United States Department of Agriculture

NRCS

Natural Resources Conservation Service

In cooperation with Virginia Polytechnic Institute and State University

Soil Survey of Arlington County, Virginia

How To Use This Soil Survey

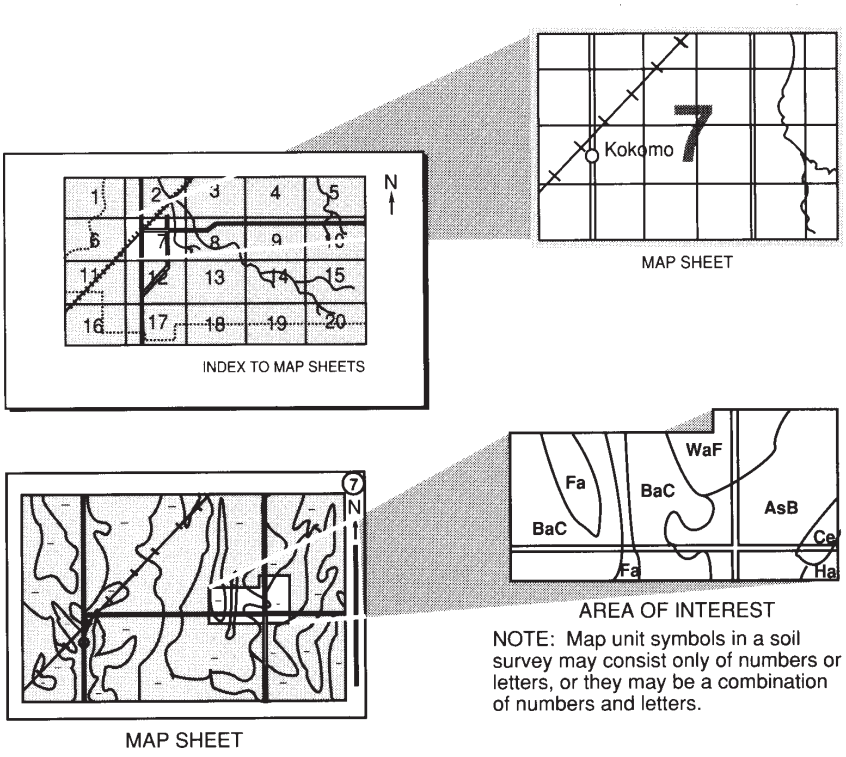
Detailed Soil Maps

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

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

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

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



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

National Cooperative Soil Survey

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey. This survey was made cooperatively by the Natural Resources Conservation Service and the Virginia Polytechnic Institute and State University. Financial assistance was provided by the Arlington County Board.

Major fieldwork for this soil survey was completed in 1998. Soil names and descriptions were approved in 2002. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2003. The most current official data are available at http://websoilsurvey.nrcs.usda.gov/.

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

Nondiscrimination Statement

Cover Caption

Arlington National Cemetery with Arlington, Virginia, in the background.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at http://www.nrcs.usda.gov.

Contents

Issued 2007

Foreword

Soil surveys contain information that affects land use planning in survey areas. They include predictions of soil behavior for selected land uses. The surveys highlight soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

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

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

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

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

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Soil Survey of
Arlington County, Virginia

By John David Harper Jr., Natural Resources Conservation Service

Fieldwork by Fred M. Garst and Louis W. Heidel, Natural Resources Conservation Service

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

Arlington County is located in the northeastern part of Virginia (fig. 1) and is directly across the Potomac River from Washington, D.C. The county is an urban area of about 26 square miles. There are no incorporated towns or cities within the boundaries of the county (PRAT, 2006).

In 2006, according to the U.S. Census Bureau, Arlington had an estimated population of approximately 199,776, which is a 5.5 percent increase from 2000 (USDC, 2007). Arlington is one of the most densely populated areas in the country. The population density of Arlington County is approximately 7,761 persons per square mile, which is higher than cities such as Seattle, Minneapolis, and Pittsburgh (PRAT, 2006).

Besides being a major residential area, Arlington County is also a major center for employment and tourism. The Pentagon, the Arlington National Cemetery, and the Marine Corps War Memorial (fig. 2) are among some of the most well-known places in the county (HALRB, 2001).

General Nature of the Survey Area

This section provides general information about the survey area. It describes the history, industry, and climate.

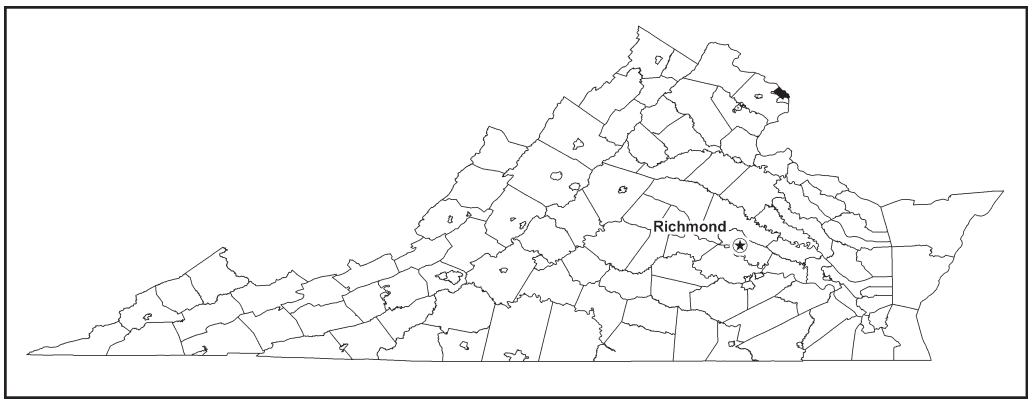

Figure 1.—Location of Arlington County in Virginia.

History

Native Americans once inhabited the area that is now Arlington County. The first recorded history of the area came in 1608 when Captain John Smith, along with several other Englishmen, explored the area (HALRB, 2001).

It wasn't until the eighteenth century that permanent settlement began in the area. Among the first major towns in the area were Alexandria, which was established in 1749, and Georgetown, which was established several years later. Both cities are just outside of the boundaries of present-day Arlington County. The city of Alexandria lies to the south of Arlington, and Georgetown is on the Maryland side of the Potomac River (HALRB, 2001).

The survey work to establish the nation's capital began in 1791 under the direction of President George Washington. The area that is now Arlington County was once part of the area that was surveyed for the capital. In 1846, however, the area west of the Potomac River was returned to the Commonwealth of Virginia. This area was part of the city and county of Alexandria until 1920 when the county portion was renamed as Arlington County (HALRB, 2001).

The county got its name from the Arlington Estate, which was the residence of General Robert E. Lee and his family until the war when it was confiscated and then bought at auction by the Federal Government. The son of General Lee later received compensation from the U.S. Government for the family's loss of the estate. The grounds of the estate were used for various purposes by the government but most notably as the Arlington National Cemetery. The cemetery attracts visitors from all over

Figure 2.—The Marine Corps War Memorial, which depicts the famous battle of Iwo Jima. The memorial is dedicated to all Marines who have given their lives for the United States since 1775.

who come to see the Tomb of the Unknowns and to pay their respects to the thousands of others who are buried here (HALRB, 2001).

Factors such as the Great Depression and the outbreak of World War II, which caused an expanding federal work force, and the opening of the Metrorail system in Arlington have created a large demand over the years for housing in the area. Thousands of homes and large apartment complexes now occupy the land that was once farmland (HALRB, 2001).

Industry

The federal government employs more people than any other employer in Arlington County. The top five private employers in Arlington are Virginia Hospital Center, Verizon, SAIC, Marriott International Incorporated, and US Airways (PRAT, 2006).

Climate

Prepared by the Natural Resources Conservation Service, National Water and Climate Center, Portland Oregon.

Thunderstorm days, relative humidity, percent sunshine, and wind information are estimated from the First Order station at the Ronald Reagan Washington National Airport, Arlington County, Virginia.

Climate data are provided in the tables "Temperature and Precipitation," "Freeze Dates in Spring and Fall," and "Growing Season." The data were recorded at the Washington, D.C., National Airport in the period 1948 to 2005.

In winter, the average temperature is 38.4 degrees F and the average daily minimum temperature is 30.6 degrees. The lowest temperature on record, which occurred on January 17, 1982, is -5 degrees. In summer, the average temperature is 77.7 degrees and the average daily maximum temperature is 86.5 degrees. The highest recorded temperature, which occurred on August 17,1997, is 105 degrees.

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

The total annual precipitation is about 39.34 inches. Of this, 26.86 inches, or 68 percent, usually falls in April through November. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 6.11 inches on June 21, 1972. Thunderstorms occur on about 32 days each year, and most occur in June and July.

The average seasonal snowfall is about 14.8 inches. The greatest snow depth at any one time during the period of record was 22 inches on February 20, 1979. The heaviest 1-day snowfall on record was 16.4 inches on February 11, 1983. On the average, 12 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 53 percent. Humidity is higher at night, and the average at dawn is about 74 percent. The sun shines 52 percent of the time possible in summer and 42 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 10.9 miles per hour, in March.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and

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

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

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

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

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

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

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

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

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

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

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

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

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

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

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown

on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Glenelg loam, 3 to 8 percent slopes, is a phase of the Glenelg series.

Some map units in this survey are made up of two or more major soils or miscellaneous areas. These map units are complexes. A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Glenelg-Urban land complex, 3 to 8 percent slopes, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Urban land is an example.

The table "Acreage and Proportionate Extent of the Soils" lists the map units in this survey area. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

1A—Hatboro sandy loam, 0 to 3 percent slopes, frequently flooded

Setting

Major land resource area: Northern Piedmont (MLRA 148)
Landform: Piedmont
Position on the landform: Flood plains
Shape of areas: Long and narrow

Map Unit Composition

Hatboro and similar soils: Typically 90 percent, ranging from about 85 to 95 percent

Typical Profile

Surface layer:
0 to 6 inches—dark gray sandy loam

Subsoil:
6 to 23 inches—gray loam; brown iron-manganese masses

Substratum:
23 to 61 inches—dark bluish gray clay loam; brown iron-manganese masses

Minor Components

- Udorthents
- Codorus soils

Soil Properties and Qualities

Available water capacity: Moderate (about 8.6 inches)
Slowest saturated hydraulic conductivity: Moderately high (about 0.57 in/hr)
Depth class: Very deep (more than 60 inches)
Depth to root-restrictive feature: More than 60 inches
Drainage class: Poorly drained
Depth to seasonal high water table: About 0 to 0.5 foot
Water table kind: Apparent
Flooding hazard: Frequent
Ponding hazard: None
Shrink-swell potential: Low
Runoff class: Low

Surface fragments: None
Parent material: Alluvium derived from igneous and metamorphic rock

Use and Management Considerations

Pasture
Suitability: Poorly suited
- Flooding may damage pastures.
- The seasonal high water table can affect equipment use, grazing patterns, and the viability of grass and legume species.

Woodland
Suitability: Moderately suited to yellow-poplar
- Proper planning for timber harvesting is essential in order to minimize the potential negative impact to soil and water quality. A plan to harvest timber should focus on streamside management zones and stream crossings and should include general adherence to all applicable best management practices.
- Flooding may damage haul roads.
- Flooding restricts the safe use of roads by log trucks.
- Soil wetness may limit the use of log trucks.
- The low strength of the soil interferes with the construction of haul roads and log landings.
- The low strength of the soil may create unsafe conditions for log trucks.

Building sites
- Flooding limits the use of the soil for building site development.
- The seasonal high water table may restrict the period when excavations can be made.

Septic tank absorption fields
- Flooding limits the use of the soil for septic tank absorption fields.
- The seasonal high water table greatly limits the absorption and proper treatment of the effluent from conventional septic systems.

Local roads and streets
- Flooding may damage local roads and streets.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- The low strength of the soil is unfavorable for supporting heavy loads.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: 4w
Virginia soil management group: HH
Hydric soil: Yes

2A—Codorus-Hatboro complex, 0 to 3 percent slopes, frequently flooded

Setting

Major land resource area: Northern Piedmont (MLRA 148)
Landform: Piedmont
Position on the landform: Flood plains
Shape of areas: Long and narrow

Map Unit Composition

Codorus and similar soils: Typically 50 percent, ranging from about 40 to 95 percent
Hatboro and similar soils: Typically 40 percent, ranging from about 35 to 95 percent

Typical Profile

Codorus

Surface layer:
0 to 8 inches—dark grayish brown silt loam

Subsoil:
8 to 19 inches—brown silt loam; light brownish gray iron depletions
19 to 33 inches—brown loam; strong brown iron-manganese masses and light brownish gray iron depletions

Substratum:
33 to 50 inches—light brown loam; brown and light brownish gray iron depletions
50 to 62 inches—light yellowish brown stratified loam to sandy loam to extremely gravelly sandy loam; light brownish gray iron depletions

Hatboro

Surface layer:
0 to 6 inches—dark gray sandy loam

Subsoil:
6 to 23 inches—gray loam; brown iron-manganese masses

Substratum:
23 to 61 inches—dark bluish gray clay loam; brown iron-manganese masses

Minor Components

- Udorthents
- Urban land

Soil Properties and Qualities

Available water capacity: Moderate (about 8.7 inches)
Slowest saturated hydraulic conductivity: Moderately high (about 0.57 in/hr)
Depth class: Very deep (more than 60 inches)
Depth to root-restrictive feature: More than 60 inches
Drainage class: Codorus—moderately well drained; Hatboro—poorly drained
Depth to seasonal high water table: Codorus—about 1.0 to 2.0 feet; Hatboro—about 0 to 0.5 foot
Water table kind: Apparent
Flooding hazard: Frequent
Ponding hazard: None
Shrink-swell potential: Low
Runoff class: Low
Surface fragments: None
Parent material: Alluvium derived from igneous and metamorphic rock

Use and Management Considerations

Pasture
Suitability: Moderately suited
- Flooding may damage pastures.

Woodland
Suitability: Well suited to northern red oak, yellow-poplar, and eastern white pine
- Proper planning for timber harvesting is essential in order to minimize the potential negative impact to soil and water quality. A plan to harvest timber should focus on streamside management zones and stream crossings and should include general adherence to all applicable best management practices.
- Flooding may damage haul roads.
- Flooding restricts the safe use of roads by log trucks.
- Soil wetness may limit the use of log trucks.
- The low strength of the soil interferes with the construction of haul roads and log landings.
- The low strength of the soil may create unsafe conditions for log trucks.

Building sites
- Flooding limits the use of these soils for building site development.
- The seasonal high water table may restrict the period when excavations can be made.

Septic tank absorption fields
- Flooding limits the use of these soils for septic tank absorption fields.
- The seasonal high water table greatly limits the absorption and proper treatment of the effluent from conventional septic systems.

Local roads and streets
- Flooding may damage local roads and streets.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- The low strength of the soil is unfavorable for supporting heavy loads.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: 4w
Virginia soil management group: Hatboro—HH; Codorus—AA
Hydric soil: Codorus—no; Hatboro—Yes

3A—Urban land-Codorus complex, 0 to 3 percent slopes

Setting

Major land resource area: Northern Coastal Plain (MLRA 149A)
Landform: Piedmont
Position on the landform: Flood plains
Shape of areas: Long and narrow

Map Unit Composition

Urban land: Typically 70 percent, ranging from about 65 to 90 percent
Codorus and similar soils: Typically 20 percent, ranging from about 15 to 30 percent

Typical Profile

Urban land

Urban land consists of areas covered by impervious material, such as roads, commercial buildings, industries, schools, churches, parking lots, streets, and shopping centers. No interpretations are given for Urban land.

Codorus

Surface layer:
0 to 8 inches—dark grayish brown silt loam

Subsoil:
8 to 19 inches—brown silt loam; light brownish gray iron depletions
19 to 33 inches—brown loam; strong brown iron-manganese masses and light brownish gray iron depletions

Substratum:
33 to 50 inches—light brown loam; brown and light brownish gray iron depletions
50 to 62 inches—light yellowish brown stratified loam to sandy loam to extremely gravelly sandy loam; light brownish gray iron depletions

Minor Components

- Hatboro soils
- Udorthents

Soil Properties and Qualities

Available water capacity: Codorus—moderate (about 8.7 inches)
Slowest saturated hydraulic conductivity: Codorus—moderately high (about 0.57 in/hr)
Depth class: Codorus—very deep (more than 60 inches)
Depth to root-restrictive feature: Codorus—more than 60 inches
Drainage class: Codorus—moderately well drained
Depth to seasonal high water table: Codorus—about 1.0 to 2.0 feet
Water table kind: Codorus—apparent
Flooding hazard: Codorus—frequent
Ponding hazard: Codorus—none
Shrink-swell potential: Codorus—low
Runoff class: Codorus—low
Surface fragments: Codorus—none
Parent material: Codorus—alluvium derived from igneous and metamorphic rock

Use and Management Considerations

Building sites
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- Flooding limits the use of the Codorus soil for building site development.
- The seasonal high water table of the Codorus soil may restrict the period when excavations can be made.

Septic tank absorption fields
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- Flooding limits the use of the Codorus soil for septic tank absorption fields.
- The seasonal high water table of the Codorus soil greatly limits the absorption and proper treatment of the effluent from conventional septic systems.

Local roads and streets
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.

- Flooding may damage local roads and streets.
- The seasonal high water table of the Codorus soil affects the ease of excavation and grading and reduces the bearing capacity of the soil.
- The low strength of the Codorus soil is unfavorable for supporting heavy loads.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: Codorus—2w
Virginia soil management group: Codorus—AA
Hydric soil: Codorus—no

4A—Sassafras-Urban land-Neabsco complex, 0 to 3 percent slopes

Setting

Major land resource area: Northern Coastal Plain (MLRA 149A)
Landform: Coastal Plain
Position on the landform: Gently sloping interfluves
Shape of areas: Irregular

Map Unit Composition

Sassafras and similar soils: Typically 40 percent, ranging from about 30 to 50 percent
Urban land: Typically 35 percent, ranging from about 25 to 50 percent
Neabsco and similar soils: Typically 15 percent, ranging from about 10 to 25 percent

Typical Profile

Sassafras

Surface layer:
0 to 6 inches—brown gravelly sandy loam

Subsoil:
6 to 10 inches—yellowish brown gravelly sandy clay loam
10 to 34 inches—strong brown gravelly sandy clay loam
34 to 40 inches—brownish yellow gravelly sandy loam

Substratum:
40 to 60 inches—brownish yellow gravelly loamy sand

Neabsco

Surface layer:
0 to 2 inches—brown loam

Subsurface layer:
2 to 8 inches—light yellowish brown loam

Subsoil:
8 to 17 inches—yellowish brown clay loam
17 to 36 inches—yellowish brown loam; light gray and pale brown iron depletions
36 to 52 inches—brownish yellow clay loam; common yellowish red masses of oxidized iron and pale brown iron depletions

Substratum:
52 to 72 inches—brownish yellow and yellowish brown very gravelly sandy loam

Urban land

Urban land consists of areas covered by impervious material, such as roads, commercial buildings, industries, schools, churches, parking lots, streets, and shopping centers. No interpretations are given for Urban land.

