
Bibb silt loam (Bs).	Severe; subject to overflow.	Severe; subject to overflow, low shear strength in substratum.	Severe; subject to overflow, high water table.
Chillum silt loam (ChA, ChB).	Moderate; firm substratum.[2]	Slight; moderate shear strength in subsoil, high shear strength in substratum.	Slight; moderately slow permeability.
Clay pits (Ca).	Severe; slow permeability.	Moderate; low shear strength.	Moderate; slow permeability.
Clayey land (CbE, CcF).	Severe; slowly permeable, steep.	Severe; low shear strength; steep.	Severe; slow permeability, erosion hazard.
Downer loamy sand (DoB, DuB). For Sassafras part of DuB, refer to Sassafras loamy sand.	Slight	Slight	Moderate; moderately low water-holding capacity.
Downer loamy sand (DoC).	Slight	Slight	Moderate; moderately low water-holding capacity.

See footnotes at end of table.

shallow depth to a seasonal or a permanent water table, (3) steepness of the slope, and (4) the risk of flooding.

For development and landscaping of homesites, the important factors are texture of the surface soil and subsoil, the depth to the water table or to perched water, the steepness of slope, and the hazard of flooding.

For streets and parking lots the factors are the depth to the water table or to perched water, the hazard of flooding, and the steepness of slope.

For athletic fields the factors are gradient of slope, the depth to the water table or to perched water, the texture of the surface soil and subsoil, and the hazard of flooding. To be suitable, a soil must have slope more gentle than that required for many of the other uses.

Ratings for parks and play areas are based on the slope, the depth to the water table or to perched water, the texture of the surface soil and subsoil, and the hazard of flooding. Requirements are not so exacting as those for athletic fields.

Ratings for sanitary land fill and for cemeteries are based on texture, plasticity, and consistence of the soil material when moist, on the depth to the water table or to perched water, on the slope, and on the hazard of flooding. The ratings of many soils for these two uses are somewhat different.

Ratings for lawns depend mostly on texture of the surface soil and subsoil, the depth to the water table or to perched water, the slope, and the hazard of flooding.

of major soils for some uses in community development

Streets, parking lots, and subdivisions	Athletic fields	Parks and play areas	Lawns	Sanitary land fill	Cemeteries
Slight	Moderate; moderately slow permeability, gravel in some places.	Slight	Slight	Moderate; firm substratum is difficult to move.	Moderate; firm substratum is difficult to move.
Slight	Severe; slope greater than 5 percent.	Moderate; slope greater than 5 percent.	Moderate; slope greater than 5 percent.	Moderate; firm substratum is difficult to move.	Moderate; firm substratum is difficult to move.
Slight	AlA, slight. AlB, moderate; gentle slope.	Slight	Slight	Moderate; firm substratum is difficult to move.	Moderate; firm substratum is difficult to move.
Slight	Sight to moderate; gentle slope.	Slight	AmB, moderate; coarse texture. ArB, slight.	Moderate; firm substratum is difficult to move.	Moderate; firm substratum is difficult to move.
Severe; poorly drained	Severe; poorly drained.	Severe; poorly drained.	Severe: poorly drained	Severe; poorly drained, plastic material.	Severe; poorly drained.
Severe; high water table.	Severe; poorly drained.	Severe: poorly drained.	Severe; poorly drained	Severe; high water table.	Severe; high water.
Severe; subject to overflow, high water table.	Severe; subject to overflow.	Moderate; subject to overflow.	Slight; subject to overflow.	Severe; high water table.	Severe; subject to overflow.
Slight	ChA, slight. ChB, moderate; gentle slope.	Slight	Slight	Slight	Slight.
Moderate; subject to frost heaving, highly plastic.	Severe; slow permeability.	Severe; poorly drained.	Severe; low organic-matter content; subject to frost heaving.	Severe; plastic material.	Severe; plastic material.
Severe; steep, highly plastic.	Severe; steep	Severe; steep	Severe; steep	Severe; steep	Severe; highly plastic, steep.
Slight	Slight to moderate; gentle slope.	Slight	Moderate; coarse texture.	Slight	Slight.
Slight	Severe; slope greater than 5 percent.	Moderate; slope greater than 5 percent.	Moderate; coarse texture.	Slight	Slight.

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TABLE 8.—*Estimated degree of limitation and limiting characteristics*

Soil and map symbol	Disposal of sewage effluent (onsite)	Foundations for low buildings [1]	Homesites (landscaping)
Downer sandy loam (DvB). For Sassafras part, refer to Sassafras sandy loam.	Slight	Slight	Slight; moderately low water-holding capacity.
Dragston sandy loam (DwB). For Woodstown part, refer to Woodstown loamy sand, clayey substratum.	Severe; slowly permeable substratum.	Moderate; moderately high water table.	Slight; moderately high water table seasonally.
Dune land (Dz).	Slight; variable water table.	Moderate to severe; variable water table.	Severe; low water-holding capacity, very low fertility, wind erosion hazard.
Elkton silt loam (EkB). Elkton-Bayboro sandy loams (ElA). Elkton-Bayboro silt loams (EnA). For Bayboro part of ElA and EnA, refer to Bayboro sandy loam and Bayboro silt loam.	Severe; slow permeability, poorly drained.	Severe; poorly drained, low shear strength.	Severe; poorly drained
Evesboro sand (EvB).	Slight	Slight	Moderate; low water-holding capacity, very low fertility, wind erosion hazard.
Evesboro sand (EvC).	Slight	Slight	Moderate; low water-holding capacity, very low fertility, wind erosion hazard.
Evesboro sand (EvD, EwD). For Aura part of EwD, refer to Aura gravelly sandy loam.	Moderate; strong slope	Slight	Moderate; low water-holding capacity, very low fertility, water erosion hazard.
Evesboro sand (EvF).	Severe; steep slope	Slight	Severe; low water-holding capacity, very low fertility, water erosion hazard.
Fallsington sandy loam (FdA, FeA, Fp). For Othello part of FeA, refer to Othello silt loam; for Pocomoke part of Fp, refer to Pocomoke sandy loam; for Berryland part of Fp, refer to Berryland sand.	Severe; high water table	Severe; high water table	Severe; high water table
Fort Mott loamy sand (FrB).	Slight	Slight	Moderate; low water-holding capacity, low fertility, wind erosion hazard.
Fort Mott loamy sand (FrC).	Slight	Slight	Moderate; low water-holding capacity, low fertility, wind erosion hazard.
Fresh water marsh (Fw).	Severe; high water table	Severe; subject to overflow; low shear strength, high shrink-swell ratio.	Severe; subject to overflow; high water table.
Galestown sand (GaB, GbB). For Sassafras part of GbB, refer to Sassafras loamy sand; for Klej part of GbB, refer to Klej loamy sand.	Slight	Slight	Moderate; moderately low water-holding capacity, low fertility, wind erosion hazard.