Minor Components

- Udorthents
- Woodstown soils

Soil Properties and Qualities

Available water capacity: Sassafras and Neabsco—moderate (about 8.1 inches)
Slowest saturated hydraulic conductivity: Sassafras—moderately high (about 0.57 in/hr); Neabsco—low (about 0.00 in/hr)
Depth class: Sassafras and Neabsco—very deep (more than 60 inches)
Depth to root-restrictive feature: Sassafras—more than 60 inches; Neabsco—15 to 39 inches to fragipan
Drainage class: Sassafras—well drained; Neabsco—moderately well drained
Depth to seasonal high water table: Sassafras—more than 6.0 feet; Neabsco—about 1.0 to 2.5 feet
Water table kind: Neabsco—perched
Flooding hazard: Sassafras and Neabsco—none
Ponding hazard: Sassafras and Neabsco—none
Shrink-swell potential: Sassafras and Neabsco—low
Runoff class: Sassafras—low; Neabsco—high
Surface fragments: Sassafras and Neabsco—none
Parent material: Sassafras and Neabsco—fluviomarine deposits

Use and Management Considerations

Building sites

- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The seasonal high water table may restrict the period when excavations can be made.
- The high content of sand or gravel in the soil increases sloughing and causes cutbanks to be more susceptible to caving.

Septic tank absorption fields

- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The seasonal high water table greatly limits the absorption and proper treatment of the effluent from conventional septic systems.
- Seepage limits the proper treatment of the effluent from conventional septic systems and may pollute the water table.

Local roads and streets

- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: Sassafras—2e; Neabsco—2w
Virginia soil management group: Sassafras—T; Neabsco—BB
Hydric soil: Sassafras and Neabsco—no

4B—Urban land-Sassafras-Neabsco complex, 3 to 8 percent slopes

Setting

Major land resource area: Northern Coastal Plain (MLRA 149A)
Landform: Coastal Plain
Position on the landform: Gently sloping interfluves
Shape of areas: Irregular

Map Unit Composition

Urban land: Typically 70 percent, ranging from about 65 to 95 percent
Sassafras and similar soils: Typically 15 percent, ranging from about 10 to 25 percent
Neabsco and similar soils: Typically 10 percent, ranging from about 10 to 15 percent

Typical Profile

Sassafras

Surface layer:
0 to 6 inches—brown gravelly sandy loam

Subsoil:
6 to 10 inches—yellowish brown gravelly sandy clay loam
10 to 34 inches—strong brown gravelly sandy clay loam
34 to 40 inches—brownish yellow gravelly sandy loam

Substratum:
40 to 60 inches—brownish yellow gravelly loamy sand

Neabsco

Surface layer:
0 to 2 inches—brown loam

Subsurface layer:
2 to 8 inches—light yellowish brown loam

Subsoil:
8 to 17 inches—yellowish brown clay loam
17 to 36 inches—yellowish brown loam; light gray and pale brown iron depletions
36 to 52 inches—brownish yellow clay loam; common yellowish red masses of oxidized iron and pale brown iron depletions

Substratum:
52 to 72 inches—brownish yellow and yellowish brown very gravelly sandy loam

Urban land

Urban land consists of areas covered by impervious material, such as roads, commercial buildings, industries, schools, churches, parking lots, streets, and shopping centers. No interpretations are given for Urban land.

Minor Components

- Udorthents

Soil Properties and Qualities

Available water capacity: Sassafras and Neabsco—moderate (about 8.1 inches)
Slowest saturated hydraulic conductivity: Sassafras—moderately high (about 0.57 in/hr); Neabsco—low (about 0.00 in/hr)
Depth class: Sassafras and Neabsco—very deep (more than 60 inches)
Depth to root-restrictive feature: Sassafras—more than 60 inches; Neabsco—15 to 39 inches to fragipan
Drainage class: Sassafras—well drained; Neabsco—moderately well drained
Depth to seasonal high water table: Sassafras—more than 6.0 feet; Neabsco—about 1.0 to 2.5 feet
Water table kind: Neabsco—perched
Flooding hazard: Sassafras and Neabsco—none
Ponding hazard: Sassafras and Neabsco—none
Shrink-swell potential: Sassafras and Neabsco—low
Runoff class: Sassafras—low; Neabsco—high
Surface fragments: Sassafras and Neabsco—none
Parent material: Sassafras and Neabsco—fluviomarine deposits

Use and Management Considerations

Building sites
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The seasonal high water table may restrict the period when excavations can be made.
- The high content of sand or gravel in the soil increases sloughing and causes cutbanks to be more susceptible to caving.

Septic tank absorption fields
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The seasonal high water table greatly limits the absorption and proper treatment of the effluent from conventional septic systems.
- Seepage limits the proper treatment of the effluent from conventional septic systems and may pollute the water table.

Local roads and streets
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: Sassafras—2e; Neabsco—2w
Virginia soil management group: Sassafras—T; Neabsco—BB
Hydric soil: Sassafras and Neabsco—no

4C—Urban land-Sassafras-Neabsco complex, 8 to 15 percent slopes

Setting

Major land resource area: Northern Coastal Plain (MLRA 149A)
Landform: Coastal Plain
Position on the landform: Gently sloping interfluves and backslopes
Shape of areas: Irregular

Map Unit Composition

Urban land: Typically 70 percent, ranging from about 65 to 95 percent
Sassafras and similar soils: Typically 15 percent, ranging from about 10 to 50 percent
Neabsco and similar soils: Typically 10 percent, ranging from about 10 to 15 percent.

Typical Profile

Sassafras

Surface layer:
0 to 6 inches—brown gravelly sandy loam

Subsoil:
6 to 10 inches—yellowish brown gravelly sandy clay loam
10 to 34 inches—strong brown gravelly sandy clay loam
34 to 40 inches—brownish yellow gravelly sandy loam

Substratum:
40 to 60 inches—brownish yellow gravelly loamy sand

Neabsco

Surface layer:
0 to 2 inches—brown loam

Subsurface layer:
2 to 8 inches—light yellowish brown loam

Subsoil:
8 to 17 inches—yellowish brown clay loam
17 to 36 inches—yellowish brown loam; light gray and pale brown iron depletions
36 to 52 inches—brownish yellow clay loam; common yellowish red masses of oxidized iron and pale brown iron depletions

Substratum:
52 to 72 inches—brownish yellow and yellowish brown very gravelly sandy loam

Urban land

Urban land consists of areas covered by impervious material, such as roads, commercial buildings, industries, schools, churches, parking lots, streets, and shopping centers. No interpretations are given for Urban land.

Minor Components

- Udorthents

Soil Properties and Qualities

Available water capacity: Sassafras and Neabsco—moderate (about 8.1 inches)
Slowest saturated hydraulic conductivity: Sassafras—moderately high (about 0.57 in/hr); Neabsco—low (about 0.00 in/hr)

Depth class: Sassafras and Neabsco—very deep (more than 60 inches)
Depth to root-restrictive feature: Sassafras—more than 60 inches; Neabsco—15 to 39 inches to fragipan
Drainage class: Sassafras—well drained; Neabsco—moderately well drained
Depth to seasonal high water table: Sassafras—more than 6.0 feet; Neabsco—about 1.0 to 2.5 feet
Water table kind: Neabsco—perched
Flooding hazard: Sassafras and Neabsco—none
Ponding hazard: Sassafras and Neabsco—none
Shrink-swell potential: Sassafras and Neabsco—low
Runoff class: Sassafras—low; Neabsco—high
Surface fragments: Sassafras and Neabsco—none
Parent material: Sassafras and Neabsco—fluviomarine deposits

Use and Management Considerations

Building sites
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The seasonal high water table may restrict the period when excavations can be made.
- The high content of sand or gravel in the soil increases sloughing and causes cutbanks to be more susceptible to caving.

Septic tank absorption fields
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The seasonal high water table greatly limits the absorption and proper treatment of the effluent from conventional septic systems.
- Seepage limits the proper treatment of the effluent from conventional septic systems and may pollute the water table.

Local roads and streets
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: Sassafras—2e; Neabsco—2w
Virginia soil management group: Sassafras—T; Neabsco—BB
Hydric soil: Sassafras and Neabsco—no

5—Arlington National Cemetery

Setting

Landform: Piedmont

Map Unit Composition

Arlington National Cemetery: 100 percent

Typical Profile

This map unit consists of areas where the surface is covered by headstones, monuments, buildings, and access roads. The soils are deep and very deep, nearly level to moderately sloping, and well drained and moderately well drained. Onsite investigation is needed to determine the suitability for and limitations affecting any specific use. No interpretations are given for this map unit.

6B—Glenelg loam, 3 to 8 percent slopes

Setting

Major land resource area: Northern Piedmont (MLRA 148)
Landform: Piedmont
Position on the landform: Summits and gently sloping backslopes
Shape of areas: Irregular

Map Unit Composition

Glenelg and similar soils: Typically 90 percent, ranging from about 60 to 95 percent

Typical Profile

Surface layer:
0 to 1 inch—dark brown loam

Subsurface layer:
1 to 6 inches—brown silt loam

Subsoil:
6 to 27 inches—yellowish red silt loam

Substratum:
27 to 45 inches—yellowish red loam
45 to 71 inches—red and light reddish brown channery loam

Minor Components

- Manor soils
- Udorthents

Soil Properties and Qualities

Available water capacity: High (about 9.6 inches)
Slowest saturated hydraulic conductivity: Moderately high (about 0.57 in/hr)
Depth class: Very deep (more than 60 inches)
Depth to root-restrictive feature: More than 60 inches
Drainage class: Well drained
Depth to seasonal high water table: More than 6.0 feet
Flooding hazard: None
Ponding hazard: None
Shrink-swell potential: Low
Runoff class: Medium
Surface fragments: None
Parent material: Residuum weathered from mica schist

Use and Management Considerations

Pasture
Suitability: Well suited

- The hazard of erosion, the rate of surface runoff, and the amount of nutrient loss are increased because of the slope.

Woodland
Suitability: Moderately suited to yellow-poplar
- Proper planning for timber harvesting is essential in order to minimize the potential negative impact to soil and water quality. A timber harvest plan should include general adherence to all applicable best management practices.
- The slope may restrict the use of some mechanical planting equipment.
- The low strength of the soil interferes with the construction of haul roads and log landings.
- This soil is well suited to equipment operations.

Building sites
- This soil is well suited to building sites.

Septic tank absorption fields
- This soil is well suited to septic tank absorption fields.

Local roads and streets
- The low strength of the soil may cause structural damage to local roads and streets.

Interpretive Groups

Prime farmland: Prime farmland in all areas
Land capability class: 2e
Virginia soil management group: U
Hydric soil: No

6C—Glenelg loam, 8 to 15 percent slopes

Setting

Major land resource area: Northern Piedmont (MLRA 148)
Landform: Piedmont
Position on the landform: Strongly sloping backslopes
Shape of areas: Irregular

Map Unit Composition

Glenelg and similar soils: Typically 90 percent, ranging from about 60 to 95 percent

Typical Profile

Surface layer:
0 to 1 inch—dark brown loam

Subsurface layer:
1 to 6 inches—brown silt loam

Subsoil:
6 to 27 inches—yellowish red silt loam

Substratum:
27 to 45 inches—yellowish red loam
45 to 71 inches—red and light reddish brown channery loam

Minor Components

- Udorthents
- Manor soils

Soil Properties and Qualities

Available water capacity: High (about 9.6 inches)
Slowest saturated hydraulic conductivity: Moderately high (about 0.57 in/hr)
Depth class: Very deep (more than 60 inches)
Depth to root-restrictive feature: More than 60 inches
Drainage class: Well drained
Depth to seasonal high water table: More than 6.0 feet
Flooding hazard: None
Ponding hazard: None
Shrink-swell potential: Low
Runoff class: Medium
Surface fragments: None
Parent material: Residuum weathered from mica schist

Use and Management Considerations

Pasture
Suitability: Well suited
- The hazard of erosion, the rate of surface runoff, and the amount of nutrient loss are increased because of the slope.

Woodland
Suitability: Moderately suited to yellow-poplar
- Proper planning for timber harvesting is essential in order to minimize the potential negative impact to soil and water quality. A timber harvest plan should include general adherence to all applicable best management practices.
- The slope creates unsafe operating conditions for log trucks and reduces their operating efficiency.
- The slope may restrict the use of some mechanical planting equipment.
- The low strength of the soil interferes with the construction of haul roads and log landings.

Building sites
- The slope influences the use of machinery and the amount of excavation required.

Septic tank absorption fields
- The slope limits the proper treatment of effluent from conventional septic systems.

Local roads and streets
- The low strength of the soil may cause structural damage to local roads and streets.
- Designing local roads and streets is difficult because of the slope.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: 3e
Virginia soil management group: U
Hydric soil: No

6D—Glenelg-Manor complex, 15 to 35 percent slopes

Setting

Major land resource area: Northern Piedmont (MLRA 148)
Landform: Piedmont
Position on the landform: Moderately steep backslopes
Shape of areas: Irregular

Map Unit Composition

Glenelg and similar soils: Typically 50 percent, ranging from about 40 to 95 percent
Manor and similar soils: Typically 45 percent, ranging from about 30 to 60 percent

Typical Profile

Glenelg

Surface layer:
0 to 1 inch—dark brown loam

Subsurface layer:
1 to 6 inches—brown silt loam

Subsoil:
6 to 27 inches—yellowish red silt loam

Substratum:
27 to 45 inches—yellowish red loam
45 to 71 inches—red and light reddish brown channery loam

Manor

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

Subsurface layer:
1 to 6 inches—dark yellowish brown sandy loam

Subsoil:
6 to 22 inches—yellowish red sandy loam

Substratum:
22 to 60 inches—brown loamy sand

Minor Components

- Udorthents

Soil Properties and Qualities

Available water capacity: Glenelg—high (about 9.6 inches); Manor—moderate (about 8.2 inches)
Slowest saturated hydraulic conductivity: Moderately high (about 0.57 in/hr)
Depth class: Very deep (more than 60 inches)
Depth to root-restrictive feature: More than 60 inches
Drainage class: Well drained
Depth to seasonal high water table: More than 6.0 feet
Flooding hazard: None
Ponding hazard: None
Shrink-swell potential: Low
Runoff class: High
Surface fragments: None
Parent material: Residuum weathered from mica schist

Use and Management Considerations

Pasture
Suitability: Moderately suited
- The hazard of erosion, the rate of surface runoff, and the amount of nutrient loss are increased because of the slope.
- The slope may restrict the use of some farm equipment.

Woodland
Suitability: Moderately suited to yellow-poplar
- Proper planning for timber harvesting is essential in order to minimize the potential negative impact to soil and water quality. A timber harvest plan should include general adherence to all applicable best management practices.
- The slope poses safety hazards and creates a potential for erosion during the construction of haul roads and log landings.
- The slope creates unsafe operating conditions and reduces the operating efficiency of log trucks and harvesting equipment.
- The use of equipment for preparing sites for planting and seeding is restricted because of the slope.
- The slope makes the use of mechanical planting equipment impractical.
- Coarse-textured soil layers increase the need for maintenance of haul roads and log landings.
- The low strength of the soil interferes with the construction of haul roads and log landings.

Building sites
- The slope influences the use of machinery and the amount of excavation required.
- The high content of sand or gravel in the soil increases sloughing and causes cutbanks to be more susceptible to caving.

Septic tank absorption fields
- The slope limits the proper treatment of effluent from conventional septic systems.

Local roads and streets
- Designing local roads and streets is difficult because of the slope.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: 4e
Virginia soil management group: Glenelg—U; Manor—FF
Hydric soil: No

7A—Glenelg-Urban land complex, 0 to 3 percent slopes

Setting

Major land resource area: Northern Piedmont (MLRA 148)
Landform: Piedmont
Position on the landform: Summits and gently sloping backslopes
Shape of areas: Irregular

Map Unit Composition

Glenelg and similar soils: Typically 45 percent, ranging from about 40 to 50 percent
Urban land: Typically 40 percent, ranging from about 30 to 50 percent

Typical Profile

Glenelg

Surface layer:
0 to 1 inch—dark brown loam

Subsurface layer:
1 to 6 inches—brown silt loam

Subsoil:
6 to 27 inches—yellowish red silt loam

Substratum:
27 to 45 inches—yellowish red loam
45 to 71 inches—red and light reddish brown channery loam

Urban land

Urban land consists of areas covered by impervious material, such as roads, commercial buildings, industries, schools, churches, parking lots, streets, and shopping centers. No interpretations are given for Urban land.

Minor Components

- Udorthents
- Manor soils

Soil Properties and Qualities

Available water capacity: Glenelg—high (about 9.6 inches)
Slowest saturated hydraulic conductivity: Glenelg—moderately high (about 0.57 in/hr)
Depth class: Glenelg—very deep (more than 60 inches)
Depth to root-restrictive feature: Glenelg—more than 60 inches
Drainage class: Glenelg—well drained
Depth to seasonal high water table: Glenelg—more than 6.0 feet
Flooding hazard: Glenelg—none
Ponding hazard: Glenelg—none
Shrink-swell potential: Glenelg—low
Runoff class: Glenelg—low
Surface fragments: Glenelg—none
Parent material: Glenelg—residuum weathered from mica schist

Use and Management Considerations

Building sites
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The Glenelg soil is well suited to building sites.

Septic tank absorption fields
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The Glenelg soil is well suited to septic tank absorption fields.

Local roads and streets
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The low strength of the soil may cause structural damage to local roads and streets.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: Glenelg—2e
Virginia soil management group: Glenelg—U
Hydric soil: Glenelg—no

7B—Glenelg-Urban land complex, 3 to 8 percent slopes

Setting

Major land resource area: Northern Piedmont (MLRA 148)
Landform: Piedmont
Position on the landform: Summits and gently sloping backslopes
Shape of areas: Irregular

Map Unit Composition

Glenelg and similar soils: Typically 45 percent, ranging from about 40 to 50 percent
Urban land: Typically 40 percent, ranging from about 30 to 50 percent

Typical Profile

Glenelg

Surface layer:
0 to 1 inch—dark brown loam

Subsurface layer:
1 to 6 inches—brown silt loam

Subsoil:
6 to 27 inches—yellowish red silt loam

Substratum:
27 to 45 inches—yellowish red loam
45 to 71 inches—red and light reddish brown channery loam

Urban land

Urban land consists of areas covered by impervious material, such as roads, commercial buildings, industries, schools, churches, parking lots, streets, and shopping centers. No interpretations are given for Urban land.

Minor Components

- Udorthents
- Manor soils

Soil Properties and Qualities

Available water capacity: Glenelg—high (about 9.6 inches)
Slowest saturated hydraulic conductivity: Glenelg—moderately high (about 0.57 in/hr)
Depth class: Glenelg—very deep (more than 60 inches)
Depth to root-restrictive feature: Glenelg—more than 60 inches
Drainage class: Glenelg—well drained
Depth to seasonal high water table: Glenelg—more than 6.0 feet
Flooding hazard: Glenelg—none
Ponding hazard: Glenelg—none
Shrink-swell potential: Glenelg—low
Runoff class: Glenelg—medium
Surface fragments: Glenelg—none
Parent material: Glenelg—residuum weathered from mica schist

Use and Management Considerations

Building sites

- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.

- The Glenelg soil is well suited to building sites.

Septic tank absorption fields
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The Glenelg soil is well suited to septic tank absorption fields.

Local roads and streets
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The low strength of the soil may cause structural damage to local roads and streets.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: Glenelg—2e
Virginia soil management group: Glenelg—U
Hydric soil: Glenelg—no

7C—Glenelg-Urban land complex, 8 to 15 percent slopes

Setting

Major land resource area: Northern Piedmont (MLRA 148)
Landform: Piedmont
Position on the landform: Strongly sloping backslopes
Shape of areas: Irregular

Map Unit Composition

Glenelg and similar soils: Typically 45 percent, ranging from about 40 to 50 percent
Urban land: Typically 40 percent, ranging from about 30 to 50 percent

Typical Profile

Glenelg

Surface layer:
0 to 1 inch—dark brown loam

Subsurface layer:
1 to 6 inches—brown silt loam

Subsoil:
6 to 27 inches—yellowish red silt loam

Substratum:
27 to 45 inches—yellowish red loam
45 to 71 inches—red and light reddish brown channery loam

Urban land

Urban land consists of areas covered by impervious material, such as roads, commercial buildings, industries, schools, churches, parking lots, streets, and shopping centers. No interpretations are given for Urban land.

Minor Components

- Udorthents
- Manor soils

Soil Properties and Qualities

Available water capacity: Glenelg—high (about 9.6 inches)
Slowest saturated hydraulic conductivity: Glenelg—moderately high (about 0.57 in/hr)
Depth class: Glenelg—very deep (more than 60 inches)
Depth to root-restrictive feature: Glenelg—more than 60 inches
Drainage class: Glenelg—well drained
Depth to seasonal high water table: Glenelg—more than 6.0 feet
Flooding hazard: Glenelg—none
Ponding hazard: Glenelg—none
Shrink-swell potential: Glenelg—low
Runoff class: Glenelg—medium
Surface fragments: Glenelg—none
Parent material: Glenelg—residuum weathered from mica schist

Use and Management Considerations

Building sites
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The slope influences the use of machinery and the amount of excavation required.

Septic tank absorption fields
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The slope limits the proper treatment of effluent from conventional septic systems.

Local roads and streets
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The low strength of the soil may cause structural damage to local roads and streets.
- Designing local roads and streets is difficult because of the slope.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: Glenelg—3e
Virginia soil management group: Glenelg—U
Hydric soil: Glenelg—no

7D—Glenelg-Urban land complex, 15 to 25 percent slopes

Setting

Major land resource area: Northern Piedmont (MLRA 148)
Landform: Piedmont
Position on the landform: Moderately steep backslopes
Shape of areas: Irregular

Map Unit Composition

Glenelg and similar soils: Typically 45 percent, ranging from about 40 to 50 percent
Urban land: Typically 40 percent, ranging from about 30 to 50 percent

Typical Profile

Glenelg

Surface layer:
0 to 1 inch—dark brown loam

Subsurface layer:
1 to 6 inches—brown silt loam

Subsoil:
6 to 27 inches—yellowish red silt loam

Substratum:
27 to 45 inches—yellowish red loam
45 to 71 inches—red and light reddish brown channery loam

Urban land

Urban land consists of areas covered by impervious material, such as roads, commercial buildings, industries, schools, churches, parking lots, streets, and shopping centers. No interpretations are given for Urban land.

Minor Components

- Udorthents
- Manor soils

Soil Properties and Qualities

Available water capacity: Glenelg—high (about 9.6 inches)
Slowest saturated hydraulic conductivity: Glenelg—moderately high (about 0.57 in/hr)
Depth class: Glenelg—very deep (more than 60 inches)
Depth to root-restrictive feature: Glenelg—more than 60 inches
Drainage class: Glenelg—well drained
Depth to seasonal high water table: Glenelg—more than 6.0 feet
Flooding hazard: Glenelg—none
Ponding hazard: Glenelg—none
Shrink-swell potential: Glenelg—low
Runoff class: Glenelg—high
Surface fragments: Glenelg—none
Parent material: Glenelg—residuum weathered from mica schist

Use and Management Considerations

Building sites

- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The slope influences the use of machinery and the amount of excavation required.
- The high content of sand or gravel in the soil increases sloughing and causes cutbanks to be more susceptible to caving.

Septic tank absorption fields

- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The slope limits the proper treatment of effluent from conventional septic systems.

Local roads and streets
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- Designing local roads and streets is difficult because of the slope.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: Glenelg—4e
Virginia soil management group: Glenelg—U
Hydric soil: Glenelg—no

9B—Sassafras gravelly sandy loam, 3 to 8 percent slopes

Setting

Major land resource area: Northern Coastal Plain (MLRA 149A)
Landform: Coastal Plain
Position on the landform: Gently sloping interfluves
Shape of areas: Irregular

Map Unit Composition

Sassafras and similar soils: Typically 85 percent, ranging from about 75 to 95 percent

Typical Profile

Surface layer:
0 to 6 inches—brown gravelly sandy loam

Subsoil:
6 to 10 inches—yellowish brown gravelly sandy clay loam
10 to 34 inches—strong brown gravelly sandy clay loam
34 to 40 inches—brownish yellow gravelly sandy loam

Substratum:
40 to 60 inches—brownish yellow gravelly loamy sand

Minor Components

- Udorthents
- Woodstown soils

Soil Properties and Qualities

Available water capacity: Moderate (about 8.1 inches)
Slowest saturated hydraulic conductivity: Moderately high (about 0.57 in/hr)
Depth class: Very deep (more than 60 inches)
Depth to root-restrictive feature: More than 60 inches
Drainage class: Well drained
Depth to seasonal high water table: More than 6.0 feet
Flooding hazard: None
Ponding hazard: None
Shrink-swell potential: Low
Runoff class: Medium
Surface fragments: None
Parent material: Fluviomarine deposits

Use and Management Considerations

Pasture
Suitability: Well suited
- The hazard of erosion, the rate of surface runoff, and the amount of nutrient loss are increased because of the slope.

Woodland
Suitability: Well suited to loblolly pine and moderately suited to yellow-poplar
- Proper planning for timber harvesting is essential in order to minimize the potential negative impact to soil and water quality. A timber harvest plan should include general adherence to all applicable best management practices.
- The slope may restrict the use of some mechanical planting equipment.
- Rock fragments restrict the use of equipment for preparing sites for planting and seeding.
- Coarse-textured soil layers may slough, thus reducing the efficiency of mechanical planting equipment.
- The coarseness of the soil material may reduce the traction of wheeled harvest equipment and log trucks.
- Coarse-textured soil layers increase the need for maintenance of haul roads and log landings.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.

Building sites
- The high content of sand or gravel in the soil increases sloughing and causes cutbanks to be more susceptible to caving.

Septic tank absorption fields
- Seepage limits the proper treatment of the effluent from conventional septic systems and may pollute the water table.
- This soil is well suited to septic tank absorption fields.

Local roads and streets
- This soil is well suited to local roads and streets.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: 2e
Virginia soil management group: T
Hydric soil: No

9C—Sassafras gravelly sandy loam, 8 to 15 percent slopes

Setting

Major land resource area: Northern Coastal Plain (MLRA 149A)
Landform: Coastal Plain
Position on the landform: Gently sloping interfluves and backslopes
Shape of areas: Irregular

Map Unit Composition

Sassafras and similar soils: Typically 85 percent, ranging from about 75 to 95 percent

Typical Profile

Surface layer:
0 to 6 inches—brown gravelly sandy loam

Subsoil:
6 to 10 inches—yellowish brown gravelly sandy clay loam
10 to 34 inches—strong brown gravelly sandy clay loam
34 to 40 inches—brownish yellow gravelly sandy loam

Substratum:
40 to 60 inches—brownish yellow gravelly loamy sand

Minor Components

- Udorthents
- Woodstown soils

Soil Properties and Qualities

Available water capacity: Moderate (about 8.1 inches)
Slowest saturated hydraulic conductivity: Moderately high (about 0.57 in/hr)
Depth class: Very deep (more than 60 inches)
Depth to root-restrictive feature: More than 60 inches
Drainage class: Well drained
Depth to seasonal high water table: More than 6.0 feet
Flooding hazard: None
Ponding hazard: None
Shrink-swell potential: Low
Runoff class: Medium
Surface fragments: None
Parent material: Fluviomarine deposits

Use and Management Considerations

Pasture
Suitability: Well suited
- The hazard of erosion, the rate of surface runoff, and the amount of nutrient loss are increased because of the slope.

Woodland
Suitability: Well suited to loblolly pine and moderately suited to yellow-poplar
- Proper planning for timber harvesting is essential in order to minimize the potential negative impact to soil and water quality. A timber harvest plan should include general adherence to all applicable best management practices.
- The slope creates unsafe operating conditions for log trucks and reduces their operating efficiency.
- The slope may restrict the use of some mechanical planting equipment.
- Rock fragments restrict the use of equipment for preparing sites for planting and seeding.
- Coarse-textured soil layers may slough, thus reducing the efficiency of mechanical planting equipment.
- The coarseness of the soil material may reduce the traction of wheeled harvest equipment and log trucks.
- Coarse-textured soil layers increase the need for maintenance of haul roads and log landings.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.

Building sites
- The slope influences the use of machinery and the amount of excavation required.

- The high content of sand or gravel in the soil increases sloughing and causes cutbanks to be more susceptible to caving.

Septic tank absorption fields
- The slope limits the proper treatment of effluent from conventional septic systems.

Local roads and streets
- Designing local roads and streets is difficult because of the slope.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: 3e
Virginia soil management group: T
Hydric soil: No

9D—Sassafras gravelly sandy loam, 15 to 25 percent slopes

Setting

Major land resource area: Northern Coastal Plain (MLRA 149A)
Landform: Coastal Plain
Position on the landform: Strongly sloping interfluves and backslopes
Shape of areas: Irregular

Map Unit Composition

Sassafras and similar soils: Typically 85 percent, ranging from about 75 to 95 percent

Typical Profile

Surface layer:
0 to 6 inches—brown gravelly sandy loam

Subsoil:
6 to 10 inches—yellowish brown gravelly sandy clay loam
10 to 34 inches—strong brown gravelly sandy clay loam
34 to 40 inches—brownish yellow gravelly sandy loam

Substratum:
40 to 60 inches—brownish yellow gravelly loamy sand

Minor Components

- Udorthents
- Woodstown soils

Soil Properties and Qualities

Available water capacity: Moderate (about 8.1 inches)
Slowest saturated hydraulic conductivity: Moderately high (about 0.57 in/hr)
Depth class: Very deep (more than 60 inches)
Depth to root-restrictive feature: More than 60 inches
Drainage class: Well drained
Depth to seasonal high water table: More than 6.0 feet
Flooding hazard: None
Ponding hazard: None
Shrink-swell potential: Low
Runoff class: Medium

Surface fragments: None
Parent material: Fluviomarine deposits

Use and Management Considerations

Pasture
Suitability: Moderately suited
- The hazard of erosion, the rate of surface runoff, and the amount of nutrient loss are increased because of the slope.

Woodland
Suitability: Well suited to loblolly pine and moderately suited to yellow-poplar
- Proper planning for timber harvesting is essential in order to minimize the potential negative impact to soil and water quality. A timber harvest plan should include general adherence to all applicable best management practices.
- The slope poses safety hazards and creates a potential for erosion during the construction of haul roads and log landings.
- The slope creates unsafe operating conditions and reduces the operating efficiency of log trucks and harvesting equipment.
- The use of equipment for preparing sites for planting and seeding is restricted because of the slope.
- The slope may restrict the use of some mechanical planting equipment.
- Rock fragments restrict the use of equipment for preparing sites for planting and seeding.
- Coarse-textured soil layers may slough, thus reducing the efficiency of mechanical planting equipment.
- The coarseness of the soil material may reduce the traction of wheeled harvest equipment and log trucks.
- Coarse-textured soil layers increase the need for maintenance of haul roads and log landings.
- The stickiness of the soil reduces the efficiency of mechanical planting equipment.

Building sites
- The slope influences the use of machinery and the amount of excavation required.
- The high content of sand or gravel in the soil increases sloughing and causes cutbanks to be more susceptible to caving.

Septic tank absorption fields
- The slope limits the proper treatment of effluent from conventional septic systems.

Local roads and streets
- Designing local roads and streets is difficult because of the slope.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: 4e
Virginia soil management group: T
Hydric soil: No

10B—Urban land-Glenelg complex, 3 to 8 percent slopes

Setting

Major land resource area: Northern Piedmont (MLRA 148)
Landform: Piedmont
Position on the landform: Summits and gently sloping backslopes
Shape of areas: Irregular

Map Unit Composition

Urban land: Typically 70 percent, ranging from about 65 to 95 percent
Glenelg and similar soils: Typically 20 percent, ranging from about 15 to 30 percent

Typical Profile

Urban land

Urban land consists of areas covered by impervious material, such as roads, commercial buildings, industries, schools, churches, parking lots, streets, and shopping centers. No interpretations are given for Urban land.

Glenelg

Surface layer:
0 to 1 inch—dark brown loam

Subsurface layer:
1 to 6 inches—brown silt loam

Subsoil:
6 to 27 inches—yellowish red silt loam

Substratum:
27 to 45 inches—yellowish red loam
45 to 71 inches—red and light reddish brown channery loam

Minor Components

- Udorthents

Soil Properties and Qualities

Available water capacity: Glenelg—high (about 9.6 inches)
Slowest saturated hydraulic conductivity: Glenelg—moderately high (about 0.57 in/hr)
Depth class: Glenelg—very deep (more than 60 inches)
Depth to root-restrictive feature: Glenelg—more than 60 inches
Drainage class: Glenelg—well drained
Depth to seasonal high water table: Glenelg—more than 6.0 feet
Flooding hazard: Glenelg—none
Ponding hazard: Glenelg—none
Shrink-swell potential: Glenelg—low
Runoff class: Glenelg—medium
Surface fragments: Glenelg—none
Parent material: Glenelg—residuum weathered from mica schist

Use and Management Considerations

Building sites

- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The Glenelg soil is well suited to building sites.

Septic tank absorption fields

- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The Glenelg soil is well suited to septic tank absorption fields.

Local roads and streets

- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The low strength of the soil may cause structural damage to local roads and streets.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: Glenelg—2e
Virginia soil management group: Glenelg—U
Hydric soil: Glenelg—no

10C—Urban land-Glenelg complex, 8 to 15 percent slopes

Setting

Major land resource area: Northern Piedmont (MLRA 148)
Landform: Piedmont
Position on the landform: Strongly sloping backslopes
Shape of areas: Irregular

Map Unit Composition

Urban land: Typically 70 percent, ranging from about 65 to 95 percent
Glenelg and similar soils: Typically 20 percent, ranging from about 15 to 30 percent

Typical Profile

Urban land

Urban land consists of areas covered by impervious material, such as roads, commercial buildings, industries, schools, churches, parking lots, streets, and shopping centers. No interpretations are given for Urban land.

Glenelg

Surface layer:
0 to 1 inch—dark brown loam

Subsurface layer:
1 to 6 inches—brown silt loam

Subsoil:
6 to 27 inches—yellowish red silt loam

Substratum:
27 to 45 inches—yellowish red loam
45 to 71 inches—red and light reddish brown channery loam

Minor Components

- Udorthents

Soil Properties and Qualities

Available water capacity: Glenelg—high (about 9.6 inches)
Slowest saturated hydraulic conductivity: Glenelg—moderately high (about 0.57 in/hr)
Depth class: Glenelg—very deep (more than 60 inches)
Depth to root-restrictive feature: Glenelg—more than 60 inches
Drainage class: Glenelg—well drained
Depth to seasonal high water table: Glenelg—more than 6.0 feet

Flooding hazard: Glenelg—none
Ponding hazard: Glenelg—none
Shrink-swell potential: Glenelg—low
Runoff class: Glenelg—medium
Surface fragments: Glenelg—none
Parent material: Glenelg—residuum weathered from mica schist

Use and Management Considerations

Building sites
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The slope influences the use of machinery and the amount of excavation required.

Septic tank absorption fields
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The slope limits the proper treatment of effluent from conventional septic systems.

Local roads and streets
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The low strength of the soil may cause structural damage to local roads and streets.
- Designing local roads and streets is difficult because of the slope.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: Glenelg—3e
Virginia soil management group: Glenelg—U
Hydric soil: Glenelg—no

10D—Urban land-Glenelg complex, 15 to 25 percent slopes

Setting

Major land resource area: Northern Piedmont (MLRA 148)
Landform: Piedmont
Position on the landform: Moderately steep backslopes
Shape of areas: Irregular

Map Unit Composition

Urban land: Typically 70 percent, ranging from about 65 to 95 percent
Glenelg and similar soils: Typically 20 percent, ranging from about 15 to 30 percent

Typical Profile

Urban land

Urban land consists of areas covered by impervious material, such as roads, commercial buildings, industries, schools, churches, parking lots, streets, and shopping centers. No interpretations are given for Urban land.