See footnotes at end of table.

of major soils for some uses in community development—Continued

Streets, parking lots, and subdivisions	Athletic fields	Parks and play areas	Lawns	Sanitary land fill	Cemeteries
Slight	Slight to moderate; gentle slope.	Slight	Slight	Slight	Slight.
Moderate; moderately high water table seasonally.	Severe to moderate; moderately high water table.	Moderate to slight; somewhat poorly drained to moderately well drained.	Slight	Moderate; moderately high water table seasonally.	Moderate; somewhat poorly drained to moderately well drained.
Slight	Severe; coarse texture.	Slight	Severe; low water-holding capacity, very low fertility.	Moderate; variable water table.	Severe; variable water table.
Severe; poorly drained	Severe; poorly drained.	Severe; poorly drained.	Severe; poorly drained.	Severe; poorly drained, plastic material.	Severe; poorly drained.
Slight; loose sand hinders hauling	Moderate; coarse texture.	Slight	Severe; low water-holding capacity, very low fertility.	Slight	Slight.
Slight; loose sand hinders hauling.	Severe; slope greater than 5 percent.	Moderate; slope greater than 5 percent.	Severe; low water-holding capacity, very low fertility.	Slight	Slight.
Moderate; loose sand hinders hauling; water erosion hazard.	Severe; slope greater than 5 percent.	Moderate; slope greater than 5 percent.	Severe; low water-holding capacity, very low fertility.	Slight	Slight.
Severe; loose sand hinders hauling; water erosion hazard.	Severe; slope greater than 5 percent.	Severe; steep slope.	Severe; steep slope	Moderate; steep slope.	Severe; steep slope.
Severe; high water table.	Severe; poorly drained.	Severe; poorly drained.	Severe; poorly drained	Severe; high water table.	Severe; high water table.
Slight; loose sand hinders hauling.	Moderate; coarse texture.	Slight	Moderate; low water-holding capacity, low fertility.	Slight	Slight.
Slight; loose sand hinders hauling.	Severe; slope greater than 5 percent.	Moderate; slope greater than 5 percent.	Moderate; low water-holding capacity, low fertility.	Slight	Slight.
Severe; subject to overflow; high water table, high organic-matter content.	Severe: subject to overflow.	Severe; subject to overflow.	Severe; poorly drained	Severe; high water table.	Severe; high water table.
Slight; loose sand hinders hauling.	Moderate; slope greater than 5 percent, coarse texture.	Slight	Moderate; moderately low water-holdlng capacity, low fertility.	Slight	Slight.

TABLE 8.—*Estimated degree of limitation and limiting characteristics*

Soil and map symbol	Disposal of sewage effluent (onsite)	Foundations for low buildings [1]	Homesites (landscaping)
Gravel pits (Gp).	Variable	Slight	Severe; low water-holding capacity, very low fertility.
Howell soils (HoB).	Moderate; moderately high water table seasonally.	Moderate; moderately high (perched) water table seasonally.	Slight; moderately high water table (perched over subsoil) seasonally.
Keyport loam (KlB2). Keyport sandy loam (KpB).	Severe; slow permeability.	Moderate; low shear strength, moderately well drained.	Moderate; water table perched over subsoil seasonally.
Keyport loam (KlC2). Keyport soils (KpC2).	Severe; slow permeability.	Moderate; low shear strength.	Moderate; slow permeability, plastic.
Keyport loam (KlD2). Keyport soils (KpD2).	Severe; slow permeability.	Moderate; low shear strength.	Moderate; slow permeability, plastic.
Klej loamy sand (KmA, KnA). For Woodstown part of KnA, refer to Woodstown loamy sand; for Galestown part of KnA, refer to Galestown sand.	Moderate; moderately high water table seasonally.[3]	Moderate; moderately high water table seasonally.	Moderate; moderately low water-holding capacity, moderately high water table seasonally, low fertility, wind erosion hazard.
Lenoir silt loam (LkA). For Keyport part of LkA, refer to Keyport loam.	Severe; slow permeability.	Moderate; low shear strength, somewhat poorly to moderately well drained.	Moderate; water table perched over subsoil seasonally.
Made land, dredged river materials (Mf).	Severe; moderately slow permeability.	Slight; moderate shear strength.	Slight
Made land, sanitary land fill (Mg).	Severe; numerous obstructions.	Severe; variable shear strength, severe settling.	Severe; numerous obstructions.
Marlton soils (MrB, MrB2).	Severe; slow permeability.	Moderate; low shear strength, moderately well drained.	Moderate; water table perched over subsoil seasonally.
Marlton soils (MrC2).	Severe; slow permeability.	Moderate; low shear strength, seeps in some places.	Moderate; subject to water erosion.
Marlton soils (MrD2).	Severe; slow permeability.	Moderate; low shear strength, strong slope.	Moderate; subject to water erosion.
Matapeake silt loam (MoA, MoB).	Slight	Slight	Slight
Matapeake silt loam (MoC, MoC2).	Slight; moderate slope	Slight	Moderate; subject to water erosion.

See footnotes at end of table.

of major soils for some uses in community development—Continued

Streets, parking lots, and subdivisions	Athletic fields	Parks and play areas	Lawns	Sanitary land fill	Cemeteries
Slight	Severe; coarse texture, low organic-matter content.	Slight	Severe; low water-holding capacity, low fertility.	Slight; some spots have moderately high water table seasonally.	Slight; some spots have moderately high water table seasonally.
Moderate; moderately high water table seasonally.	Moderate; moderately well drained.	Slight	Moderate; low water-holding capacity of surface soil.	Moderate; water table moderately high seasonally.	Severe; moderately well drained.
Moderate; water table perched over subsoil seasonally, plastic, subject to frost heaving.	Severe; slow permeability.	Slight	Slight	Severe; plastic, moderately well drained.	Severe; plastic, moderately well drained.
Moderate; water table perched over subsoil seasonally, plastic, subject to frost heaving.	Severe; slow permeability, slope greater than 5 percent.	Moderate; slope greater than 5 percent.	Slight	Severe; plastic, moderately well drained.	Severe; plastic, moderately well drained.
Severe; plastic, subject to frost heaving.	Severe; strong slopes.	Moderate; strong slopes.	Moderate; strong slopes.	Severe; plastic	Severe; plastic, moderately well drained.
Moderate; loose sand hinders hauling; moderately high water table seasonally.	Moderate; moderately well drained.	Slight	Severe; moderately low water-holding capacity, low fertility.	Moderate; moderately well drained.	Severe; plastic, moderately well drained.
Moderate; water table perched over subsoil seasonally, plastic, subject to frost heaving.	Severe; slow permeability.	Slight to moderate; somewhat poorly drained to moderately well drained.	Moderate; somewhat poorly drained to moderately well drained.	Severe; plastic	Severe; plastic, somewhat poorly drained to moderately well drained.
Moderate; subject to frost heaving.	Slight to moderate; variable drainage.	Slight	Slight	Slight	Slight.
Variable	Severe; subject to severe settling.	Slight	Slight; subject to severe settling.	Slight	Severe; subject to severe settling.
Moderate; water table perched over subsoil seasonally, seeps in some places, subject to frost heaving.	Severe; slow permeability.	Slight	Slight	Moderate; moderately well drained, plastic.	Severe; moderately well drained, plastic.
Moderate; subject to water erosion and to frost heaving, seeps in some places.	Severe; moderate slope.	Moderate; slope greater than 5 percent.	Moderate; slope of 5 to 10 percent.	Moderate; moderately well drained, plastic.	Severe; moderately well drained, plastic.
Moderate; subject to water erosion and to frost heaving, seeps in some places.	Severe; strong slope.	Moderate; strong slope.	Moderate; strong slope.	Severe; strong slope	Severe; moderately well drained, plastic.
Moderate; subject to frost heaving.	MoA, slight. MoB, moderate; gentle slope.	Slight	Slight	Slight	Slight.
Moderate; subject to frost heaving and to water erosion.	Severe; moderate slope.	Moderate; slope greater than 5 percent.	Moderate; moderate slope.	Slight	Slight.