Glenelg

Surface layer:
0 to 1 inch—dark brown loam

Subsurface layer:
1 to 6 inches—brown silt loam

Subsoil:
6 to 27 inches—yellowish red silt loam

Substratum:
27 to 45 inches—yellowish red loam
45 to 71 inches—red and light reddish brown channery loam

Minor Components

- Udorthents

Soil Properties and Qualities

Available water capacity: Glenelg—high (about 9.6 inches)
Slowest saturated hydraulic conductivity: Glenelg—moderately high (about 0.57 in/hr)
Depth class: Glenelg—very deep (more than 60 inches)
Depth to root-restrictive feature: Glenelg—more than 60 inches
Drainage class: Glenelg—well drained
Depth to seasonal high water table: Glenelg—more than 6.0 feet
Flooding hazard: Glenelg—none
Ponding hazard: Glenelg—none
Shrink-swell potential: Glenelg—low
Runoff class: Glenelg—high
Surface fragments: Glenelg—none
Parent material: Glenelg—residuum weathered from mica schist

Use and Management Considerations

Building sites
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The slope influences the use of machinery and the amount of excavation required.
- The high content of sand or gravel in the soil increases sloughing and causes cutbanks to be more susceptible to caving.

Septic tank absorption fields
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The slope limits the proper treatment of effluent from conventional septic systems.

Local roads and streets
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- Designing local roads and streets is difficult because of the slope.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: Glenelg—4e

Virginia soil management group: Glenelg—U
Hydric soil: Glenelg—no

11B—Urban land-Sassafras complex, 3 to 8 percent slopes

Setting

Major land resource area: Northern Coastal Plain (MLRA 149A)
Landform: Coastal Plain
Position on the landform: Gently sloping interfluves
Shape of areas: Irregular

Map Unit Composition

Urban land: Typically 70 percent, ranging from about 65 to 95 percent
Sassafras and similar soils: Typically 25 percent, ranging from about 15 to 35 percent

Typical Profile

Urban land

Urban land consists of areas covered by impervious material, such as roads, commercial buildings, industries, schools, churches, parking lots, streets, and shopping centers. No interpretations are given for Urban land.

Sassafras

Surface layer:
0 to 6 inches—brown gravelly sandy loam

Subsoil:
6 to 10 inches—yellowish brown gravelly sandy clay loam
10 to 34 inches—strong brown gravelly sandy clay loam
34 to 40 inches—brownish yellow gravelly sandy loam

Substratum:
40 to 60 inches—brownish yellow gravelly loamy sand

Minor Components

- Udorthents
- Woodstown soils

Soil Properties and Qualities

Available water capacity: Sassafras—moderate (about 8.1 inches)
Slowest saturated hydraulic conductivity: Sassafras—moderately high (about 0.57 in/hr)
Depth class: Sassafras—very deep (more than 60 inches)
Depth to root-restrictive feature: Sassafras—more than 60 inches
Drainage class: Sassafras—well drained
Depth to seasonal high water table: Sassafras—more than 6.0 feet
Flooding hazard: Sassafras—none
Ponding hazard: Sassafras—none
Shrink-swell potential: Sassafras—low
Runoff class: Sassafras—medium
Surface fragments: Sassafras—none
Parent material: Sassafras—fluviomarine deposits

Use and Management Considerations

Building sites
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The high content of sand or gravel in the soil increases sloughing and causes cutbanks to be more susceptible to caving.

Septic tank absorption fields
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- Seepage limits the proper treatment of the effluent from conventional septic systems and may pollute the water table.
- The Sassafras soil is well suited to septic tank absorption fields.

Local roads and streets
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The Sassafras soil is well suited to local roads and streets.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: Sassafras—2e
Virginia soil management group: Sassafras—T
Hydric soil: Sassafras—no

11C—Urban land-Sassafras complex, 8 to 15 percent slopes

Setting

Major land resource area: Northern Coastal Plain (MLRA 149A)
Landform: Coastal Plain
Position on the landform: Gently sloping interfluves and backslopes
Shape of areas: Irregular

Map Unit Composition

Urban land: Typically 70 percent, ranging from about 65 to 95 percent
Sassafras and similar soils: Typically 15 percent, ranging from about 10 to 35 percent

Typical Profile

Urban land

Urban land consists of areas covered by impervious material, such as roads, commercial buildings, industries, schools, churches, parking lots, streets, and shopping centers. No interpretations are given for Urban land.

Sassafras

Surface layer:
0 to 6 inches—brown gravelly sandy loam

Subsoil:
6 to 10 inches—yellowish brown gravelly sandy clay loam
10 to 34 inches—strong brown gravelly sandy clay loam
34 to 40 inches—brownish yellow gravelly sandy loam

Substratum:
40 to 60 inches—brownish yellow gravelly loamy sand

Minor Components

- Udorthents
- Woodstown soils

Soil Properties and Qualities

Available water capacity: Sassafras—moderate (about 8.1 inches)
Slowest saturated hydraulic conductivity: Sassafras—moderately high (about 0.57 in/hr)
Depth class: Sassafras—very deep (more than 60 inches)
Depth to root-restrictive feature: Sassafras—more than 60 inches
Drainage class: Sassafras—well drained
Depth to seasonal high water table: Sassafras—more than 6.0 feet
Flooding hazard: Sassafras—none
Ponding hazard: Sassafras—none
Shrink-swell potential: Sassafras—low
Runoff class: Sassafras—medium
Surface fragments: Sassafras—none
Parent material: Sassafras—fluviomarine deposits

Use and Management Considerations

Building sites
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The slope influences the use of machinery and the amount of excavation required.
- The high content of sand or gravel in the soil increases sloughing and causes cutbanks to be more susceptible to caving.

Septic tank absorption fields
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The slope limits the proper treatment of effluent from conventional septic systems.

Local roads and streets
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- Designing local roads and streets is difficult because of the slope.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: Sassafras—3e
Virginia soil management group: Sassafras—T
Hydric soil: Sassafras—no

11D—Urban land-Sassafras complex, 15 to 25 percent slopes

Setting

Major land resource area: Northern Coastal Plain (MLRA 149A)
Landform: Coastal Plain
Position on the landform: Strongly sloping interfluves and backslopes
Shape of areas: Irregular

Map Unit Composition

Urban land: Typically 70 percent, ranging from about 65 to 95 percent
Sassafras and similar soils: Typically 20 percent, ranging from about 10 to 35 percent

Typical Profile

Urban land

Urban land consists of areas covered by impervious material, such as roads, commercial buildings, industries, schools, churches, parking lots, streets, and shopping centers. No interpretations are given for Urban land.

Sassafras

Surface layer:
0 to 6 inches—brown gravelly sandy loam

Subsoil:
6 to 10 inches—yellowish brown gravelly sandy clay loam
10 to 34 inches—strong brown gravelly sandy clay loam
34 to 40 inches—brownish yellow gravelly sandy loam

Substratum:
40 to 60 inches—brownish yellow gravelly loamy sand

Minor Components

- Udorthents
- Woodstown soils

Soil Properties and Qualities

Available water capacity: Sassafras—moderate (about 8.1 inches)
Slowest saturated hydraulic conductivity: Sassafras—moderately high (about 0.57 in/hr)
Depth class: Sassafras—very deep (more than 60 inches)
Depth to root-restrictive feature: Sassafras—more than 60 inches
Drainage class: Sassafras—well drained
Depth to seasonal high water table: Sassafras—more than 6.0 feet
Flooding hazard: Sassafras—none
Ponding hazard: Sassafras—none
Shrink-swell potential: Sassafras—low
Runoff class: Sassafras—medium
Surface fragments: Sassafras—none
Parent material: Sassafras—fluviomarine deposits

Use and Management Considerations

Building sites

- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.

- The slope influences the use of machinery and the amount of excavation required.
- The high content of sand or gravel in the soil increases sloughing and causes cutbanks to be more susceptible to caving.

Septic tank absorption fields
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The slope limits the proper treatment of effluent from conventional septic systems.

Local roads and streets
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- Designing local roads and streets is difficult because of the slope.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: Sassafras—4e
Virginia soil management group: Sassafras—T
Hydric soil: Sassafras—no

12—Urban land-Udorthents complex, 2 to 15 percent slopes

Setting

Major land resource area: Northern Coastal Plain (MLRA 149A)
Landform: Coastal Plain and Piedmont
Position on the landform: Broad upland flats and summits
Shape of areas: Irregular

Map Unit Composition

Urban land: Typically 85 percent, ranging from about 80 to 95 percent
Udorthents and similar soils: Typically 15 percent, ranging from about 0 to 35 percent

Typical Profile

Urban land

Urban land consists of areas covered by impervious material, such as roads, commercial buildings, industries, schools, churches, parking lots, streets, and shopping centers. No interpretations are given for Urban land.

Onsite investigation is needed to determine the suitability for specific uses.

Udorthents

Udorthents are deep or very deep, well drained or somewhat excessively drained, nearly level to very steep, loamy and clayey soils. These soils are mainly on summits and side slopes in the uplands. They mostly consist of overburden and waste rock that have been stockpiled during quarrying or mining and soil material that has been cut and filled during road or building construction. These soils occur in or near quarries and mines, along highways, and near large buildings.

Onsite investigation is needed to determine the suitability for specific uses.

Interpretive Groups

Prime farmland: Not prime farmland

13—Udorthents, loamy

Setting

Major land resource area: Northern Coastal Plain (MLRA 149A)
Landform: Coastal Plain and Piedmont
Position on the landform: Broad upland flats and summits
Shape of areas: Irregular

Map Unit Composition

Udorthents and similar soils: Typically 90 percent, ranging from about 85 to 100 percent

Typical profile

Udorthents are deep or very deep, well drained or somewhat excessively drained, nearly level to very steep, loamy and clayey soils. These soils are mainly on summits and side slopes in the uplands. They mostly consist of overburden and waste rock that have been stockpiled during quarrying or mining and soil material that has been cut and filled during road or building construction. These soils occur in or near quarries and mines, along highways, and near large buildings. Slopes range from 0 to 45 percent.

Onsite investigation is needed to determine the suitability for specific uses.

Interpretive Groups

Prime farmland: Not prime farmland

15A—Sassafras-Urban land complex, 0 to 3 percent slopes

Setting

Major land resource area: Northern Coastal Plain (MLRA 149A)
Landform: Coastal Plain
Position on the landform: Gently sloping interfluves
Shape of areas: Irregular

Map Unit Composition

Sassafras and similar soils: Typically 45 percent, ranging from about 40 to 50 percent
Urban land: Typically 40 percent, ranging from about 35 to 50 percent

Typical Profile

Sassafras

Surface layer:
0 to 6 inches—brown gravelly sandy loam

Subsoil:
6 to 10 inches—yellowish brown gravelly sandy clay loam
10 to 34 inches—strong brown gravelly sandy clay loam
34 to 40 inches—brownish yellow gravelly sandy loam

Substratum:
40 to 60 inches—brownish yellow gravelly loamy sand

Urban land

Urban land consists of areas covered by impervious material, such as roads, commercial buildings, industries, schools, churches, parking lots, streets, and shopping centers. No interpretations are given for Urban land.

Minor Components

- Udorthents
- Woodstown soils

Soil Properties and Qualities

Available water capacity: Sassafras—moderate (about 8.1 inches)
Slowest saturated hydraulic conductivity: Sassafras—moderately high (about 0.57 in/hr)
Depth class: Sassafras—very deep (more than 60 inches)
Depth to root-restrictive feature: Sassafras—more than 60 inches
Drainage class: Sassafras—well drained
Depth to seasonal high water table: Sassafras—more than 6.0 feet
Flooding hazard: Sassafras—none
Ponding hazard: Sassafras—none
Shrink-swell potential: Sassafras—low
Runoff class: Sassafras—low
Surface fragments: Sassafras—none
Parent material: Sassafras—fluviomarine deposits

Use and Management Considerations

Building sites
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The high content of sand or gravel in the soil increases sloughing and causes cutbanks to be more susceptible to caving.

Septic tank absorption fields
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- Seepage limits the proper treatment of the effluent from conventional septic systems and may pollute the water table.
- The Sassafras soil is well suited to septic tank absorption fields.

Local roads and streets
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The Sassafras soil is well suited to local roads and streets.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: Sassafras—2e
Virginia soil management group: Sassafras—T
Hydric soil: Sassafras—No

15C—Sassafras-Urban land complex, 8 to 15 percent slopes

Setting

Major land resource area: Northern Coastal Plain (MLRA 149A)
Landform: Coastal Plain
Position on the landform: Gently sloping interfluves and backslopes
Shape of areas: Irregular

Map Unit Composition

Sassafras and similar soils: Typically 45 percent, ranging from about 40 to 50 percent
Urban land: Typically 40 percent, ranging from about 35 to 50 percent

Typical Profile

Sassafras

Surface layer:
0 to 6 inches—brown gravelly sandy loam

Subsoil:
6 to 10 inches—yellowish brown gravelly sandy clay loam
10 to 34 inches—strong brown gravelly sandy clay loam
34 to 40 inches—brownish yellow gravelly sandy loam

Substratum:
40 to 60 inches—brownish yellow gravelly loamy sand

Urban land

Urban land consists of areas covered by impervious material, such as roads, commercial buildings, industries, schools, churches, parking lots, streets, and shopping centers. No interpretations are given for Urban land.

Minor Components

- Udorthents
- Woodstown soils

Soil Properties and Qualities

Available water capacity: Sassafras—moderate (about 8.1 inches)
Slowest saturated hydraulic conductivity: Sassafras—moderately high (about 0.57 in/hr)
Depth class: Sassafras—very deep (more than 60 inches)
Depth to root-restrictive feature: Sassafras—more than 60 inches
Drainage class: Sassafras—well drained
Depth to seasonal high water table: Sassafras—more than 6.0 feet
Flooding hazard: Sassafras—none
Ponding hazard: Sassafras—none
Shrink-swell potential: Sassafras—low
Runoff class: Sassafras—medium
Surface fragments: Sassafras—none
Parent material: Sassafras—fluviomarine deposits

Use and Management Considerations

Building sites

- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.

- The slope influences the use of machinery and the amount of excavation required.
- The high content of sand or gravel in the soil increases sloughing and causes cutbanks to be more susceptible to caving.

Septic tank absorption fields
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The slope limits the proper treatment of effluent from conventional septic systems.

Local roads and streets
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- Designing local roads and streets is difficult because of the slope.

Interpretive Groups

Sassafras
Prime farmland: Not prime farmland
Land capability class: Sassafras—3e
Virginia soil management group: Sassafras—T
Hydric soil: Sassafras—no

15D—Sassafras-Urban land complex, 15 to 25 percent slopes

Setting

Major land resource area: Northern Coastal Plain (MLRA 149A)
Landform: Coastal Plain
Position on the landform: Strongly sloping interfluves and backslopes
Shape of areas: Irregular

Map Unit Composition

Sassafras and similar soils: Typically 45 percent, ranging from about 40 to 50 percent
Urban land: Typically 40 percent, ranging from about 35 to 50 percent

Typical Profile

Sassafras

Surface layer:
0 to 6 inches—brown gravelly sandy loam

Subsoil:
6 to 10 inches—yellowish brown gravelly sandy clay loam
10 to 34 inches—strong brown gravelly sandy clay loam
34 to 40 inches—brownish yellow gravelly sandy loam

Substratum:
40 to 60 inches—brownish yellow gravelly loamy sand

Urban land

Urban land consists of areas covered by impervious material, such as roads, commercial buildings, industries, schools, churches, parking lots, streets, and shopping centers. No interpretations are given for Urban land.

Minor Components

- Udorthents
- Woodstown soils

Soil Properties and Qualities

Available water capacity: Sassafras—moderate (about 8.1 inches)
Slowest saturated hydraulic conductivity: Sassafras—moderately high (about 0.57 in/hr)
Depth class: Sassafras—very deep (more than 60 inches)
Depth to root-restrictive feature: Sassafras—more than 60 inches
Drainage class: Sassafras—well drained
Depth to seasonal high water table: Sassafras—more than 6.0 feet
Flooding hazard: Sassafras—none
Ponding hazard: Sassafras—none
Shrink-swell potential: Sassafras—low
Runoff class: Sassafras—medium
Surface fragments: Sassafras—none
Parent material: Sassafras—fluviomarine deposits

Use and Management Considerations

Building sites
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The slope influences the use of machinery and the amount of excavation required.
- The high content of sand or gravel in the soil increases sloughing and causes cutbanks to be more susceptible to caving.

Septic tank absorption fields
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The slope limits the proper treatment of effluent from conventional septic systems.

Local roads and streets
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- Designing local roads and streets is difficult because of the slope.

Interpretive Groups

Prime farmland: Not prime farmland
Land capability class: Sassafras—4e
Virginia soil management group: Sassafras—T
Hydric soil: Sassafras—no

16B—Urban land-Woodstown complex, 3 to 8 percent slopes

Setting

Major land resource area: Northern Coastal Plain (MLRA 149A)
Landform: Coastal Plain

Position on the landform: Broad upland flats and convex areas
Shape of areas: Irregular

Map Unit Composition

Urban land: Typically 70 percent, ranging from about 65 to 95 percent
Woodstown and similar soils: Typically 20 percent, ranging from about 15 to 35 percent

Typical Profile

Woodstown

Surface layer:
0 to 7 inches—dark grayish brown sandy loam

Subsurface layer:
7 to 11 inches—light yellowish brown sandy loam

Subsoil:
11 to 19 inches—light olive brown sandy clay loam
19 to 29 inches—light olive brown sandy clay loam; yellowish brown masses of oxidized iron and pale red iron depletions

Substratum:
29 to 45 inches—light brownish gray sandy loam; yellowish brown iron depletions
45 to 70 inches—light gray sandy loam; grayish brown iron depletions

Urban land

Urban land consists of areas covered by impervious material, such as roads, commercial buildings, industries, schools, churches, parking lots, streets, and shopping centers. No interpretations are given for Urban land.

Minor Components

- Udorthents
- Sassafras soils

Soil Properties and Qualities

Available water capacity: Woodstown—moderate (about 6.7 inches)
Slowest saturated hydraulic conductivity: Woodstown—moderately high (about 0.20 in/hr)
Depth class: Woodstown—very deep (more than 60 inches)
Depth to root-restrictive feature: Woodstown—more than 60 inches
Drainage class: Woodstown—moderately well drained
Depth to seasonal high water table: Woodstown—about 1.5 to 3.5 feet
Water table kind: Woodstown—apparent
Flooding hazard: Woodstown—none
Ponding hazard: Woodstown—none
Shrink-swell potential: Woodstown—low
Runoff class: Woodstown—low
Surface fragments: Woodstown—none
Parent material: Woodstown—marine sandy alluvium

Use and Management Considerations

Building sites

- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.