TABLE 8.—*Estimated degree of limitation and limiting characteristics*

Soil and map symbol	Disposal of sewage effluent (onsite)	Foundations for low buildings [1]	Homesites (landscaping)
Matapeake silt loam, thin solum (MpD).	Moderate; strong slope	Slight	Moderate; subject to wind erosion.
Mattapex silt loam (MqA, MqB).	Moderate; moderately high water table seasonally.	Moderate; moderately high water table seasonally.	Moderate; moderately high water table seasonally.
Mattapex silt loam (MqC).	Moderate; moderately well drained.	Moderate; moderately well drained.	Moderate; subject to water erosion.
Mattapex silt loam, clayey substratum (MsA, MsB).	Severe; slow permeability.	Moderate; moderately high water table seasonally.	Moderate; moderately high water table seasonally.
Mattapex silt loam, clayey substratum (MsC).	Severe; slow permeability of substratum.	Moderate; moderately well drained.	Moderate; subject to water erosion.
Mattapex silt loam, glauconitic substratum (MtA, MtB).	Severe; slow permeability of substratum.	Moderate; moderately high water table seasonally, low shear strength in substratum.	Moderate; moderately high water table seasonally.
Muck, shallow (Mu).	Severe; high water table	Severe; subject to overflow, high shrink-swell ratio, low shear strength.	Severe; subject to overflow, high water table.
Othello silt loam (OtA).	Severe; high water table	Severe; high water table	Severe; high water table
Peat, shallow (Pe).	Severe; high water table	Severe; subject to overflow, high shrink-swell ratio, low shear strength.	Severe; subject to overflow, high water table.
Pocomoke loamy sand (Pr). Pocomoke sandy loam (Ps). For Berryland part of Pr, refer to Berryland sand.	Severe; high water table	Severe; high water table	Severe; high water table
Sand pits (Sa).	Slight [3]	Slight to moderate; variable water table.	Severe; very low water-holding capacity, very low fertility, wind erosion hazard.
Sandy and clayey land, glauconitic materials (ScB).	Moderate; moderate or moderately slow permeability of substratum, moderately high water table seasonally.	Moderate; moderately high water table seasonally.	Moderate; moderately high water table seasonally.
Sandy land, Downer and Sassafras materials (SdF).	Severe; steep slope	Moderate; steep slope	Severe; low water-holding capacity, low fertility, water erosion hazard.
Sassafras loamy sand (SfB, SwB). For Galestown part of SwB, refer to Galestown sand. For Woodstown part of SwB, refer to Woodstown loamy sand.	Slight	Slight	Moderate; moderately low water-holding capacity in surface soil.
Sassafras loamy sand (SfC).	Slight; moderate slope	Slight	Moderate; moderately low water-holding capacity in surface soil, water erosion hazard.

See footnotes at end of table.

of major soils for some uses in community development—Continued

Streets, parking lots, and subdivisions	Athletic fields	Parks and play areas	Lawns	Sanitary land fill	Cemeteries
Moderate; subject to frost heaving and to water erosion.	Severe; strong slope.	Moderate; strong slope.	Moderate; strong slope.	Moderate; strong slope.	Moderate; strong slope.
Moderate; moderately high water table seasonally.	Moderate; moderately well drained.	Slight	Slight	Moderate; moderately high water table seasonally.	Severe; moderately high water table seasonally.
Moderate; subject to water erosion, seeps in some places.	Severe; moderate slope.	Moderate; slope greater than 5 percent.	Moderate; moderate slope.	Moderate; moderately high water table seasonally.	Severe; moderately well drained.
Moderate; moderately high water table seasonally.	Moderate; moderately well drained.	Slight	Slight	Moderate; moderately well drained.	Severe; moderately well drained.
Moderate; subject to water erosion, seeps in some places.	Severe; moderate slope.	Moderate; slope greater than 5 percent.	Moderate; moderate slope.	Moderate; moderate slope.	Severe; moderately well drained.
Moderate; moderately high water table seasonally.	Moderate; moderately well drained.	Slight	Slight	Moderate; moderately high water table seasonally.	Severe; moderately high water table seasonally.
Severe; subject to overflow, high organic-matter content.	Severe; poorly drained.	Severe; poorly drained.	Severe; poorly drained.	Severe; high water table.	Severe; high water table.
Severe; high water table, subject to frost heaving.	Severe; poorly drained.	Severe; poorly drained.	Severe; poorly drained.	Severe; high water table.	Severe; high water table.
Severe; subject to overflow, high organic-matter content.	Severe; poorly drained.	Severe; poorly drained.	Severe; poorly drained.	Severe; high water table.	Severe; high water table.
Severe; high water table.	Severe; poorly drained.	Severe; poorly drained.	Severe; poorly drained.	Severe; high water table.	Severe; high water table.
Slight; loose sand hinders hauling.	Severe; coarse texture.	Slight	Severe; low water-holding capacity, low fertility.	Slight; moderately high water table seasonally.	Slight; moderately high water table seasonally.
Moderate; variable soil, moderately high water table seasonally.	Moderate to severe; variable texture.	Slight	Slight	Moderate; moderately high water table seasonally.	Severe; moderately high water table seasonally.
Moderate; water erosion hazard.	Severe; steep slope.	Severe; steep slope.	Severe; steep slope.	Severe; steep slope.	Severe; steep slope.
Slight	Slight to moderate, gentle slope.	Slight	Moderate; moderately low water-holding capacity, low fertility.	Slight	Slight.
Slight; subject to water erosion.	Severe; slope greater than 5 percent.	Moderate; slope greater than 5 percent.	Moderate; moderately low water-holding capacity, low fertility.	Slight	Slight.

TABLE 8.—*Estimated degree of limitation and limiting characteristics*

Soil and map symbol	Disposal of sewage effluent (onsite)	Foundations for low buildings [1]	Homesites (landscaping)
Sassafras loamy sand (SfD).	Moderate; strong slope	Slight	Severe; moderately low water-holding capacity, water erosion hazard.
Sassafras sandy loam (SrA, SrB, SuB, SyB). For Aura part of SuB, refer to Aura loamy sand. For Woodstown part of SyB, refer to Woodstown sandy loam.	Slight	Slight	Slight
Sassafras sandy loam (SrC, SrC2).	Slight; moderate slope	Slight	Slight; water erosion hazard.
Sassafras sandy loam (SrD, SrD2).	Moderate; strong slope	Slight	Moderate; water erosion hazard.
Sassafras loam (StB). For Aura part of StB, refer to Aura loam.	Slight	Slight	Slight
Tidal marsh (Tm).	Severe; flooded daily by tides.	Severe; flooded daily, low shear strength, high shrink-swell ratio, hazard of marsh gas.	Severe; flooded by tides
Woodstown loamy sand (WkB, WtA, WwA). For Fallsington part of WtA, refer to Fallsington sandy loam; for Klej parts of WtA and WwA, refer to Klej loamy sand; for Sassafras part of WwA, refer to Sassafras loamy sand.	Moderate; moderately high water table seasonally.	Moderate; moderately high water table seasonally.	Moderate; moderately high water table seasonally.
Woodstown loamy sand, clayey substratum (WlB).	Moderate; moderately high water table seasonally.	Moderate; moderately high water table seasonally.	Moderate; moderately high water table seasonally; water-holding capacity of surface soil low.
Woodstown sandy loam (WmB).	Moderate; moderately high water table seasonally.	Moderate; moderately high water table seasonally.	Moderate; moderately high water table seasonally.
Woodstown sandy loam (WmC).	Moderate; moderately well drained.	Moderate; moderately well drained.	Moderate; excess water seasonally, water erosion hazard.
Woodstown sandy loam, clayey substratum (WnB).	Moderate; moderately high water table seasonally.	Moderate; moderately high water table seasonally, low shear strength in substratum.	Moderate; moderately high water table seasonally.
Woodstown loamy sand (WoB). For Dragston part, refer to Dragston sandy loam.	Moderate; moderately high water table seasonally.	Moderate; moderately high water table seasonally.	Moderate; moderately high water table seasonally.
Woodstown sandy loam (WsB). For Dragston part, refer to Dragston sandy loam.	Moderate; moderately high water table seasonally.	Moderate; moderately high water table seasonally.	Moderate; moderately high water table seasonally, moderate water-holding capacity in surface soil.

[1] For low buildings and normal foundation loads.
[2] The hard or firm substratum makes necessary special investigation, design, and construction.

of major soils for some uses in community development—Continued

Streets, parking lots, and subdivisions	Athletic fields	Parks and play areas	Lawns	Sanitary land fill	Cemeteries
Slight; subject to water erosion.	Severe; strong slope.	Moderate; strong slope.	Moderate; moderately low water-holding capacity, low fertility, strong slope.	Moderate; strong slope.	Slight.
Slight	SrA, slight. SrB, SuB, and SyB, moderate; gentle slope.	Slight	Slight	Slight	Slight.
Slight; water erosion hazard.	Severe; slope greater than 5 percent.	Moderate; slope greater than 5 percent.	Moderate; slope 5 to 10 percent.	Slight	Slight.
Slight; water erosion hazard.	Severe; strong slope.	Moderate; strong slope.	Moderate; slope 10 to 15 percent.	Moderate; strong slope.	Moderate; strong slope.
Slight	Slight to moderate; gentle slope.	Slight	Slight	Slight	Slight.
Severe; flooded by tides, high organic-matter content.	Severe; flooded daily.	Severe; flooded daily.	Severe; flooded daily	Severe; flooded daily	Severe; flooded daily.
Moderate; moderately high water table seasonally.	Moderate; moderately well drained.	Slight	Moderate; low water-holding capacity, low fertility.	Moderate; moderately high water table seasonally.	Severe; moderately high water table seasonally.
Moderate; moderately high water table seasonally.	Moderate; moderately well drained.	Slight	Moderate; low water-holding capacity, low fertility.	Moderate; moderately high water table seasonally.	Severe; moderately high water table seasonally.
Moderate; moderately high water table seasonally.	Moderate; moderately well drained.	Slight	Slight; moderately well drained.	Moderate; moderately high water table seasonally.	Severe; moderately high water table seasonally.
Moderate; water erosion hazard, seeps in some places.	Severe; slope greater than 5 percent.	Moderate; slope greater than 5 percent.	Moderate; slope 5 to 10 percent.	Moderate; moderately well drained.	Severe; moderately well drained.
Moderate; moderately high water table seasonally.	Moderate; moderately well drained.	Slight	Slight; moderately well drained.	Moderate; moderately high water table seasonally.	Severe; moderately high water table seasonally.
Moderate; moderately high water table seasonally.	Moderate to severe; moderately well drained to somewhat poorly drained.	Slight to moderate; moderately well drained to somewhat poorly drained.	Slight to moderate; moderately well drained to somewhat poorly drained.	Moderate; moder ately high water table seasonally.	Severe; moderately high water table seasonally.
Moderate; moderately high water table seasonally.	Moderate; to severe; moderately well drained to somewhat poorly drained.	Slight to moderate; moderately well drained to somewhat poorly drained.	Slight to moderate; moderately well drained to somewhat poorly drained.	Moderate; moderately high water table seasonally.	Severe; moderately high water table seasonally.

[3] A risk of polluting the shallow water supply exists in some areas.

Formation and Classification of Soils

This section contains three main parts. The first part discusses the factors of soil formation as they relate to the development of soils in Salem County. The second part describes important processes in the development of soil horizons. The third part explains the current system of soil classification and places the soil series of the county in some of the categories of the current system of classification and in great soil groups of the older system of classification.

Factors in Soil Formation

Soils are formed by forces of the environment acting on soil materials deposited or accumulated by geologic processes. The characteristics of a soil at any particular place are determined by (1) the climate in which the soil material has accumulated and has existed since accumulation; (2) the physical and mineralogical composition of the parental material; (3) the relief, or lay of the land, which influences drainage, moisture content, aeration, susceptibility to erosion, and exposure to the sun and the elements; (4) the biological forces acting upon the soil material—the plants and animals living in and on the soil; and (5) the length of time the climate and the biological forces have acted upon the soil material.

Climate.—The soils of Salem County have developed in a warm, moist climate under marine influences. Average temperature and rainfall are listed in table 10 in the subsection "Climate."

The climate of the county is nearly uniform, since there are no major barriers to obstruct the movement of winds, clouds, and rainstorms. Most storms originate in the west, but some move in from the southeast.

Rainfall has been enough since the soil materials were deposited to leach away all the free carbonates and much of the bases. As a result, all the soils are naturally strongly acid, and most of them are low in fertility.

From the position, extent, and distribution of the soils in Salem County that contain a large amount of silt, it is postulated that wind velocities were high and the action of the wind was important right after the soil material was deposited by glacial waters.

Parent material.—The parent material of the Salem County soils consists of water-deposited clays, silts, sands, and gravel. Deposits of clay weather to make clayey soils that are difficult to plow and cultivate, such as the Keyport soils. Deposits of sand form sandy soils that have low fertility and low water-holding capacity, such as the Evesboro soils. Salem County has some clayey and some sandy soils, but they are not extensive. Most of the soils developed from mixed materials containing considerable amounts of both clay and sand. The Sassafras and Woodstown soils are such soils.

Extensive areas of soils formed in material that is mostly silt. There is evidence that much of the silt and some of the sand have been reworked by wind after they were deposited by water.

Topography.—Salem County is entirely within the Coastal Plain. The highest places in the county are about 150 feet above sea level. Most areas are nearly level or gently sloping, but small areas range from strongly sloping to steep. The steep areas generally are blufflike escarpments along the streams. Erosion removes soil from many of these steep areas about as fast as it is formed. In these areas there are only faint difference in soil horizons.

Estuaries are important in the county. They are winding streams of slow velocity that overflow from time to time and leave deposits of soil material.

Plants and animals.—Plants and animals add organic matter to the soils and, to some extent, offset leaching by bringing plant nutrients from the lower layers to the upper layers of the soil. The organic matter supplies food for micro-organisms in the soil.

Vegetation originally was a more important factor in soil formation in Salem County than it is now. Most of the inland sandy soils had a cover of pine trees. Some soils show the results of leaching, which commonly takes place in sandy soils where pine trees are abundant.

Time.—The oldest soil materials in the county are marine deposits. Most of these have been covered by more recent deposits. The age of the oldest exposed clays is estimated to be more than a hundred million years (*6*). Most soils formed on these clays are not nearly that old, because in most places the soils consist partly of sand and gravel, which appear to have been spread by melting glacial waters. Those waters covered most of the county, and the soil materials were thoroughly mixed and redeposited by them. The age of most of the soils, therefore, can be dated from the time when the last glaciers melted, estimated at between 10,000 and 12,000 years ago.

Development of Soil Horizons

Soil-forming processes produce soils that contain horizons. Some of the horizons are contrasting enough to be readily recognized, and some are faint.

The differentiation of horizons is the result of several soil forming processes. The most important of these are (1) accumulation of organic matter; (2) leaching of carbonates and of salts more soluble than the carbonates; (3) chemical weathering of the primary minerals into silicate clay minerals; (4) movement of the silicate clay minerals from one horizon to another; and (5) chemical change and transfer of iron.

All of these processes have taken place, and all of them are now taking place, in Salem County soils. Not all of them function in all the soils, nor do they function to the same degree in all soils.

Probably, the first change that occurs in a soil is the accumulation of organic matter near the surface. Plants are growing and organic matter is being added to the youngest soil materials in the county, which are those in the mapping unit, Made land, dredged river materials. These materials, which have been placed in their present position mostly within the past 20 years, began growing Phragmites grass soon after they became dry enough to be aerated. The youthful Bibb soils, which consist of deposits from annual stream overflows, also contain considerable organic matter.

Excessively drained and well-drained sandy soils, such as the Evesboro, Fort Mott and Downer soils, never accumulate much organic matter. The organic layer in them is, at most, about an inch thick under a natural cover of trees. In the soils that have a water table at or near the surface, however, organic matter accumulates readily. A 1-foot layer of organic matter is common in some of the

wet soils, and the organic layers in some of the Muck soils have a depth of 5 feet or more.

Leaching of carbonates is shown in the soils that developed in the Vincentown geologic formation (*5*, *6*). This formation consists of limy sand. The soils have been leached so that the surface layer is very strongly acid, but the substratum 5 to 10 feet below the surface in most places is nearly neutral.