- The seasonal high water table may restrict the period when excavations can be made

Septic tank absorption fields
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The seasonal high water table greatly limits the absorption and proper treatment of the effluent from conventional septic systems.

Local roads and streets
- Soil properties are highly variable in areas where the soil has been disturbed by cutting and filling. Onsite investigation is needed to determine the potentials and limitations of this map unit.
- The seasonal high water table affects the ease of excavation and grading and reduces the bearing capacity of the soil.

Interpretive Groups

Woodstown
Prime farmland: Not prime farmland
Land capability class: Woodstown—2w
Virginia soil management group: Woodstown—J
Hydric soil: Woodstown—no

W—Water

Typical Profile

This map unit is in the Northern Piedmont and the Northern Coastal Plain Major Land Resource Areas. It includes ponds, lakes, creeks, and rivers. This map unit is not assigned any interpretive groups.

Use and Management of the Soils

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

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for pasture; as forestland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; for agricultural waste management; and as wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

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

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

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

Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited, somewhat limited,* and *very limited*. The suitability ratings are expressed as *well suited, moderately suited, poorly suited,* and *unsuited* or as *good, fair,* and *poor*.

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate

gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

Pasture

General management needed for pasture is suggested in this section. The estimated yields of pasture are listed, and the system of land capability classification used by the Natural Resources Conservation Service is explained.

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

Yields per Acre

The average yields are shown in the table "Land Capability Class, Virginia Soil Management Group, and Nonirrigated Yields." The yields in the table are those that can be expected under a high level of management. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of map units in the survey area also is shown in the table.

The yields are based on the Virginia Agronomic Land Use Evaluation System, or VALUES (Virginia Polytechnic Institute and State University, 1994). Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of pasture depends on the kind of soil. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements.

Realistic yield goals can be maintained over a long-term basis through proper nutrient management and other soil amendments, such as lime. Nitrogen and phosphorus from organic and inorganic forms should be applied according to approved nutrient management practices and regulations.

Pasture yields are expressed in terms of animal unit months. An animal unit month (AUM) is the amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

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

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

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils

are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.

In the capability system, soils are generally grouped at two levels—capability class and subclass (USDA, 1961).

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or 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, 2e. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, wildlife habitat, or recreation.

The capability classification of the soils in this survey area is given in the section “Detailed Soil Map Units” and in the yields table.

Virginia Soil Management Groups

The Virginia Agronomic Land Use Evaluation System (VALUES) is a system to rank soils for management and productivity (Virginia Polytechnic Institute and State University, 1994). VALUES places each soil series in Virginia into one of 43 management groups. The management groups, A through QQ, include the following soil characteristics: regional occurrence; parent material; landscape position or influence; solum thickness; dominant profile features, such as texture; available water capacity for plants; and internal soil drainage. Economically and environmentally

feasible yields were assigned to each management group based on yields of field trial crop data and research. The following paragraphs describe the soil management groups in Arlington County.

Group J. The soils of this group formed in sediments of the Coastal Plain in low-lying landscape positions. These soils are deep, have loamy subsurface horizons, are moderately high water suppliers, and are somewhat poorly drained or moderately well drained.

Group T. The soils of this group formed in loamy sediments of the Coastal Plain and are located on uplands and stream terraces in the Coastal Plain. These soils are deep, have fine loamy subsurface textures and are usually underlain by coarser sediments, are moderate water suppliers, and are well drained.

Group U. The soils of this group formed in a variety of residual parent materials that range from Triassic sediments to sandstone, shales, and limestone and colluvium from these materials and are located in the mountain and Piedmont regions. These soils are moderately deep or shallow, generally have fine loamy subsurface textures and coarse fragments that are one-third of the soil volume, are moderate or moderately low water suppliers, and are well drained or moderately well drained.

Group AA. The soils of this group formed in a variety of sediments and are located on uplands. These soils range from deep to shallow, have clayey subsurface horizons that sometimes have coarse fragments, are moderately low water suppliers, and are somewhat poorly drained or moderately well drained.

Group BB. The soils of this group formed in a variety of parent materials, such as colluvium, alluvium, and limestone residuum, and are on uplands, terraces, and footslopes in the western mountains, Piedmont, and Coastal Plain. These soils have fragipans that underlie silty to loamy subsurface horizons that sometimes have coarse fragments, have a limited rooting zone as a result of the fragipan, are low or moderately low water suppliers, and generally are somewhat poorly drained.

Group FF. The soils of this group formed in residual parent materials that range from sandstone, shales, and slates to loamy granitic saprolites and are on steeply dissected uplands. These soils are moderately shallow, generally have loamy-skeletal subsurface horizons that may contain 80 percent or more coarse fragments, are very low or low water suppliers, and are moderately well drained or well drained.

Group HH. The soils of this group formed in loamy alluvial sediments and are on flood plains. These soils are very deep, have a fine-loamy or clayey subsurface layer, are moderate water suppliers, and are moderately well drained or somewhat poorly drained.

The management groups for the map units in Arlington County are given in the section “Detailed Soil Map Units” and in the yields table.

Prime Farmland

In an effort to identify the extent and location of important farmlands, the Natural Resources Conservation Service, in cooperation with other interested Federal, State, and local government organizations, has inventoried land that can be used for the production of the Nation’s food supply.

Prime farmland is of major importance in meeting the Nation’s short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation’s prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated

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

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

Glenelg loam, 3 to 8 percent slopes, is the only map unit of prime farmland in Arlington County, Virginia.

Hydric Soils

This section lists the map units that are rated as hydric soils in the survey area. This list can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council, 1995; Hurt and others, 2002).

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin and others, 1979; U.S. Army Corps of Engineers, 1987; National Research Council, 1995; Tiner, 1985). Criteria for all of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in “Soil Taxonomy” (Soil Survey Staff, 1999) and “Keys to Soil Taxonomy” (Soil Survey Staff, 2006) and in the “Soil Survey Manual” (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in “Field Indicators of Hydric Soils in the United States” (Hurt and others, 2002).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

Map units that are dominantly made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units dominantly made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

The following map units meet the definition of hydric soils and, in addition, have at least one of the hydric soil indicators. This list can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council, 1995; Hurt and others, 2002).

1A Hatboro sandy loam, 0 to 3 percent slopes, frequently flooded
2A Codorus-Hatboro complex, 0 to 3 percent slopes, frequently flooded

The following map unit, in general, does not meet the definition of hydric soils because it does not have one of the hydric soil indicators. A portion of this map unit, however, may include hydric soils.

3A Urban land-Codorus complex, 0 to 3 percent slopes

Onsite investigation is recommended to determine whether hydric soils occur and the location of the included hydric soils.

Forestland Productivity and Management

The tables described in this section can help forest owners or managers plan the use of soils for wood crops. They show the potential productivity of the soils for wood crops and rate the soils according to the limitations that affect various aspects of forestland management.

Forestland Productivity

In the table, "Forestland Productivity," the *potential productivity* of merchantable or *common trees* on a soil is expressed as a site index and as a volume number. The *site index* is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that forest managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. More detailed information regarding site index is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet.

The *volume of wood fiber*, a number, is the yield likely to be produced by the most important tree species. This number, expressed as cubic feet per acre per year and calculated at the age of culmination of the mean annual increment (CMAI), indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand.

Trees to manage are those that are preferred for planting, seeding, or natural regeneration and those that remain in the stand after thinning or partial harvest.

Forestland Management

The titles of the tables described in this section are:

- "Haul Roads, Log Landings, and Soil Rutting on Forestland"
- "Hazard of Erosion and Suitability for Roads on Forestland"
- "Forestland Planting and Harvesting"
- "Forestland Site Preparation"
- "Damage by Fire and Seedling Mortality on Forestland"

In these tables, interpretive ratings are given for various aspects of forestland management. The ratings are both verbal and numerical.

Some rating class terms indicate the degree to which the soils are suited to a specified aspect of forestland management. *Well suited* indicates that the soil has features that are favorable for the specified management aspect and has no limitations. Good performance can be expected, and little or no maintenance is needed. *Moderately suited* indicates that the soil has features that are moderately favorable for the specified management aspect. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. *Poorly suited* indicates that the soil has one or more properties that are unfavorable for the specified management aspect. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration. *Unsuited* indicates that the expected performance of the soil is unacceptable for the specified management aspect or that extreme measures are needed to overcome the undesirable soil properties.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

Rating class terms for fire damage and seedling mortality are expressed as *low, moderate,* and *high*. Where these terms are used, the numerical ratings indicate gradations between the point at which the potential for fire damage or seedling mortality is highest (1.00) and the point at which the potential is lowest (0.00).

Proper planning for timber harvesting is essential to minimize the potential impact to soil and water quality. A harvest plan should include logging roads, log decks, streamside management zones, stream crossings, skid trails, a schedule of activities, and best management practices (BMPs) for each activity. Forests should be managed to increase economic and environmental benefits. A forest stewardship plan should be developed to guide management and utilization of the woodlands.

The paragraphs that follow indicate the soil properties considered in rating the soils. More detailed information about the criteria used in the ratings is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or on the Internet.

For *limitations affecting construction of haul roads and log landings*, the ratings are based on slope, flooding, permafrost, plasticity index, the hazard of soil slippage, content of sand, the Unified classification, rock fragments on or below the surface, depth to a restrictive layer that is indurated, depth to a water table, and ponding. The limitations are described as slight, moderate, or severe. A rating of *slight* indicates that no significant limitations affect construction activities, *moderate* indicates that one or more limitations can cause some difficulty in construction, and *severe* indicates that one or more limitations can make construction very difficult or very costly.

The ratings of *suitability for log landings* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water

table, ponding, flooding, and the hazard of soil slippage. The soils are described as well suited, moderately suited, or poorly suited to use as log landings.

Ratings in the column *soil rutting hazard* are based on depth to a water table, rock fragments on or below the surface, the Unified classification, depth to a restrictive layer, and slope. Ruts form as a result of the operation of forest equipment. The hazard is described as slight, moderate, or severe. A rating of *slight* indicates that the soil is subject to little or no rutting, *moderate* indicates that rutting is likely, and *severe* indicates that ruts form readily.

Ratings in the column *hazard of off-road or off-trail erosion* are based on slope and on soil erosion factor K. The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50 to 75 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance. The hazard is described as slight, moderate, severe, or very severe. A rating of *slight* indicates that erosion is unlikely under ordinary climatic conditions; *moderate* indicates that some erosion is likely and that erosion-control measures may be needed; *severe* indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and *very severe* indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical.

Ratings in the column *hazard of erosion on roads and trails* are based on the soil erosion factor K, slope, and content of rock fragments. The ratings apply to unsurfaced roads and trails. The hazard is described as slight, moderate, or severe. A rating of *slight* indicates that little or no erosion is likely; *moderate* indicates that some erosion is likely, that the roads or trails may require occasional maintenance, and that simple erosion-control measures are needed; and *severe* indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

Ratings in the column *suitability for roads (natural surface)* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, ponding, flooding, and the hazard of soil slippage. The ratings indicate the suitability for using the natural surface of the soil for roads. The soils are described as well suited, moderately suited, or poorly suited to this use.

Ratings in the columns *suitability for hand planting* and *suitability for mechanical planting* are based on slope, depth to a restrictive layer, content of sand, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, moderately suited, poorly suited, or unsuited to these methods of planting. It is assumed that necessary site preparation is completed before seedlings are planted.

Ratings in the column *suitability for use of harvesting equipment* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, and ponding. The soils are described as well suited, moderately suited, or poorly suited to this use.

Ratings in the column *suitability for mechanical site preparation (surface)* are based on slope, depth to a restrictive layer, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 1 foot is considered in the ratings.

Ratings in the column *suitability for mechanical site preparation (deep)* are based on slope, depth to a restrictive layer, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 3 feet is considered in the ratings.

Ratings in the column *potential for damage to soil by fire* are based on texture of the surface layer, content of rock fragments and organic matter in the surface layer,

thickness of the surface layer, and slope. The soils are described as having a low, moderate, or high potential for this kind of damage. The ratings indicate an evaluation of the potential impact of prescribed fires or wildfires that are intense enough to remove the duff layer and consume organic matter in the surface layer.

Ratings in the column *potential for seedling mortality* are based on flooding, ponding, depth to a water table, content of lime, reaction, salinity, available water capacity, soil moisture regime, soil temperature regime, aspect, and slope. The soils are described as having a low, moderate, or high potential for seedling mortality.

Recreational Development

The titles of the tables described in this section are:

- "Camp Areas, Picnic Areas, and Playgrounds"
- "Paths, Trails, and Golf Fairways"

In the tables described in this section, the soils of the survey area are rated according to limitations that affect their suitability for recreational development. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

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

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of

camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, saturated hydraulic conductivity (Ksat), and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, saturated hydraulic conductivity (Ksat), and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, saturated hydraulic conductivity (Ksat), and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, saturated hydraulic conductivity (Ksat), and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, saturated hydraulic conductivity (Ksat), and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, saturated hydraulic conductivity (Ksat), and toxic substances in the soil.

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Off-road motorcycle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on

observed performance of the soils and on the data in the tables described under the heading “Soil Properties.”

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, saturated hydraulic conductivity (Ksat), corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, reclamation material, roadfill, and topsoil; plan structures for water management; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

The titles of the tables described in this section are:

- “Dwellings and Small Commercial Buildings”
- “Roads and Streets, Shallow Excavations, and Lawns and Landscaping”

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. The tables described in this section show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected.

Somewhat limited indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict

the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Sanitary Facilities

The titles of the tables described in this section are:

- "Sewage Disposal"
- "Landfills"

These tables show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches or between a depth of 24 inches and a restrictive layer is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Saturated hydraulic conductivity (Ksat), depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and

contamination of ground water. Considered in the ratings are slope, saturated hydraulic conductivity (Ksat), depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Saturated hydraulic conductivity (Ksat) is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a Ksat rate of more than 14 micrometers per second are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include saturated hydraulic conductivity (Ksat), depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, saturated hydraulic conductivity (Ksat), depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If the downward movement of water through the soil profile is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a

consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

Construction Materials

The titles of the tables described in this section are:

- "Source of Gravel and Sand"
- "Source of Reclamation Material, Roadfill, and Topsoil"

These tables give information about the soils as potential sources of gravel, sand, reclamation material, roadfill, and topsoil. Normal compaction, minor processing, and other standard construction practices are assumed.

Gravel and *sand* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table "Source of Sand and Gravel," only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

The soils are rated *good, fair,* or *poor* as potential sources of sand and gravel. A rating of *good* or *fair* means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of sand or gravel. The number 0.00 indicates that the layer is a poor source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

In the table "Source of Reclamation Material, Roadfill, and Topsoil," the rating class terms are *good, fair,* and *poor*. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of reclamation material, roadfill, and topsoil. The lower the number, the greater the limitation.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

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

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

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

Water Management

The table “Ponds and Embankments” gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the saturated hydraulic conductivity (Ksat) of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

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

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering properties, physical and chemical properties, and pertinent soil and water features.

Engineering Properties

The table described in this section gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

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

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group

index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

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

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

Physical Soil Properties

The table described in this section shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In the table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In the table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

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

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, saturated hydraulic conductivity (Ksat), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$- or $^1/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil

properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Saturated hydraulic conductivity (Ksat) refers to the ability of a soil to transmit water or air. The estimates in the table indicate the rate of water movement, in micrometers per second, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity (Ksat) is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

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

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the "National Soil Survey Handbook," which is available in local offices of the Natural Resources Conservation Service or on the Internet.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Soil Properties

The table described in this section shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

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

Water Features

The table described in this section gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

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

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

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

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

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. The table indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of

flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Soil Features

The table described in this section gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, saturated hydraulic conductivity (Ksat), content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1999 and 2006). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. The categories are defined in the following paragraphs.

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

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

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludults (*Hapl*, meaning minimal horizonation, plus *udult*, the suborder of the Ultisols that has a udic moisture regime).

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

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

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

The table "Taxonomic Classification of the Soils" indicates the order, suborder, great group, subgroup, and family of the soil series in the survey area.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each

series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (Soil Survey Division Staff, 1993) and in the "Field Book for Describing and Sampling Soils" (Schoeneberger and others, 2002). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (Soil Survey Staff, 1999) and in "Keys to Soil Taxonomy" (Soil Survey Staff, 2006). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

Codorus Series

Physiographic province: Piedmont
Landform: Flood plains
Parent material: Alluvium derived from igneous, metamorphic, and sedimentary rock
Drainage class: Somewhat poorly drained
Slowest saturated hydraulic conductivity: Moderately high
Depth class: Very deep
Slope range: 0 to 3 percent

Associated Soils

- The well drained Glenelg soils
- The poorly drained Hatboro soils

Taxonomic Classification

Fine-loamy, mixed, active, mesic Fluvaquentic Dystrudepts

Typical Pedon

Codorus silt loam, in an area of Codorus-Hatboro complex, 0 to 3 percent slopes, frequently flooded; located approximately 0.5 mile south on Highway VA-632 from its junction with Highway US-50, about 150 feet west of road along Hungry Run; Middleburg, VA, 7.5-minute USGS topographic quadrangle; NAD27; lat. 38 degrees 58 minutes 14.00 seconds N. and long. 77 degrees 39 minutes 16.00 seconds W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable, nonsticky, nonplastic; many fine and medium roots; 5 percent rounded quartzite gravel; strongly acid; abrupt smooth boundary.

Bw1—8 to 19 inches; brown (10YR 4/3) silt loam; weak fine subangular blocky structure; friable, slightly sticky, nonplastic; few fine and medium roots; few fine distinct light brownish gray (10YR 6/2) iron depletions; 5 percent rounded quartzite gravel; strongly acid; clear wavy boundary.

Bw2—19 to 33 inches; brown (10YR 5/3) loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine prominent strong brown (7.5YR 5/6) iron-manganese masses; common fine distinct light brownish gray (10YR 6/2) iron depletions; strongly acid; gradual smooth boundary.

C1—33 to 50 inches; light brown (7.5YR 6/4) loam; massive; friable, slightly sticky, slightly plastic; common medium faint brown (7.5YR 5/4) and common medium distinct light brownish gray (10YR 6/2) iron depletions; strongly acid; clear smooth boundary.

C2—50 to 62 inches; light yellowish brown (10YR 6/4) stratified loam to sandy loam to extremely gravelly sandy loam; massive; friable, nonsticky, nonplastic; common medium distinct light brownish gray (10YR 6/2) iron depletions; 40 percent rounded quartzite gravel; strongly acid.

Range in Characteristics

Solum thickness: 30 to 55 inches
Depth to bedrock: More than 60 inches
Depth to stratified sand and gravel: More than 40 inches
Rock fragments: 0 to 15 percent in the solum, 0 to 25 percent in the C horizon above 40 inches, and 0 to 70 percent in the C horizon below 40 inches; mostly water-rounded gravel
Reaction: Very strongly acid to moderately acid in the upper part of the solum and strongly acid to slightly acid in the lower part of the solum and in the C horizon, except where lime has been applied
Redoximorphic features: In shades of red, brown, yellow, or gray in the Bw and C horizons

A or Ap horizon:
Hue—10YR
Value—3 to 6
Chroma—2 to 6
Texture (fine-earth fraction)—loam or silt loam

B or Bw horizon:
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—3 or 4
Texture (fine-earth fraction)—loam, silt loam, clay loam, or silty clay loam

C horizon:
Hue—7.5YR to 2.5Y
Value—3 to 6
Chroma—1 to 4
Texture (fine-earth fraction)—stratified sand and gravel or loam

Glenelg Series

Physiographic province: Piedmont
Landform: Uplands and interfluves
Parent material: Residuum weathered from phyllite and residuum weathered from mica schist
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high
Depth class: Very deep
Slope range: 0 to 35 percent

Associated Soils

- The well drained Manor soils, which are coarse-loamy

Taxonomic Classification

Fine-loamy, mixed, semiactive, mesic Typic Hapludults

Typical Pedon

Glenelg loam, 3 to 8 percent slopes; located approximately 30 yards north of the junction of VA-662 and VA-665; Waterford, VA, 7.5-minute USGS topographic quadrangle; NAD27; lat. 39 degrees 12 minutes 27.00 seconds N. and long. 77 degrees 35 minutes 28.00 seconds W.

A—0 to 1 inch; dark brown (10YR 3/3) loam; weak medium granular structure; very friable, nonsticky, nonplastic; few fine and very fine roots; common fine mica flakes; 10 percent gravel; strongly acid; abrupt smooth boundary.
E—1 to 6 inches; brown (7.5YR 5/4) silt loam; weak medium granular structure; very friable, nonsticky, nonplastic; few fine and medium roots; common fine mica flakes; 5 percent gravel; strongly acid; clear smooth boundary.
Bt1—6 to 17 inches; yellowish red (5YR 5/6) silt loam; moderate medium subangular blocky structure; friable, slightly sticky, nonplastic; many very fine, fine, medium, and coarse roots; common faint discontinuous yellowish red (5YR 5/6) clay films on all faces of peds; common fine mica flakes; 5 percent gravel; strongly acid; gradual wavy boundary.
Bt2—17 to 27 inches; yellowish red (5YR 5/6) silt loam; strong medium subangular blocky structure; friable, slightly sticky, nonplastic; many faint continuous yellowish red (5YR 5/6) clay bridges between sand grains; common fine mica flakes; 5 percent subangular phyllite channers and 5 percent subangular quartzite gravel; strongly acid; gradual wavy boundary.
C1—27 to 45 inches; yellowish red (5YR 5/6) loam; massive; friable, nonsticky, nonplastic; common medium and coarse roots; many fine mica flakes; 2 percent subangular quartzite gravel and 3 percent subangular phyllite gravel; very strongly acid; gradual wavy boundary.
C2—45 to 71 inches; variegated red (2.5YR 5/8) and light reddish brown (5YR 6/4) channery loam; massive; friable, nonsticky, nonplastic; many fine mica flakes; 10 percent subangular phyllite gravel and 15 percent subangular phyllite channers; very strongly acid.

Range in Characteristics

Solum thickness: 18 to 35 inches
Depth to bedrock: 72 to more than 120 inches
Rock fragments: 0 to 35 percent throughout the solum and 5 to 35 percent in the C horizon; mostly subangular quartzite gravel
Mica flakes: Amount increases sharply in the lower part of the solum and substratum
Reaction: Very strongly acid to slightly acid, except where lime has been applied

A horizon:
Hue—7.5YR or 10YR
Value—3 to 5
Chroma—1 to 4
Texture (fine-earth fraction)—loam or silt loam

E horizon:
Hue—7.5YR or 10YR
Value—3 to 5
Chroma—2 to 4
Texture (fine-earth fraction)—loam or silt loam

Bt horizon:
Hue—5YR to 10YR
Value—4 or 5
Chroma—4 to 8
Texture (fine-earth fraction)—loam, silt loam, silty clay loam, or clay loam

C horizon:
Hue—2.5YR to 10YR
Value—4 to 6
Chroma—2 to 8
Texture (fine-earth fraction)—loam or sandy loam

Hatboro Series

Physiographic province: Piedmont
Landform: Flood plains
Parent material: Alluvium derived from igneous and metamorphic rock
Drainage class: Poorly drained
Slowest saturated hydraulic conductivity: Moderately high
Depth class: Very deep
Slope range: 0 to 3 percent

Associated Soils

- The moderately well drained Codorus soils

Taxonomic Classification

Fine-loamy, mixed, active, nonacid, mesic Fluvaquentic Endoaquepts

Typical Pedon

Hatboro sandy loam, 0 to 3 percent slopes, frequently flooded; located approximately 5,000 feet west-northwest of the junction of Highways VA-688 and VA-635, about 6,900 feet northwest of junction of Highways VA-688 and VA-734; Joplin, VA, 7.5-minute USGS topographic quadrangle; NAD27; lat. 38 degrees 49 minutes 59.10 seconds N. and long. 78 degrees 01 minute 00.00 second W.

Ap—0 to 6 inches; dark gray (2.5Y 4/1) sandy loam; weak coarse subangular blocky structure; friable, nonsticky, nonplastic; many fine and medium roots; strongly acid; abrupt smooth boundary.
Bg—6 to 23 inches; gray (2.5Y 5/1) loam; weak medium subangular blocky structure; friable, nonsticky, nonplastic; few medium roots; many fine tubular pores; common medium prominent brown (7.5YR 4/4) iron-manganese masses; strongly acid; clear smooth boundary.
Cg—23 to 61 inches; dark bluish gray (5PB 4/1) clay loam; massive; friable, nonsticky, nonplastic; common medium prominent brown (7.5YR 4/4) iron-manganese masses; strongly acid.

Range in Characteristics

Solum thickness: 20 to 40 inches
Depth to bedrock: More than 60 inches
Rock fragments: 0 to 10 percent in the solum and 0 to 80 percent in the C horizon
Reaction: Very strongly acid to neutral to a depth of 30 inches and strongly acid to slightly acid below 30 inches
Redoximorphic features: In shades of red, brown, yellow, or gray in the Bg and Cg horizons

A or Ap horizon:
Hue—10YR or 2.5Y
Value—3 or 4
Chroma—1 to 4
Texture (fine-earth fraction)—loam, silt loam, or sandy loam

Bg horizons:
Hue—10YR to 5Y or neutral
Value—4 or 7
Chroma—0 to 2
Texture (fine-earth fraction)—loam, silt loam, sandy clay loam, clay loam, or silty clay loam

Cg horizon:
Hue—10YR to 5Y, 5PB, or neutral
Value—4 to 7
Chroma—0 to 2
Texture (fine-earth fraction)—sandy loam, silt loam, sandy clay loam, clay loam, or silty clay loam in the upper part and stratified sand, silt, and clay sediments and gravel in the lower part

Manor Series

Physiographic province: Piedmont
Landform: Uplands and interfluves
Parent material: Residuum weathered from mica schist
Drainage class: Somewhat excessively drained
Slowest saturated hydraulic conductivity: Moderately high
Depth class: Very deep
Slope range: 15 to 35 percent

Associated Soils

- The well drained Glenelg soils

Taxonomic Classification

Coarse-loamy, micaceous, mesic Typic Dystrudepts

Typical Pedon

Manor sandy loam, in an area of Glenelg-Manor complex, 15 to 35 percent slopes; located in Donaldson Run Park; Washington West, District of Columbia, 7.5-minute USGS topographic quadrangle; NAD27; lat. 38 degrees 55 minutes 02.00 seconds N. and long. 77 degrees 06 minutes 34.00 seconds W.

A—0 to 1 inch; dark grayish brown (10YR 4/2) sandy loam; weak fine granular structure; loose; many fine roots; common fine mica flakes; strongly acid; smooth boundary.
E—1 to 6 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium granular structure; very friable, slightly sticky; many fine roots; common fine mica flakes; strongly acid; clear smooth boundary.
Bw—6 to 22 inches; yellowish red (5YR 4/6) sandy loam; weak medium subangular blocky structure; friable, slightly sticky; common medium roots; common fine mica flakes; strongly acid; clear wavy boundary.
C—22 to 60 inches; brown (10YR 5/3) loamy sand; massive; friable; few medium roots at top of horizon; many mica flakes; very strongly acid.

Range in Characteristics

Solum thickness: 15 to 35 inches
Depth to bedrock: 72 to more than 120 inches
Rock fragments: 0 to 15 percent throughout the solum and C horizon
Reaction: Moderately acid to extremely acid throughout, except where lime has been applied

A horizon:
Hue—5YR to 10YR
Value—3 to 5
Chroma—2 to 4
Texture (fine-earth fraction)—loam or sandy loam

E horizon (where present):
Hue—5YR to 10YR
Value—4 to 6
Chroma—2 to 6
Texture (fine-earth fraction)—sandy loam or loam

Bw horizon:
Hue—2.5YR to 7.5YR
Value—4 or 5
Chroma—4 to 8
Texture (fine-earth fraction)—sandy loam or loam

C horizon:
Hue—10R to 10YR
Value—4 to 8
Chroma—2 to 8
Texture (fine-earth fraction)—loam, sandy loam, or loamy sand

Neabsco Series

Physiographic province: Coastal Plain
Landform: Uplands and interfluves
Parent material: Fluviomarine deposits
Drainage class: Moderately well drained
Slowest saturated hydraulic conductivity: Low
Depth class: Very deep
Slope range: 0 to 15 percent

Associated Soils

- The well drained Sassafras soils
- The moderately well drained Woodstown soils

Taxonomic Classification

Fine-loamy, siliceous, semiactive, mesic Typic Fragiudults

Typical Pedon

Neabsco loam, in an area of Sassafras-Urban land-Neabsco complex, 0 to 3 percent slopes; located in Prince William County, Virginia; in Prince William Forest Park, about 100 feet southwest of Park Central Road, 20 feet south of Trail No. 11; Occoquan, VA, 7.5-minute USGS topographic quadrangle; NAD27; lat. 38 degrees 39 minutes 23.00 seconds N. and long. 77 degrees 17 minutes 08.00 seconds W.

A—0 to 2 inches; brown (10YR 4/3) loam; moderate very fine and fine granular structure; very friable, nonsticky, nonplastic; many fine and coarse and few medium roots; 3 percent rounded quartz gravel; very strongly acid; clear smooth boundary.

E—2 to 8 inches; light yellowish brown (10YR 6/4) loam; moderate very fine and fine granular structure; very friable, slightly sticky, slightly plastic; many fine and coarse and few medium roots; 2 percent rounded quartz gravel; very strongly acid; clear smooth boundary.

Bt—8 to 17 inches; yellowish brown (10YR 5/6) clay loam; moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; very few distinct continuous clay films on all faces of peds; 2 percent rounded quartz gravel; very strongly acid; clear smooth boundary.

Bx—17 to 36 inches; yellowish brown (10YR 5/6) loam; strong very coarse prismatic structure parting to strong medium and coarse platy structure; very firm, nonsticky, nonplastic; brittle; common fine moderate vesicular pores; many medium distinct light gray (10YR 7/2) and pale brown (10YR 6/3) iron depletions; 10 percent rounded quartz gravel; very strongly acid; gradual smooth boundary.

2Bt—36 to 52 inches; brownish yellow (10YR 6/8) clay loam; weak medium and coarse subangular blocky structure; friable, slightly sticky, slightly plastic; very few distinct continuous dark brown (10YR 3/3) clay films on vertical faces of peds; common medium distinct yellowish red (5YR 5/6) masses of oxidized iron; common medium distinct pale brown (10YR 6/3) iron depletions; 5 percent rounded quartz gravel; strongly acid; abrupt smooth boundary.

3C—52 to 72 inches; variegated brownish yellow (10YR 6/8) and yellowish brown (10YR 5/8) very gravelly sandy loam; massive; very friable, slightly sticky, nonplastic; 45 percent rounded quartz gravel; strongly acid.

Range in Characteristics

Solum thickness: 40 to 60 inches

Depth to bedrock: More than 60 inches

Rock fragments: 0 to 10 percent in the A and upper B horizons, 1 to 35 percent in the fragipan and lower B horizon, and 1 to 50 percent in the C horizon; mostly quartz gravel

Reaction: Very strongly acid or strongly acid throughout the profile

Redoximorphic features: In shades of red, brown, yellow, or gray in the Bx and 2Bt horizons

A horizon:

Hue—10YR or 2.5Y
Value—3 to 7
Chroma—2 to 4
Texture (fine-earth fraction)—sandy loam, loam, or silt loam

E horizon:

Hue—10YR or 2.5Y
Value—5 or 6
Chroma—3 or 4
Texture (fine-earth fraction)—sandy loam, loam, or silt loam

Bt horizon:

Hue—10YR or 2.5Y
Value—5 or 6
Chroma—4 to 8
Texture (fine-earth fraction)—loam, sandy clay loam, or clay loam

Bx horizon:

Hue—7.5YR to 2.5Y or variegated
Value—4 to 6
Chroma—3 to 6
Texture (fine-earth fraction)—sandy loam, loam, or sandy clay loam

C horizon:

Hue—variegated in shades of brown, yellow, red, and gray
Value—2 to 8
Chroma—2 to 8
Texture (fine-earth fraction)—stratified, ranging from gravelly sand to clay

Sassafras Series

Physiographic province: Coastal Plain
Landform: Uplands and interfluves
Parent material: Fine-loamy fluviomarine deposits
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high
Depth class: Very deep
Slope range: 0 to 25 percent

Associated Soils

- The moderately well drained Neabsco soils
- The moderately well drained Woodstown soils

Taxonomic Classification

Fine-loamy, siliceous, semiactive, acid, mesic Typic Hapludults

Typical Pedon

Sassafras gravelly sandy loam, 3 to 8 percent slopes; located about 0.7 mile southeast of the intersection of VA-601 and VA-424 in a field of Meadowood Farms BLM, 150 yards southwest from the entrance of the driveway, in field; Fort Belvoir, VA, 7.5-minute USGS topographic quadrangle; NAD27; lat. 38 degrees 40 minutes 29.00 seconds N. and long. 77 degrees 12 minutes 01.00 second W.

Ap—0 to 6 inches; brown (10YR 4/3) gravelly sandy loam; weak very fine granular structure; very friable, slightly sticky, slightly plastic; many fine and few very fine roots; 26 percent rounded quartz gravel; strongly acid; abrupt wavy boundary.
BA—6 to 10 inches; yellowish brown (10YR 5/6) gravelly sandy clay loam; moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; 15 percent rounded quartz gravel; strongly acid; clear wavy boundary.
Bt—10 to 34 inches; strong brown (7.5YR 5/6) gravelly sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; very few clay films on all faces of peds; 16 percent rounded quartz gravel; very strongly acid; clear wavy boundary.
BC—34 to 40 inches; brownish yellow (10YR 6/6) gravelly sandy loam; weak medium subangular blocky structure; friable, slightly sticky, nonplastic; common fine faint light yellowish brown (10YR 6/4) clay bodies; 15 percent rounded quartz gravel; very strongly acid; clear wavy boundary.
C—40 to 60 inches; brownish yellow (10YR 6/8) gravelly loamy sand; single grain; loose, nonsticky, nonplastic; 23 percent rounded quartz gravel; extremely acid.

Range in Characteristics

Solum thickness: 25 to 50 inches
Depth to bedrock: More than 60 inches
Rock fragments: 0 to 20 percent in the A and B horizons and 0 to 30 percent in the C horizon; mostly quartz pebbles
Reaction: Extremely acid to strongly acid throughout the profile, except where lime has been applied

Ap horizon:
Hue—7.5YR to 2.5Y
Value—4 or 5
Chroma—2 to 4
Texture (fine-earth fraction)—loam, fine sandy loam, sandy loam, loamy fine sand, or loamy sand

A horizon (where present):
Hue—7.5YR to 2.5Y
Value—2 to 4
Chroma—1 to 4
Texture (fine-earth fraction)—loam, fine sandy loam, sandy loam, loamy fine sand, or loamy sand

E horizon (where present):
Hue—2.5YR to 7.5YR
Value—4 to 6
Chroma—2 to 4
Texture (fine-earth fraction)—fine sandy loam, sandy loam, loamy fine sand, or loamy sand

BA or BE horizon:
Hue—7.5YR to 2.5Y
Value—4 to 6
Chroma—4 to 8
Texture (fine-earth fraction)—loam, fine sandy loam, sandy loam, or sandy clay loam

Bt horizon:
Hue—5YR to 2.5Y
Value—4 to 6
Chroma—4 to 8
Texture (fine-earth fraction)—loam, sandy loam, or sandy clay loam

BC horizon:
Hue—7.5YR to 2.5Y
Value—5 or 6
Chroma—4 to 8
Texture (fine-earth fraction)—loamy sand, loamy fine sand, fine sandy loam, or sandy loam

C horizon:
Hue—7.5YR to 2.5Y
Value—4 to 8
Chroma—3 to 8
Texture (fine-earth fraction)—sandy loam, loamy sand, or sand

Udorthents

Physiographic province: Piedmont and Coastal Plain
Landform: Uplands and interfluves
Slowest saturated hydraulic conductivity: Unspecified
Depth class: Very deep
Slope range: 0 to 15 percent

Associated Soils

- Soils that are adjacent to the areas that are excavated or filled

Taxonomic Classification

Udorthents

Typical Pedon

Because of the variability of Udorthents, a typical pedon is not given. Udorthents formed when soils were disturbed by land-leveling, excavating, or filling. They consist

of loamy and clayey soil material and varying amounts of rock fragments. Depth to hard bedrock varies from a few inches to more than five feet. Areas range from slightly compacted to severely compacted. Unvegetated areas are susceptible to severe erosion. Generally, Udorthents are along highways, rail yards, and railroad tracks and are near quarries, mines, large buildings, and other areas that have been excavated or filled.