Results of chemical weathering of soil material are shown by the Marlton soils. The underlying, highly glauconitic beds more than 3 feet below the surface consist of layers of friable sandy loam and sandy clay loam. The soil above those layers has been subjected to soil-forming processes for thousands of years. Clay was formed by weathering of the primary minerals, and some of it was moved from the surface layer into the subsoil. As a result, the subsoil is sandy clay and the deeper layers are still sandy loam or sandy clay loam. The Aura and Sassafras soils also have a subsoil that is distinctly more clayey than either the surface soil or the underlying layers. Weathering has been deepest in the Aura soils. Soft, weathered chert is commonly in them at depths of 5 to 10 feet or more.

Some of the wet soils, such as the Fallsington and Othello soils, have a gray or dark-gray surface soil and a grayish subsoil. The gray color indicates that iron has moved from these layers.

Movement of clay, especially from the surface soil into the subsoil, is a process common to nearly all the soils of the county. Clay films in the subsoil of the Aura and Marlton soils can be seen readily under a hand lens.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First, through classification and then through use of soil maps, we can apply our knowledge to specific fields and other tracts.

Thus, in classification, soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and applied in managing farms, fields, and woods; in developing rural areas; in doing engineering work; and in many other ways. They are placed in broad classes to facilitate study and comparison in large areas, such as counties and continents.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*3*) and revised later (*12*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965. The current system is under continual study (*11*, *14*). Therefore, readers interested in developments of the system should search the latest literature available.

Under the current system of classification, six categories are recognized. Beginning with the broadest and most inclusive, these are the order, the suborder, the great group, the subgroup, the family, and the series. Table 9 gives the family, subgroup, and order for each series in Salem County under the current classification, as well as the great soil group of the 1938 classification.

In the broadest category, the order, there are 10 classes. Only three are represented in Salem County. They are the Entisols, the Spodosols, and the Ultisols. Some of the names were derived from roots in ancient or modern languages, and some are syllables that have no meaning.

Entisols (the root has no meaning) are mineral soils that have not been changed much from their parent geological materials. In Salem County the principal change has been the accumulation of organic matter on the surface of the mineral soil.

Spodosols (from the Greek *spodos*, meaning wood ash) are mineral soils having horizons in which organic colloids, or iron and aluminum compounds, or both, have accumulated. Berryland soils have an accumulation of organic matter in the subsoil.

Ultisols (from the Latin *ultimus*, or last) are soils that are in an advanced stage of development. In Salem County these are the most extensive soils. They range from well drained to very poorly drained.

Entisols.—In Salem County the Entisols are of the suborder Aquents and Psamments. Aquents are wet Entisols. Only the Bibb soils are in this suborder in Salem County. The Quartzipsamments are moderately wet to dry soils that are very sandy throughout. Ninety-five percent or more of their material consists of quartz sand.

Spodosols.—The Spodosols of Salem County are represented by the Berryland soils, which are of the suborder Aquods. They are Haplaquods, which are soils that have a very dark gray or black A1 horizon and no more than 30 inches of very sandy material over the subsoil horizon in which organic matter has accumulated. There is little if any accumulation of iron or aluminum in Haplaquods. The Berryland soils are classified as Typic Haplaquods. They are very wet and very poorly drained.

Ultisols.—In Salem County the Ultisols are represented by soils of the suborders Aquults and Udults. The Aquults have a Bt horizon that is dominantly gray, and they are wet and poorly drained. The Udults are normally moist, but not wet, and some part of the Bt horizon is brighter in color than the Bt of the Aquults. Udults are dominantly yellow, brown, or red, but not gray.

The suborder Aquults is represented in this county by the great groups Ochraquults and Umbraquults. The former have a gray or light-gray A horizon, and the latter have a very dark gray or black A1 horizon.

Typic Ochraquults are naturally saturated with water for part of the year, have a Bt horizon of clay accumulation that is dominantly gray, and have a light-colored A horizon.

Typic Umbraquults have a very dark gray or black A1 horizon.

The suborder Udults is represented in Salem County only by the great group Hapludults. The subgroups represented in the county are Typic, Arenic, Psammentic and Aquic. The Typic subgroup contains the normal soils of the group, which have chroma of 6 or greater in all parts of the Bt horizon.

Aquic Hapludults have gray mottles in the upper 10 inches of the Bt horizon. The Dragston and Mattapex soils are in this group.

Psammentic Hapludults have a surface soil thicker than 20 inches. Galestown soils are in this group.

TABLE 9.—*Soil series classified according to the current system of classification and the 1938 system with its later revisions*

Series	Current classification			Great soil groups of the 1938 classification
	Family	Subgroup	Order	
Aura	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Bayboro	Clayey, mixed, [1] thermic [2]	Typic Umbraquults	Ultisols	Humic Gley soils.
Berryland	Sandy, siliceous, mesic	Typic Haplaquods	Spodosols	Ground-Water Podzols.
Bibb	Coarse-loamy, siliceous, acid, thermic.[2]	Typic Haplaquents	Entisols	Humic Gley soils.
Chillum	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils (intergrading to Red-Yellow Podzolic soils).
Downer	Coarse-loamy, siliceous, mesic.	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils (intergrading to Red-Yellow Podzolic soils).
Dragston	Fine-loamy,[3] siliceous, thermic.[2]	Aquic Hapludults	Ultisols	Low-Humic Gley soils (intergrading to Red-Yellow Podzolic soils).
Elkton	Clayey, mixed,[1] mesic	Typic Orchraquults	Ultisols	Low-Humic Gley soils.
Evesboro	Sandy, siliceous, acid, mesic	Typic Quartzipsamments	Entisols	Regosols.
Fallsington	Fine-loamy,[3] siliceous, mesic	Typic Ochraquults	Ultisols	Low-Humic Gley soils.
Fort Mott	Coarse-loamy, siliceous, mesic.	Arenic Hapludults	Ultisols	Gray-Brown Podzolic soils (intergrading to Red-Yellow Podzolic soils).
Galestown	Sandy, siliceous, mesic	Psammentic Hapludults	Ultisols	Sols Bruns Acides.
Howell	Clayey, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils (intergrading to Red-Yellow Podzolic soils).
Keyport	Clayey,[1] mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils (intergrading to Red-Yellow Podzolic soils).
Klej	Sandy, siliceous, mesic	Aquic Quartzipsamment	Entisols	Regosols.
Lenoir	Clayey,[1] mixed, thermic [2]	Aeric Ochraquults	Ultisols	Low-Humic Gley soils.
Marlton	Fine, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils (intergrading to Red-Yellow Podzolic soils).
Matapeake	Fine-silty,[4] mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils (intergrading to Red-Yellow Podzolic soils).
Mattapex	Fine-silty,[4] mixed, mesic	Aquic Hapludults	Ultisols	Gray-Brown Podzolic soils (intergrading to Red-Yellow Podzolic soils).
Othello	Fine-silty,[4] mixed, mesic	Typic Ochraquults	Ultisols	Low-Humic Gley soils.
Pocomoke	Fine-loamy,[3] siliceous, thermic [2].	Typic Umbraquults	Ultisols	Humic Gley soils.
Sassafras	Fine-loamy,[3] siliceous, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils (intergrading to Red-Yellow Podzolic soils).
Woodstown	Fine-loamy,[3] siliceous, mesic	Aquic Hapludults	Ultisols	Gray-Brown Podzolic soils (intergrading to Red-Yellow Podzolic soils).

[1] Clays mostly kaolinitic.
[2] Soil temperatures are a few degrees lower than normal for the group.
[3] Clay content marginal to the coarse-loamy class.
[4] Content of silt plus very fine sand, clay, or both, is marginal to the coarse-loamy class.

Soil families.—Families of soils within subgroups are differentiated on the basis of texture, amount of coarse fragments, mineralogy, mean annual temperature, and some other factors, including acidity. Salem County is close to the approximate boundary between thermic and mesic temperature zones. Most Salem County soils are classified as mesic, but there are some inextensive thermic soils in the county.

Placement of the soil series in the new classification system is still somewhat tentative, particularly the placement in families. The placements may be changed as more information becomes available.

General Information About the County

This section contains information about the climate, water supply, and history of Salem County.

Climate

The climate of Salem County is humid and temperate. The influence of the ocean on the climate is considerable. Temperature and precipitation data are given in table 10, and probabilities of the last freezing temperature in spring and the first in fall are given in table 11.

TABLE 10.—*Temperature and precipitation data* [1]

Month	Temperature				Precipitation			
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with—		Average total	One year in 10 will have—		Days with snow cover of 1 inch or more
			Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—	
	°F	°F	°F	°F	Inches	Inches	Inches	
January	41	24	54	3	3. 1	1. 4	5. 1	7
February	43	25	57	10	2. 7	1. 7	3. 9	5
March	51	31	72	19	3. 6	1. 4	5. 6	3
April	63	41	82	28	3. 6	1. 1	5. 7	0
May	74	51	90	39	3. 4	. 8	6. 4	0
June	82	59	94	49	3. 1	. 5	6. 2	0
July	86	65	94	54	3. 6	1. 1	7. 5	0
August	85	63	92	51	4. 2	1. 7	9. 2	0
September	78	56	91	44	3. 5	. 5	6. 9	0
October	69	46	81	32	2. 7	. 8	6. 0	0
November	56	36	68	26	3. 6	1. 1	6. 6	[2]
December	43	26	57	10	2. 8	1. 5	5. 3	4
Year	64	44	[3] 96	[4] −2	39. 9	33. 7	48. 5	19

[1] All data from Woodstown, Salem County, N.J. Table prepared by DONALD DUNLAP, State climatologist, Weather Bureau, U.S. Environmental Science Services Administration.

[2] Less than 0.5 day.

[3] Average annual highest maximum.

[4] Average annual lowest minimum.

TABLE 11.—*Probabilities of last freezing temperature in spring and first in fall* [1]

Season and probability	Dates for given probability and temperature of—				
	16° F. or lower	20° F. or lower	24° F. or lower	28° F. or lower	32° F. or lower
Spring:					
1 year in 10 later than	March 23	March 23	April 13	April 16	April 27
2 years in 10 later than	March 11	March 16	March 26	April 11	April 24
5 years in 10 later than	February 28	March 8	March 18	March 31	April 16
Fall:					
1 year in 10 earlier than	November 29	November 20	November 9	October 27	October 9
2 years in 10 earlier than	December 6	November 26	November 19	October 31	October 12
5 years in 10 earlier than	December 13	December 4	November 23	November 9	October 24

[1] All data from Bridgeton, Cumberland County, N.J. Table prepared by DONALD DUNLAP, State climatologist.

Coastal storms, in which the force of the wind ranges from gale to hurricane, and thunderstorms cause the most drastic changes of weather in Salem County. During the coastal storms, abnormally high tides are likely to flood low areas along Delaware Bay, the Delaware River, and the major drainageways. Heavy rainfall during some of the storms saturates the soils in low places and some of the sandy soils of the uplands. The storms are likely to cause damage to unprotected property, windthrow of trees, and severe erosion of some of the soils.

Because the cover of snow in winter is thin and the temperature often rises above the freezing point, the soils do not remain frozen for long periods. Repeated freezing and thawing of the surface layer from November through March create a severe hazard of water erosion if the soil is not protected. A partly thawed soil is easily eroded by heavy rain. Many winter rains are warm enough to thaw and erode an unprotected soil.

The range in temperature is not extreme, but a temperature either too low or too high during critical periods can damage or kill crops. Frost late in spring sometimes destroys or damages early vegetable crops, and reduces or prevents the set of fruit. Yields of tomatoes are reduced if the temperature rises above 90° F. during the critical time when fruit is setting. Such periods occur, but the temperature in summer rarely exceeds 100°.

Moderate temperature in spring permits early planting of vegetables on the sandy soils. The sandy soils warm more rapidly and can be worked earlier than the fine-textured soils.

Rainfall during the growing season generally is not enough for profitable yields of the high-value crops, and irrigation of those crops is needed. Long periods of drought increase the risk of crop failure or of low yields if crops are not irrigated. Drought in the 5 years 1961–65 caused losses and reduced yields of many crops.

Winds dry the soils rapidly during March. March has more hours than any other month in which the wind velocity is 15 miles or more per hour, and also more hours in which the wind velocity is 25 miles or more per hour. The strong winds blow out of the northwest. The sandy soils are dried quickly and are eroded readily by the wind. Crops are damaged by the blowing sand if they are not protected.

Water Supply

Only a very small part of the total water supply needed by the industries and people of Salem County comes directly from surface water. By far, the larger part of the water comes from underground water-bearing strata. Sandy soils permit water to seep through them as rapidly as several inches per hour. Clayey soils, by contrast, are so slowly permeable that on them rainfall of high intensity quickly produces runoff.

The area occupied by each kind of soil and the rate at which each soil takes in water are important. Both factors affect the amount of water that reaches the water-bearing layers. Both are being modified by encroaching urban developments. Good recharge areas are being roofed over, paved, or compacted by bulldozers. As this continues, the yields of ground water are reduced. Planning should take into account the preservation, management, and replacement of recharge areas. In many areas ponds could be constructed to help recharge the underground water-bearing strata. In the following paragraphs the water-intake conditions are discussed for the soil associations that are shown on the general soil map.

The Tidal marsh-Made land association, association 1, lies below or just below the level that is reached twice daily by tidewaters.

The Galestown-Sassafras-Berryland association, association 2, is composed mostly of soils that have a coarse surface layer and a rapid intake rate. The soils are permeable below the surface layer, and excess water moves readily into the aquifers. Many dugout ponds that are fed by ground water are used to supply water for irrigation in this association.

In the Mattapex-Othello-Woodstown association, association 3, the major soils have a slow intake rate but are underlain by material that has coarse texture. Most areas have a seasonal high water table. Dugout ponds are common in the Othello soils.

In the Sassafras-Woodstown-Fallsington association, association 4, the major soils have a moderate intake rate, have a moderately permeable subsoil, and are underlain by a coarse-textured substratum. Woodstown and Fallsington soils have a seasonal high water table. Many dugout ponds are located in the Fallsington soils.

In the Mattapex-Matapeake association, association 5, the intake rate is moderately slow and the permeability is moderately slow above a permeable, coarse substratum that begins at a depth of about 30 inches. The substratum of these soils is well suited to ponds designed to recharge ground water from retained surface water.

In the Keyport-Elkton association, association 6, the intake rate and the permeability are slow. In most places the clay substratum is so thick that it cannot be penetrated economically to provide a place where water can flow into the deeper, coarser aquifers. In this association impoundments of runoff can provide a good source of water.

The Sassafras-Evesboro-Downer association, association 7, lies generally higher than the Keyport-Elkton association. The intake rate at the surface and the permeability of the subsoil are rapid or moderate. Beneath the subsoil is coarse material, generally sand, that is underlain, in turn, by clay. Many strong-flowing springs are located at the line of contact between the sand and the clay. Next to the streams are small areas that have a high water table. A little water is stored in the sandy material, but the amount fluctuates widely with the seasons.

In the Chillum-Othello-Mattapex association, association 8, the major soils have a coarse substratum. In the Chillum soils, however, the coarse layer in most places is firm and is slowly permeable. Many dugout ponds are located in areas of Othello soil and in the areas of Muck that are in this association.

Areas of the Aura-Sassafras-Downer association, association 9, that are in high positions are well suited to ponds for recharge of ground water. The Downer and Sassafras soils are better suited to recharge ponds than the Aura soils, since the Aura soils have a firm subsoil that in most places is 3 feet thick or more. Some dugout ponds for irrigation are located in low areas near the main streams.

History

Though the first farmers came to Salem County as early as 1675, for a long time agriculture in the county consisted mainly of subsistence farming. Corn, grain, and vegetables were grown in small fields. Some flax was grown. Most settlements were close to tidewater so that fish and game could supplement the diet.