Woodstown Series

Physiographic province: Coastal Plain
Landform: Uplands and interfluves
Parent material: Fluviomarine deposits
Drainage class: Moderately well drained
Slowest saturated hydraulic conductivity: Moderately high
Depth class: Very deep
Slope range: 3 to 8 percent

Associated Soils

- The moderately well drained Neabsco soils
- The well drained Sassafras soils

Taxonomic Classification

Fine-loamy, mixed, active, mesic Aquic Hapludults

Typical Pedon

Woodstown sandy loam, in an area of Urban land-Woodstown complex, 3 to 8 percent slopes; located in Dorchester County, Maryland; 0.75 mile northwest of Galestown, 800 feet northeast of bend in Wheatly's Church Road; Cambridge, MD, 7.5-minute USGS topographic quadrangle; NAD27; lat. 38 degrees 33 minutes 08.00 seconds N. and long. 76 degrees 01 minute 11.00 seconds W.

Ap—0 to 7 inches; dark grayish brown (2.5Y 4/2) sandy loam; weak medium granular structure; friable; many fine and very fine roots; strongly acid; clear wavy boundary.
E—7 to 11 inches; light yellowish brown (2.5Y 6/4) sandy loam; weak medium granular structure; friable; many fine roots; strongly acid; clear wavy boundary.
Bt1—11 to 19 inches; light olive brown (2.5Y 5/6) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few faint clay films; very strongly acid; clear wavy boundary.
Bt2—19 to 29 inches; light olive brown (2.5Y 5/6) sandy clay loam; moderate medium subangular blocky structure; firm, moderately sticky, slightly plastic; few fine roots; few prominent clay films on all faces of peds; common medium prominent yellowish brown (10YR 5/8) masses of oxidized iron; common medium distinct pale red (2.5YR 7/2) iron depletions; very strongly acid; clear wavy boundary.
Cg1—29 to 45 inches; light brownish gray (2.5Y 6/2) sandy loam; massive; friable; few very fine and fine roots; common fine and coarse distinct yellowish brown (10YR 5/4) and yellowish brown (10YR 5/6) iron depletions; very strongly acid; clear wavy boundary.
Cg2—45 to 70 inches; light gray (5Y 7/2) sandy loam; single grain; loose; common thread-like grayish brown (2.5Y 5/2) iron depletions; 10 percent rounded quartz gravel; extremely acid.

Range in Characteristics

Solum thickness: 24 to 45 inches.
Depth to bedrock: More than 60 inches

Rock fragments: 0 to 15 percent in the A, E, and B horizons and 0 to 20 percent in the C horizon; mostly quartz pebbles
Reaction: Extremely acid to strongly acid throughout the profile, except where lime has been applied
Redoximorphic features: In shades of red, brown, yellow, or gray in the lower part of the Bt horizon and in the Cg horizon

A horizon:
Hue—10YR or 2.5Y
Value—3 or 4
Chroma—1 to 4
Texture (fine-earth fraction)—loam, fine sandy loam, or sandy loam

Ap horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 to 4
Texture (fine-earth fraction)—loam, fine sandy loam, or sandy loam

E horizon:
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—2 to 4
Texture (fine-earth fraction)—fine sandy loam or sandy loam

BE or BA horizon (where present):
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—4 to 8
Texture (fine-earth fraction)—sandy loam or fine sandy loam

Bt horizon:
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—4 to 8
Texture (fine-earth fraction)—sandy clay loam or loam; sandy loam, fine sandy loam, or clay loam in some pedons

BC horizon (where present):
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—4 to 8
Texture (fine-earth fraction)—sandy clay loam, loam, sandy loam, or fine sandy loam

BCg horizon (where present):
Hue—10YR to 5Y or neutral
Value—4 to 8
Chroma—0 to 2
Texture (fine-earth fraction)—sandy loam, loamy sand, or sand; thin strata of fine sandy clay loam, silt loam, or sandy clay loam in some pedons

C horizon (where present):
Hue—10YR to 5Y
Value—4 to 8
Chroma—3 to 8
Texture (fine-earth fraction)—sandy loam, loamy sand, or sand; thin strata of fine sandy clay loam, silt loam, or sandy clay loam in some pedons

Cg horizon:
Hue—10YR to 5Y or neutral
Value—4 to 8
Chroma—0 to 2
Texture (fine-earth fraction)—sandy loam, loamy sand, or sand; thin strata of fine sandy clay loam, silt loam, or sandy clay loam in some pedons

Formation of the Soils

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

Factors of Soil Formation

Soils are intimate mixtures of broken and partly or completely weathered rock, minerals, organic matter, living plants and animals, water, and air (Soil Survey Division Staff, 1993). They occur as part of the natural landscape and differ from place to place. They differ in occurrence, in degree of development of various horizons, in mineral content, in depth over bedrock, and in texture, color, and slope. The characteristics of the soils in any given area depend upon the interaction of the five factors of soil formation, which are parent material, climate, living organisms, topography, and time. Topography over time modifies the effect of climate and living organisms on parent material (Jenny, 1941).

Parent Material

Parent material is the unconsolidated material in which a soil forms. It is largely responsible for the chemical and mineral composition of soils. The three broad classes of parent material in Arlington County are residual, fluviomarine, and alluvial materials.

Residual parent material has weathered in place from the underlying bedrock and forms the basis for the soils of the Piedmont. Fluviomarine material is transported material that has been reworked by stream and marine action and forms the basis for the soils of the Coastal Plain. Alluvium is material that has been transported by water and deposited as unconsolidated deposits of sand, silt, clay, and large fragments of rock and forms the basis for soils on terraces and bottom lands of both the Piedmont Plateau and the Coastal Plain.

Residual material generally is west of the fall line in Arlington County. This material formed primarily from granite, gneiss, sandstone, and shale. These rocks weather into parent material that is commonly low in bases and is strongly acid. Properties of the residual parent material are directly related to the characteristics of the underlying bedrock. Glenelg and Manor soils formed in residuum.

Fluviomarine material is along and east of the fall line in Arlington County. It consists of transported and reworked sands, silts, and clays that are gravelly to extremely gravelly in places. The material is layered, and texture changes abruptly in many places in vertical or horizontal directions. The soils that formed in fluviomarine material commonly are strongly acid or very strongly acid and are low in bases. The texture of the soil reflects the textures of the layers from which it was formed. Sassafras, Woodstown, and Neabsco soils formed in fluviomarine materials.

Alluvial parent material is of local origin from along the smaller streams and drainageways and is of both local and general origin from along the Potomac River. The materials are on flood plains and terraces. The alluvium has a mixed lithology because of the wide variety of igneous and metamorphic rocks and fluviomarine deposits that are found in the uplands. Total thickness of the alluvium ranges from several feet along the drainageways and small streams to several tens of feet along

the Potomac River. Alluvium along the drainageways and small streams commonly is medium to coarse textured. Texture varies widely along the Potomac River and ranges from fine-textured slack water deposits to coarse-textured sand and gravel deposits. The soils that formed in alluvium are moderate in bases and are medium acid to strongly acid. Hatboro and Codorus soils formed in recent alluvium on flood plains.

Topography

Topography, or relief, affects the formation of soils by influencing the rate of infiltration, the rate of surface runoff, soil drainage, geologic erosion, and soil temperature. It can alter the effects of other soil forming factors to the extent that several different kinds of soil can form in the same parent material. Differences in topography can cause the same parent material to weather at different rates, thus affecting the impact of plants and animals on soil formation.

Arlington County is in an area of rolling topography that is moderately incised by the major drainage patterns. Elevations in the area range from sea level along the Potomac River to a height of about 340 feet in the western part of the county. Generally, the land surface slopes gently to the southeast at an average rate of 20 feet to the mile.

Arlington County is drained by a number of short streams that empty into the Potomac River. The drainage pattern is, in general, dendritic, but it is irregularly branched. The general fluvial cycle is in a stage of late youth or early maturity.

The survey area generally consists of gently sloping to steep, intermediate to broad ridges and rises, which have slopes that range from 0 to 15 percent. The gently sloping areas have a medium rate of runoff and a good rate of water infiltration. The steep areas, which have slopes that range from 15 to 50 percent, commonly have rapid rates of runoff and a poor rate of water infiltration.

Drainage commonly is related to both the texture and the position of the alluvium on the landscape. Thus, soils developed from fine-textured slack water deposits in low positions are often poorly drained. The Hatboro soil is an example. Deposits of fine materials on the gently sloping high river terraces are typically moderately well drained or well drained. The Woodstown and Neabsco soils are examples. Layers of contrasting materials in the alluvium cause fluctuating water tables and often result in moderately well drained or somewhat poorly drained soils. The Codorus soil is an example.

Climate

Climate affects the physical, chemical, and biological relationships in soils, primarily through the influence of precipitation and temperature. Water dissolves minerals, supports biological activity, and transports mineral and organic residue through the solum. Temperature determines the type of physical, chemical, and biological activity that takes place and the rate at which it occurs.

Arlington County has a rather humid, temperate climate that is typical of most coastal or near-coastal areas of the Middle Atlantic States. The average annual rainfall is about 39 inches and the average yearly air temperature is between 50 and 67 degrees. Rainfall is well distributed throughout the year, but most falls between April and November.

The climate is fairly uniform throughout the county, and there are no significant differences in elevation. Thus, there are no obstructions to the movement of winds, clouds, and rainstorms.

Because precipitation exceeds evapotranspiration, this humid, rather uniform climate has caused the soils to be strongly leached. Most of the soluble material that

either was originally present or was released through weathering has been removed. Therefore, most of the soils are strongly acid and generally are low in plant nutrients.

Precipitation is mainly responsible for the subsoil that characterizes most soils in the county. In addition to leaching soluble material, water that moves through the soil moves clay from the surface layer to a subsoil layer. Except for soils formed in recent alluvium or sand, soils of the county have a subsoil that contains more clay than the surface layer.

The formation of a blocky structure in the subsoil of well developed soils also is influenced by the climate. The development of peds (aggregates) in the subsoil is caused by changes in volume of the soil mass. These changes are primarily the result of alternating wet and dry periods and of alternating freezing and thawing periods.

The weathering of minerals is at a rate that is proportional to temperature and the amount of moisture. Soil weathers more rapidly in tropical regions than in temperate and humid regions. In Arlington County, the soils are relatively low in weatherable minerals. The soils contain no free carbonates and most of the bases have been leached out. However, because many of the soils that formed in transported parent material had previously undergone one or more cycles of erosion, these materials may have been highly weathered and leached at the time they were deposited.

Living Organisms

Plants and animals are the main source of organic matter in soils. Organic matter decomposes and is incorporated into the soil primarily by the action of micro-organisms and earthworms and to a lesser degree by windthrown trees and burrowing animals.

Before settlement by humans, the native vegetation was the most important type of living organism that affected soil development. The settlers found a dense forest that consisted mainly of hardwoods. Oaks were dominant in most parts of the area. Yellow-poplar, sweetgum, blackgum, holly, hickory, maple, dogwood, loblolly pine, and Virginia pine were also important, but there were probably few pure stands of pine before the area was settled. The fairly pure stands of pine that exist today are generally in areas that were once cleared and cultivated.

Most hardwoods use large amounts of calcium as well as other bases that are available. When the leaves fall and decompose, the bases re-enter the soil and are again used by the plants.

The soils in Arlington County, however, have never been very high in bases; consequently, they are acid even under a cover of hardwoods. Soils that are strongly acid and low in fertility are better suited to pines than to most hardwoods. Pines do not require large amounts of calcium and other bases and their needles do little to restore fertility to the soil.

As agriculture and urban growth developed in the area, humans became an important factor in the development of the soils. The clearing of forests, the cultivation of the soil in some areas, the introduction of new kinds of crops and other plants, and the improvements in drainage have all affected the development of the soils and will continue to affect their development in the future.

The most important changes brought about by humans include the mixing of the upper horizons of the soil to form a plow layer; the tilling of sloping soils, which resulted in accelerated erosion; and liming and fertilizing, which changed the content of plant nutrients, especially in the upper horizons.

Time

Time is needed for changes to take place in the parent material. Because of other soil-forming factors, however, soils that formed in the same type of parent material and

for the same amount of time may not be equally developed. Runoff and erosion, which hinder the development of well-expressed soil horizons, are greater on the steeper slopes. Thus, soils on the steeper slopes generally are less developed than soils on the less steep slopes, even though they formed in the same parent material. For example, the Manor soils on moderately steep and steep side slopes are less developed than the very deep Glenelg soils on gently sloping summits and shoulders.

Soils that form in parent material that is resistant to weathering do not develop as rapidly as soils that form in parent material that is less resistant to weathering. Soils on flood plains, such as the Hatboro soils, commonly have weakly defined layers because they are subject to the constant deposition of sediment.

Processes of Horizon Differentiation

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

Organic matter accumulates as plant and animal material decomposes. It darkens the surface layer and helps to form the A horizon. Once organic matter is lost, it normally takes a long time to replace. The content of organic matter in the surface layer of the soils in Arlington County averages about 1.5 percent.

Soils that have distinct subsoil horizons were leached of some of the lime and soluble salts before the clay minerals moved downward. Some of the factors that affect this leaching are the kinds of salts originally present, the depth to which the soil solution moves, and the texture of the soil profile.

In Arlington County, well drained and moderately well drained soils have a red to yellowish brown subsoil. These colors are caused mainly by thin coatings of iron oxide on sand and silt grains, but in some soils the colors are inherited from the materials in which the soils formed. The structure in these soils is weak to strong subangular blocky, and the subsoil contains more clay than the surface layer.

The reduction and transfer of iron, called gleying, is associated mainly with wet, poorly drained soils. Moderately well drained and somewhat poorly drained soils have red, yellowish red, and yellowish brown iron and manganese accumulations and gray iron and manganese depletions. This indicates the segregation of iron or manganese, or both, due to a fluctuating water table. In poorly drained soils, such as Hatboro soils, the subsoil and the underlying material are gray. This indicates the reduction and transfer of iron or manganese, or both, in solution.

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Historical Affairs and Landmark Review Board (HALRB). 2001. Historic Arlington [online]. Arlington County Bicentennial Task Force. Available: http://www.arlingtonhistoricalsociety.org/learn/snapshots/foreward.asp (May 10, 2007).

Hurt, G.W., P.M. Whited, and R.F. Pringle, editors. Version 5.0, 2002. Field indicators of hydric soils in the United States.

Jenny, Hans. 1941. Factors of soil formation.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Planning Research and Analysis Team (PRAT). 2006. Arlington, Virginia, Profile 2006 [online]. Arlington County Government, Department of Community Planning, Housing and Development. Available: http://www.arlingtonva.us/Departments/CPHD/planning/data_maps/pdf/Profile2006PreviousYear.pdf (May 10, 2007).

Schoeneberger, P.J., D.A. Wysocki, E.C. Benham, and W.D. Broderson, editors. 2002. Field book for describing and sampling soils. Version 2.0. U.S. Department of Agriculture, Natural Resources Conservation Service.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://soils.usda.gov/technical/.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://soils.usda.gov/

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://soils.usda.gov/

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://soils.usda.gov/.

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210.

United States Department of Commerce, Census Bureau. State and County Quick Facts, Arlington County, Virginia [online]. May 7, 2007. Available: http://quickfacts.census.gov/qfd/states/51/51013.html (May 10, 2007).

Virginia Polytechnic Institute and State University. 1994. VALUES—Virginia Agronomic Land Use and Evaluation System. *In* Soil Test Recommendations for Virginia. Virginia Cooperative Extension.

Glossary

Many of the terms relating to landforms, geology, and geomorphology are defined in more detail in the "National Soil Survey Handbook" (available in local offices of the Natural Resources Conservation Service or on the Internet).

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

Alluvium. Unconsolidated material, such as gravel, sand, silt, clay, and various mixtures of these, deposited on land by running water.

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

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

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

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

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

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Backswamp. A flood-plain landform. Extensive, marshy or swampy, depressed areas of flood plains between natural levees and valley sides or terraces.

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

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

Bottom land. An informal term loosely applied to various portions of a flood plain.

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

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.
Clay depletions. See Redoximorphic features.
Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.
Coarse textured soil. Sand or loamy sand.
Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.
Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.
COLE (coefficient of linear extensibility). See Linear extensibility.
Colluvium. Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (e.g., direct gravitational action) and by local, unconcentrated runoff.
Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.
Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.
Concretions. See Redoximorphic features.
Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."
Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.
Corrosion (geomorphology). A process of erosion whereby rocks and soil are removed or worn away by natural chemical processes, especially by the solvent action of running water, but also by other reactions, such as hydrolysis, hydration, carbonation, and oxidation.
Corrosion (soil survey interpretations). Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.
Crusts, soil. Relatively thin, somewhat continuous layers of the soil surface that often restrict water movement, air entry, and seedling emergence from the soil. They generally are less than 2 inches thick and are massive.
Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.
Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.
Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the "Soil Survey Manual."

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

Drainageway. A general term for a course or channel along which water moves in draining an area. A term restricted to relatively small, linear depressions that at some time move concentrated water and either do not have a defined channel or have only a small defined channel.

Earthy fill. See Mine spoil.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

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

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

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion pavement. A surficial lag concentration or layer of gravel and other rock fragments that remains on the soil surface after sheet or rill erosion or wind has removed the finer soil particles and that tends to protect the underlying soil from further erosion.

Erosion surface. A land surface shaped by the action of erosion, especially by running water.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

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

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. The nearly level plain that borders a stream and is subject to flooding unless protected artificially.

Flood-plain landforms. A variety of constructional and erosional features produced by stream channel migration and flooding. Examples include backswamps, flood-plain splays, meanders, meander belts, meander scrolls, oxbow lakes, and natural levees.

Flood-plain splay. A fan-shaped deposit or other outspread deposit formed where an overloaded stream breaks through a levee (natural or artificial) and deposits its material (commonly coarse grained) on the flood plain.

Flood-plain step. An essentially flat, terrace-like alluvial surface within a valley that is frequently covered by floodwater from the present stream; any approximately horizontal surface still actively modified by fluvial scour and/or deposition. May occur individually or as a series of steps.

Flooding frequency class. Flooding frequency class is the number of times flooding occurs over a period of time and is expressed as a class. The classes of flooding are defined as follows:

None. No reasonable possibility of flooding; near 0 percent chance of flooding in any year or less than 1 time in 500 years.