As population and settlements increased, trade relations were established and the acreages of corn, wheat, rye, oats, flax, buckwheat, and potatoes enlarged.

Later, as navigation of the Delaware River and adjoining creeks became established, and roads and railroads were built to the more inland sections, agriculture developed rapidly. General farming, supplemented by dairying and market gardening, became dominant.

As industrial development progressed, processed and fresh market crops have steadily increased in importance. Corn, asparagus, alfalfa, tomatoes, soybeans, sweetpotatoes, white potatoes, and peppers are the principal crops.

Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The rate of soil aeration depends largely on the size and number of pores in the soil and on the amount of water in the pores.

Association, soil. A group of defined and named soil units that occur in a characteristic geographic pattern. The soils in an association may be derived from the same kind of parent material and be similar in characteristics, or they may be derived

from different kinds of parent material and be dissimilar in characteristics.

Available moisture capacity. The capacity of a soil to hold water that does not drain away and can be taken up by plants. The amount of moisture held in a soil between field capacity, or about one-third atmosphere of tension, and the wilting coefficient, or about 15 atmospheres of tension.

Base saturation. The degree to which a soil is saturated chemically with replaceable cations other than hydrogen; expressed as a percentage of the cation-exchange capacity.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter (0.000079 inch) 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.

Complex, soil. A mapping unit consisting of soils of different kinds that occur in such small individual areas or in such an intricate pattern that they cannot be shown separately on a publishable soil map.

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; will 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 betwen thumb and forefinger.

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

Cemented.—Hard and brittle; little affected by moistening.

Contour farming. Conducting field operations, such as plowing, planting, cultivating, and harvesting at right angles to the natural direction of the slope and as nearly level as practical.

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

Diversion terrace or diversion. A channel that has a ridge of earth on the lower side. It is constructed across the slope to intercept runoff and to carry the runoff water to a planned outlet. Diversion terraces are maintained in permanent sod.

Fertility, soil. The quality that enables a soil to provide the proper compounds in the proper amounts and in the proper balance for the growth of specified plants when other factors, such as light, moisture, temperature, and the physical condition of the soil, are favorable.

Field terrace. A ridge 10 to 20 inches high and 15 to 30 feet wide that has gently sloping sides, a rounded crown, and a dish-shaped channel along the upper side. The ridge is constructed across the direction of the slope to control erosion by diverting runoff along the contour at a safe speed. It may be graded toward one or both ends, or it may be level. Graded terraces are called drainage-type terraces. Cultivated crops can be grown on the ridge and in the channel of a field terrace.

Geological erosion. Normal erosion that takes place when the soil is under native vegetation and undisturbed by human activity.

Glauconite. A dark-green mineral, essentially a potassium iron silicate, that occurs in greensand.

Grassed waterway. A waterway planted to grass to protect it against erosion; sometimes graded or shaped to control runoff.

Gravel. Rounded or angular rock fragments that are not prominently flattened and are between 2 millimeters (0.079 inch) and 3 inches in diameter.

Great soil group. A broad group of soils having common internal soil characteristics. It includes one or more families of soils.

Greensand. A term applied to a sedimentary deposit that contains various amounts of glauconite. The texture of the material ranges from sand to clay.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has (1) distinctive characteristics caused by accumulation of clay, sesquioxides, humus, or some combination of these; (2) prismatic or blocky structure; (3) redder or stronger colors than the A horizon; or (4) some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Inclusion. A small area of soil within a mapping unit on a soil map, unlike the major soil for which the mapping unit is named, and too small to be mapped separately at the scale of the soil map.

Internal drainage. That quality of a soil that permits the downward flow of excess water through it.

Mapping unit, soil. Areas of a soil, miscellaneous land type, soil complex, or undifferentiated soil group that are enclosed by boundaries on a soil map and identified by a symbol.

Munsell color notation. A method of designating color by a combination of letters and numbers that express the hue, value, and chroma, such as 10R 4/2. Use of the Munsell system in describing color of soils is explained in the Soil Survey Manual (*15*).

Permeability soil. The quality of a soil horizon that enables water or air to move through it.

Reaction, soil. The degree of acidity of alkalinity of the soil, expressed in pH values or in words, as follows:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Sand. Individual rock or mineral fragments having diameters ranging from 0.05 millimeter (0.002 inch) to 2.0 millimeters (0.079 inch). The larger grains feel gritty and can be seen with the naked eye. The textural class of any soil having 85 percent or more sand and not more than 10 percent clay.

Series, soil. A group of soils that have genetic horizons similar, except for the texture of the surface soil, as to differentiating characteristics and arrangement in the soil profile, and that developed from a particular type of parent material.

Silt. Individual mineral particles of soil that range in diameter between the upper size of clay, 0.002 millimeter (0.000079 inch), and the lower size of very fine sand, 0.05 millimeter (0.002 inch). Soil of the textural class called silt contains 80 percent or more silt and less than 20 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting upon parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in a mature soil includes the A and B horizons. Generally the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stripcropping. Growing alternate strips of close-growing crops and clean-tilled crops or fallow on the contour or in strips across the slope.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from ad-

joining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. 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 (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the soil profile below plow depth.

Substratum. The soil material below the surface soil and the subsoil; the C horizon.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Topsoil. A presumed fertile soil or soil material, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Type, soil. A subdivision of the soil series that is made on the basis of differences in the texture of the surface layer.

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GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and the soil series to which the mapping unit belongs. Other information is given in tables as follows:

Acreage and extent, table 1, p. 6.
Productivity ratings, table 2, p. 41.
Suitability of soils for wildlife habitats, table 4, p. 47.

Engineering uses of the soils, tables 5, 6, and 7, pp. 50 through 69.
Limitations for community developments, table 8, p. 70.

Map symbol	Soil	Page	Capability unit		Woodland group	
			Symbol	Page	Number	Page
AgB	Aura gravelly sandy loam, 0 to 5 percent slopes	8	IIs-9	35	6	46
AgC2	Aura gravelly sandy loam, 5 to 10 percent slopes, eroded	8	IIIe-9	36	6	46
AlA	Aura loam, 0 to 2 percent slopes	8	I-4	32	1	45
AlB	Aura loam, 2 to 5 percent slopes	8	IIe-4	34	1	45
AmB	Aura loamy sand, 0 to 5 percent slopes	8	IIIs-10	38	6	46
ArB	Aura sandy loam, 0 to 5 percent slopes	9	IIs-9	35	6	46
ArC2	Aura sandy loam, 5 to 10 percent slopes, eroded	9	IIIe-9	36	6	46
Be	Berryland sand, heavy subsoil variant	11	Vw-26	39	7	46
Bp	Berryland sand	10	Vw-26	39	7	46
Br	Berryland-Othello complex	10	Vw-26	39	7	46
Bs	Bibb silt loam, mucky stratum	11	Vw-28	39	4	46
Ca	Clay pits	11	------	--	-	--
CbE	Clayey land, Keyport materials, steep	11	VIIe-1	39	2	45
CcF	Clayey land, Marlton materials, steep	11	VIIe-1	39	2	45
ChA	Chillum silt loam, 0 to 2 percent slopes	12	I-4	32	1	45
ChB	Chillum silt loam, 2 to 5 percent slopes	12	IIe-4	34	1	45
DoB	Downer loamy sand, 0 to 5 percent slopes	12	IIs-6	35	3	45
DoC	Downer loamy sand, 5 to 10 percent slopes	13	IIIe-6	36	3	45
DuB	Downer-Sassafras loamy sands, 0 to 5 percent slopes	13	IIs-6	35	3	45
DvB	Downer-Sassafras sandy loams, 0 to 5 percent slopes	13	IIe-5	34	3	45
DwB	Dragston-Woodstown sandy loams, clayey substrata, 2 to 5 percent slopes	13	IIw-14	35	1	45
Dz	Dune land	13	VIIs-8	39	-	--
EkB	Elkton silt loam, 2 to 5 percent slopes	14	IIIw-23	38	4	46
ElA	Elkton-Bayboro sandy loams, 0 to 2 percent slopes	14	IIIw-19	37	4	46
EnA	Elkton-Bayboro silt loams, 0 to 2 percent slopes	15	IIIw-23	38	4	46
EvB	Evesboro sand, 0 to 5 percent slopes	15	VIIs-8	39	6	46
EvC	Evesboro sand, 5 to 10 percent slopes	15	VIIs-8	39	6	46
EvD	Evesboro sand, 10 to 15 percent slopes	15	VIIs-8	39	6	46
EvF	Evesboro sand, 15 to 30 percent slopes	15	VIIs-8	39	6	46
EwD	Evesboro-Aura complex, 10 to 15 percent slopes	15	VIIs-8	39	6	46
FdA	Fallsington sandy loam, 0 to 3 percent slopes	16	IIIw-21	37	4	46
FeA	Fallsington-Othello complex, 0 to 2 percent slopes	16	IIIw-21	37	4	46
Fp	Fallsington-Pocomoke-Berryland complex	16	IIIw-21	37	4	46
FrB	Fort Mott loamy sand, 0 to 5 percent slopes	17	IIIw-7	38	3	45
FrC	Fort Mott loamy sand, 5 to 10 percent slopes	17	IVs-7	39	3	45
Fw	Fresh water marsh	17	VIIIw-29	39	-	--
GaB	Galestown sand, 0 to 5 percent slopes	18	IVs-7	39	6	46
GbB	Galestown-Sassafras-Klej complex, 0 to 5 percent slopes	18	IVs-7	39	6	46
Gp	Gravel pits	18	------	--	-	--
HoB	Howell soils, 0 to 5 percent slopes	19	IIe-3	33	1	45
KlB2	Keyport loam, 2 to 5 percent slopes, eroded	19	IIe-1	33	2	45
KlC2	Keyport loam, 5 to 10 percent slopes, eroded	19	IIIe-1	36	2	45
KlD2	Keyport loam, 10 to 15 percent slopes, eroded	19	IVe-1	38	2	45
KmA	Klej loamy sand, 0 to 3 percent slopes	20	IIIw-16	37	3	45
KnA	Klej-Woodstown-Galestown loamy sands, 0 to 3 percent slopes	20	IIIw-16	37	3	45
KpB	Keyport sandy loam, 0 to 5 percent slopes	19	IIw-11	35	2	45
KpC2	Keyport soils, 5 to 10 percent slopes, eroded	19	IIIe-1	36	2	45
KpD2	Keyport soils, 10 to 15 percent slopes, eroded	20	IVe-1	38	2	45
LkA	Lenoir-Keyport silt loams, 0 to 2 percent slopes	21	IIIw-11	37	2	45
Mf	Made land, dredged river materials	21	IIIw-20	37	-	--
Mg	Made land, sanitary land fill	21	------	--	-	--
MoA	Matapeake silt loam, 0 to 2 percent slopes	23	I-4	32	1	45
MoB	Matapeake silt loam, 2 to 5 percent slopes	23	IIe-4	34	1	45
MoC	Matapeake silt loam, 5 to 10 percent slopes	23	IIIe-4	36	1	45
MoC2	Matapeake silt loam, 5 to 10 percent slopes, eroded	23	IIIe-4	36	1	45
MpD	Matapeake silt loam, thin solum, 10 to 15 percent slopes	23	VIe-4	39	1	45
MqA	Mattapex silt loam, 0 to 2 percent slopes	24	IIw-13	35	1	45
MqB	Mattapex silt loam, 2 to 5 percent slopes	24	IIw-13	35	1	45
MqC	Mattapex silt loam, 5 to 10 percent slopes	24	IIIe-13	36	1	45
MrB	Marlton soils, 2 to 5 percent slopes	22	IIe-1	33	2	45
MrB2	Marlton soils, 2 to 5 percent slopes, eroded	22	IIe-1	33	2	45
MrC2	Marlton soils, 5 to 10 percent slopes, eroded	22	IIIe-1	36	2	45
MrD2	Marlton soils, 10 to 15 percent slopes, eroded	23	IVe-1	38	2	45
MsA	Mattapex silt loam, clayey substratum, 0 to 2 percent slopes	24	IIw-13	35	1	45
MsB	Mattapex silt loam, clayey substratum, 2 to 5 percent slopes	25	IIw-13	35	1	45
MsC	Mattapex silt loam, clayey substratum, 5 to 10 percent slopes	25	IIIe-13	36	1	45
MtA	Mattapex silt loam, glauconitic substratum, 0 to 2 percent slopes	25	IIw-13	35	1	45
MtB	Mattapex silt loam, glauconitic substratum, 2 to 5 percent slopes	25	IIw-13	35	1	45
Mu	Muck, shallow	25	VIIw-30	39	5	46
OtA	Othello silt loam, 0 to 3 percent slopes	26	IIIw-20	37	4	46
Pe	Peat, shallow	26	VIIw-30	39	-	--
Pr	Pocomoke-Berryland loamy sands	27	IIIw-25	38	4	46
Ps	Pocomoke sandy loam	27	IIIw-25	38	4	46
Sa	Sand pits	27	------	--	-	--
ScB	Sandy and clayey land, glauconitic materials, gently sloping	27	IIw-14	35	2	45
SdF	Sandy land, Downer and Sassafras materials, steep	27	VIIs-8	39	3	45
SfB	Sassafras loamy sand, 0 to 5 percent slopes	28	IIs-6	35	3	45
SfC	Sassafras loamy sand, 5 to 10 percent slopes	28	IIIe-6	36	3	45
SfD	Sassafras loamy sand, 10 to 15 percent slopes	28	IVe-6	38	3	45
SrA	Sassafras sandy loam, 0 to 2 percent slopes	28	I-5	33	1	45
SrB	Sassafras sandy loam, 2 to 5 percent slopes	28	IIe-5	34	1	45
SrC	Sassafras sandy loam, 5 to 10 percent slopes	28	IIIe-5	36	1	45
SrC2	Sassafras sandy loam, 5 to 10 percent slopes, eroded	29	IIIe-5	36	1	45
SrD	Sassafras sandy loam, 10 to 15 percent slopes	29	IVe-5	38	1	45
SrD2	Sassafras sandy loam, 10 to 15 percent slopes, eroded	29	IVe-5	38	1	45
StB	Sassafras-Aura loams, 0 to 5 percent slopes	29	IIe-4	34	1	45
SuB	Sassafras-Aura sandy loams, 0 to 5 percent slopes	29	IIe-5	34	1	45
SwB	Sassafras-Galestown-Woodstown loamy sands, 0 to 5 percent slopes	29	IIs-6	35	3	45
SyB	Sassafras-Woodstown sandy loams, 0 to 5 percent slopes	29	IIw-14	35	3	45
Tm	Tidal marsh	29	VIIIw-29	39	-	--
WkB	Woodstown loamy sand, 0 to 5 percent slopes	30	IIw-15	35	3	45
WlB	Woodstown loamy sand, clayey substratum, 0 to 5 percent slopes	30	IIw-15	35	3	45
WmB	Woodstown sandy loam, 0 to 5 percent slopes	30	IIw-14	35	1	45
WmC	Woodstown sandy loam, 5 to 10 percent slopes	30	IIIe-14	37	1	45
WnB	Woodstown sandy loam, clayey substratum, 2 to 5 percent slopes	31	IIw-14	35	1	45
WoB	Woodstown-Dragston loamy sands, 0 to 5 percent slopes	31	IIw-15	35	3	45
WsB	Woodstown-Dragston sandy loams, 0 to 5 percent slopes	31	IIw-14	35	1	45
WtA	Woodstown-Fallsington-Klej complex, 0 to 3 percent slopes	31	IIw-15	35	3	45
WwA	Woodstown-Klej-Sassafras loamy sands, 0 to 3 percent slopes	31	IIw-15	35	3	45

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