Very Rare. Flooding is very unlikely but possible under extremely unusual weather conditions; less than 1 percent chance of flooding in any year or less than 1 time in 100 years but at least 1 time in 500 years.

Rare. Flooding unlikely but possible under unusual weather conditions; 1 to 5 percent chance of flooding in any year or nearly 1 to 5 times in 100 years.

Occasional. Flooding is expected infrequently under usual weather conditions; 5 to 50 percent chance of flooding in any year or >5 to 50 times in 100 years.

Frequent. Flooding is likely to occur often under usual weather conditions; more than a 50 percent chance of flooding in any year or more than 50 times in 100 years, but less than a 50 percent chance of flooding in all months in any year.

Very Frequent. Flooding is likely to occur very often under usual weather conditions; more than a 50 percent chance of flooding in all months of any year.

Fluvial. Of or pertaining to rivers or streams; produced by stream or river action.

Footslope. The concave surface at the base of a hillslope. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

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

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A small channel with steep sides caused by erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Head slope (geomorphology). A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

Hill. A generic term for an elevated area of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline. Slopes are generally more than 15 percent. The distinction between a hill and a mountain is arbitrary and may depend on local usage.

Hillslope. A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of a hill.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

L horizon.—A layer of organic and mineral limnic materials, including coprogenous earth (sedimentary peat), diatomaceous earth, and marl.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

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

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

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties include depth to a seasonal high water table, the infiltration rate, and depth to a layer that significantly restricts the downward movement of water. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock that was formed by cooling and solidification of magma and that has not been changed appreciably by weathering since its formation. Major varieties include plutonic and volcanic rock (e.g., andesite, basalt, and granite).

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interfluve. A landform composed of the relatively undissected upland or ridge between two adjacent valleys containing streams flowing in the same general direction. An elevated area between two drainageways that sheds water to those drainageways.

Interfluve (geomorphology). A geomorphic component of hills consisting of the uppermost, comparatively level or gently sloping area of a hill; shoulders of backwearing hillslopes can narrow the upland or can merge, resulting in a strongly convex shape.

Intermittent stream. A stream, or reach of a stream, that does not flow year-round but that is commonly dry for 3 or more months out of 12 and whose channel is generally below the local water table. It flows only during wet periods or when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. See Redoximorphic features.

Irrigation. Application of water to soils to assist in production of crops.

Ksat. See Saturated hydraulic conductivity.

Landslide. A general, encompassing term for most types of mass movement landforms and processes involving the downslope transport and outward deposition of soil and rock materials caused by gravitational forces; the movement may or may not involve saturated materials. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

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

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.
Low strength. The soil is not strong enough to support loads.
Mass movement. A generic term for the dislodgment and downslope transport of soil and rock material as a unit under direct gravitational stress.
Masses. See Redoximorphic features.
Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.
Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.
Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement at depth in the earth's crust. Nearly all such rocks are crystalline.
Mine spoil. An accumulation of displaced earthy material, rock, or other waste material removed during mining or excavation. Also called earthy fill.
Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.
Miscellaneous area. A kind of map unit that has little or no natural soil and supports little or no vegetation.
Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.
Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.
Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.
Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).
Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.
Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)
Nodules. See Redoximorphic features.
Nose slope (geomorphology). A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent. Nose slopes consist dominantly of colluvium and slope-wash sediments (for example, slope alluvium).
Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.
Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Permafrost. Ground, soil, or rock that remains at or below 0 degrees C for at least 2 years. It is defined on the basis of temperature and is not necessarily frozen.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting (in tables). Pits caused by melting around ice. They form on the soil after plant cover is removed.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Pore linings. See Redoximorphic features.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed as pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. See Redoximorphic features.

Redoximorphic depletions. See Redoximorphic features.

Redoximorphic features. Redoximorphic features are associated with wetness and result from alternating periods of reduction and oxidation of iron and manganese compounds in the soil. Reduction occurs during saturation with water, and oxidation occurs when the soil is not saturated. Characteristic color patterns are

created by these processes. The reduced iron and manganese ions may be removed from a soil if vertical or lateral fluxes of water occur, in which case there is no iron or manganese precipitation in that soil. Wherever the iron and manganese are oxidized and precipitated, they form either soft masses or hard concretions or nodules. Movement of iron and manganese as a result of redoximorphic processes in a soil may result in redoximorphic features that are defined as follows:

1. Redoximorphic concentrations.—These are zones of apparent accumulation of iron-manganese oxides, including:
   A. Nodules and concretions, which are cemented bodies that can be removed from the soil intact. Concretions are distinguished from nodules on the basis of internal organization. A concretion typically has concentric layers that are visible to the naked eye. Nodules do not have visible organized internal structure; *and*
   B. Masses, which are noncemented concentrations of substances within the soil matrix; *and*
   C. Pore linings, i.e., zones of accumulation along pores that may be either coatings on pore surfaces or impregnations from the matrix adjacent to the pores.
2. Redoximorphic depletions.—These are zones of low chroma (chromas less than those in the matrix) where either iron-manganese oxides alone or both iron-manganese oxides and clay have been stripped out, including:
   A. Iron depletions, i.e., zones that contain low amounts of iron and manganese oxides but have a clay content similar to that of the adjacent matrix; *and*
   B. Clay depletions, i.e., zones that contain low amounts of iron, manganese, and clay (often referred to as silt coatings or skeletans).
3. Reduced matrix.—This is a soil matrix that has low chroma *in situ* but undergoes a change in hue or chroma within 30 minutes after the soil material has been exposed to air.

Reduced matrix. See Redoximorphic features.

Regolith. All unconsolidated earth materials above the solid bedrock. It includes material weathered in place from all kinds of bedrock and alluvial, glacial, eolian, lacustrine, and pyroclastic deposits.

Relief. The relative difference in elevation between the upland summits and the lowlands or valleys of a given region.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as bedrock disintegrated in place.

Rill. A very small, steep-sided channel resulting from erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. A rill generally is not an obstacle to wheeled vehicles and is shallow enough to be smoothed over by ordinary tillage.

Riser. The vertical or steep side slope (e.g., escarpment) of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural, steplike landforms, such as successive stream terraces.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Saprolite. Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Saturated hydraulic conductivity (Ksat). The ease with which pores of a saturated soil transmit water. Formally, the proportionality coefficient that expresses the relationship of the rate of water movement to hydraulic gradient in Darcy's Law, a law that describes the rate of water movement through porous media. Commonly abbreviated as "Ksat." Terms describing saturated hydraulic conductivity are *very high*, 100 or more micrometers per second (14.17 or more inches per hour); *high*, 10 to 100 micrometers per second (1.417 to 14.17 inches per hour); *moderately high*, 1 to 10 micrometers per second (0.1417 inch to 1.417 inches per hour); *moderately low*, 0.1 to 1 micrometer per second (0.01417 to 0.1417 inch per hour); *low*, 0.01 to 0.1 micrometer per second (0.001417 to 0.01417 inch per hour); and *very low*, less than 0.01 micrometer per second (less than 0.001417 inch per hour). To convert inches per hour to micrometers per second, multiply inches per hour by 7.0572. To convert micrometers per second to inches per hour, multiply micrometers per second by 0.1417.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sedimentary rock. A consolidated deposit of clastic particles, chemical precipitates, or organic remains accumulated at or near the surface of the earth under normal low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and eolian, lacustrine, and marine deposits. Examples are sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock that formed by the hardening of a deposit of clay, silty clay, or silty clay loam and that has a tendency to split into thin layers.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The convex, erosional surface near the top of a hillslope. A shoulder is a transition from summit to backslope.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Shrub-coppice dune. A small, streamlined dune that forms around brush and clump vegetation.

Side slope (geomorphology). A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel. Side slopes are dominantly colluvium and slope-wash sediments.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slickensides (pedogenic). Grooved, striated, and/or glossy (shiny) slip faces on structural peds, such as wedges; produced by shrink-swell processes, most commonly in soils that have a high content of expansive clays.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope alluvium. Sediment gradually transported down the slopes of mountains or hills primarily by nonchannel alluvial processes (i.e., slope-wash processes) and characterized by particle sorting. Lateral particle sorting is evident on long slopes. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of rock fragments and may be separated by stone lines. Burnished peds and sorting of rounded or subrounded pebbles or cobbles distinguish these materials from unsorted colluvial deposits.

Slow refill (in tables). The slow filling of ponds, resulting from restricted water transmission in the soil.

Slow water movement (in tables). Restricted downward movement of water through the soil. See Saturated hydraulic conductivity.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief and by the passage of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. In a vertical cross section, a line formed by scattered fragments or a discrete layer of angular and subangular rock fragments (commonly a gravel- or cobble-sized lag concentration) that formerly was draped across a topographic surface and was later buried by additional sediments. A stone line generally caps material that was subject to weathering, soil formation, and erosion before burial. Many stone lines seem to be buried erosion pavements, originally formed by sheet and rill erosion across the land surface.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream; represents the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of fluvial erosion or deposition.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace (conservation). An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geomorphology). A steplike surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, lake, or seashore. The term is usually applied both to the relatively flat summit surface (tread) that was cut or built by stream or wave action and to the steeper descending slope (scarp or riser) that has graded to a lower base level of erosion.

Terracettes. Small, irregular steplike forms on steep hillslopes, especially in pasture, formed by creep or erosion of surficial materials that may be induced or enhanced by trampling of livestock, such as sheep or cattle.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Toeslope. The gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tread. The flat to gently sloping, topmost, laterally extensive slope of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural steplike landforms, such as successive stream terraces.

Upland. An informal, general term for the higher ground of a region, in contrast with a low-lying adjacent area, such as a valley or plain, or for land at a higher elevation than the flood plain or low stream terrace; land above the footslope zone of the hillslope continuum.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical disintegration, chemical decomposition, and biologically induced changes in rocks or other deposits at or near the earth's surface by atmospheric or biologic agents or by circulating surface waters but involving essentially no transport of the altered material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Temperature and Precipitation

(Recorded in the period 1948-2005 at Washington, D.C., National Airport, Virginia)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	43.3	28.2	35.8	69	5	60	3.21	1.93	4.48	6	6.0
February----	47.2	30.6	38.9	75	11	92	2.63	1.36	3.82	5	5.1
March-------	56.3	38.0	47.2	83	19	255	3.60	2.09	5.00	6	1.6
April-------	66.8	46.6	56.7	89	30	501	2.77	1.78	3.66	5	0.0
May---------	75.8	56.6	66.2	93	42	812	3.82	2.35	5.31	7	0.0
June--------	84.2	65.9	75.1	98	51	1052	3.13	1.64	4.16	5	0.0
July--------	88.5	71.1	79.8	100	59	1234	3.66	2.20	5.10	6	0.0
August------	86.7	69.5	78.1	99	56	1181	3.44	1.86	4.96	5	0.0
September---	79.7	62.7	71.2	95	47	937	3.79	1.40	5.77	5	0.0
October-----	68.7	50.5	59.6	86	34	606	3.22	1.50	4.75	4	0.0
November----	58.0	40.9	49.5	80	24	298	3.03	1.44	4.58	5	0.7
December----	47.8	32.9	40.4	72	13	112	3.05	1.53	4.43	5	1.4
Yearly:											
Average---	66.9	49.5	58.2	---	---	---	---	---	---	---	---
Extreme---	105	-5	---	101	3	---	---	---	---	---	---
Total-----	---	---	---	---	---	7141	39.34	33.65	44.50	64	14.8

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Freeze Dates in Spring and Fall

(Recorded for the period 1948-2005 at Washington, D.C., National Airport, VA)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Mar. 23	Mar. 29	Apr. 10
2 year in 10 later than--	Mar. 16	Mar. 24	Apr. 5
5 year in 10 later than--	Mar. 3	Mar. 15	Mar. 28
First freezing temperature in fall:			
1 yr in 10 earlier than--	Nov. 27	Nov. 9	Oct. 27
2 yr in 10 earlier than--	Dec. 2	Nov. 16	Nov. 2
5 yr in 10 earlier than--	Dec. 12	Nov. 29	Nov. 14

Growing Season

(Recorded for the period 1948-2005 at Washington, D.C., National Airport, VA)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	256	231	204
8 years in 10	265	240	213
5 years in 10	283	258	230
2 years in 10	300	275	247
1 year in 10	309	284	256

Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
1A	Hatboro sandy loam, 0 to 3 percent slopes, frequently flooded	21	0.1
2A	Codorus-Hatboro complex, 0 to 3 percent slopes, frequently flooded	15	*
3A	Urban land-Codorus complex, 0 to 3 percent slopes	134	0.8
4A	Sassafras-Urban land-Neabsco complex, 0 to 3 percent slopes	290	1.7
4B	Urban land-Sassafras-Neabsco complex, 3 to 8 percent slopes	3,037	18.2
4C	Urban land-Sassafras-Neabsco complex, 8 to 15 percent slopes	24	0.1
5	Arlington National Cemetery	641	3.8
6B	Glenelg loam, 3 to 8 percent slopes	71	0.4
6C	Glenelg loam, 8 to 15 percent slopes	152	0.9
6D	Glenelg-Manor complex, 15 to 35 percent slopes	805	4.8
7A	Glenelg-Urban land complex, 0 to 3 percent slopes	183	1.1
7B	Glenelg-Urban land complex, 3 to 8 percent slopes	978	5.9
7C	Glenelg-Urban land complex, 8 to 15 percent slopes	1,232	7.4
7D	Glenelg-Urban land complex, 15 to 25 percent slopes	505	3.0
9B	Sassafras gravelly sandy loam, 3 to 8 percent slopes	76	0.5
9C	Sassafras gravelly sandy loam, 8 to 15 percent slopes	127	0.8
9D	Sassafras gravelly sandy loam, 15 to 25 percent slopes	98	0.6
10B	Urban land-Glenelg complex, 3 to 8 percent slopes	1,144	6.9
10C	Urban land-Glenelg complex, 8 to 15 percent slopes	534	3.2
10D	Urban land-Glenelg complex, 15 to 25 percent slopes	227	1.4
11B	Urban land-Sassafras complex, 3 to 8 percent slopes	88	0.5
11C	Urban land-Sassafras complex, 8 to 15 percent slopes	316	1.9
11D	Urban land-Sassafras complex, 15 to 25 percent slopes	100	0.6
12	Urban land-Udorthents complex, 2 to 15 percent slopes	5,055	30.3
13	Udorthents, loamy	297	1.8
15A	Sassafras-Urban land complex, 0 to 3 percent slopes	6	*
15C	Sassafras-Urban land complex, 8 to 15 percent slopes	44	0.3
15D	Sassafras-Urban land complex, 15 to 25 percent slopes	221	1.3
16B	Urban land-Woodstown complex, 3 to 8 percent slopes	171	1.0
W	Water	108	0.6
	Total	16,700	100.0

* Less than 0.1 percent.

Land Capability Class, Virginia Soil Management Group, and Nonirrigated Yields

Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.

Map symbol and soil name	Land capability	Virginia Soil Management Group	Pasture
			AUM
1A:			
Hatboro	4w	HH	1.5
2A:			
Codorus	2w	AA	5.5
Hatboro	4w	HH	1.5
3A:			
Urban land	8s		---
Codorus	2w	AA	5.5
4A:			
Sassafras	2e	T	8.0
Urban land	8s		---
Neabsco	2w	BB	8.0
4B:			
Urban land	8s		---
Sassafras	2e	T	6.0
Neabsco	2w	BB	7.0
4C:			
Urban land	8s		---
Sassafras	3e	T	6.0
Neabsco	3e	BB	6.5
5:			
Arlington National Cemetery	8s		---
6B:			
Glenelg	2e	U	10.5
6C:			
Glenelg	3e	U	9.5
6D:			
Glenelg	4e	U	4.0
Manor	4e	FF	4.0
7A:			
Glenelg	2e	U	10.5
Urban land	8s		---

Land Capability Class, Virginia Soil Management Group, and Nonirrigated Yields—Continued

Map symbol and soil name	Land capability	Virginia Soil Management Group	Pasture
			AUM
7B:			
Glenelg	2e	U	10.5
Urban land	8s		---
7C:			
Glenelg	3e	U	9.5
Urban land	8s		---
7D:			
Glenelg	2e	U	4.0
Urban land	8s		---
9B:			
Sassafras	2e	T	6.0
9C:			
Sassafras	3e	T	6.0
9D:			
Sassafras	4e	T	5.5
10B:			
Urban land	8s		---
Glenelg	2e	U	10.5
10C:			
Urban land	8s		---
Glenelg	3e	U	9.5
10D:			
Urban land	8s		---
Glenelg	4e	U	4.0
11B:			
Urban land	8s		---
Sassafras	2e	T	---
11C:			
Urban land	8s		---
Sassafras	3e	T	6.0
11D:			
Urban land	8s		---
Sassafras	4e	T	5.5
12:			
Urban land	8s		---
Udorthents	6s		---

Land Capability Class, Virginia Soil Management Group, and Nonirrigated Yields—Continued

Map symbol and soil name	Land capability	Virginia Soil Management Group	Pasture
			AUM
13:			
Udorthents	6s		---
15A:			
Sassafras	1	T	8.0
Urban land	8s		---
15C:			
Sassafras	3e	T	6.0
Urban land	8s		---
15D:			
Sassafras	4e	T	5.5
Urban land	8s		---
16B:			
Urban land	8s		---
Woodstown	2w	J	8.0

Forestland Productivity

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber	
			cu ft/ac	
1A:				
Hatboro	American sycamore	60	43	eastern white pine, white spruce
	pin oak	60	43	
	red maple	60	43	
2A:				
Codorus	black walnut	100	---	black walnut, eastern white pine, sugar maple, white ash, yellow-poplar
	eastern white pine	100	143	
	northern red oak	90	72	
	sugar maple	90	57	
	white ash	90	72	
	yellow-poplar	100	114	
Hatboro	American sycamore	60	43	eastern white pine, white spruce
	pin oak	60	43	
	red maple	60	43	
3A:				
Urban land	---	---	---	---
Codorus	black walnut	100	---	black walnut, eastern white pine, sugar maple, white ash, yellow-poplar
	eastern white pine	100	143	
	northern red oak	90	72	
	sugar maple	90	57	
	white ash	90	72	
	yellow-poplar	100	114	
4A:				
Sassafras	loblolly pine	85	114	eastern white pine, loblolly pine, yellow-poplar
	Virginia pine	70	114	
	white oak	70	57	
	yellow-poplar	80	72	
Urban land	---	---	---	---
Neabsco	loblolly pine	70	86	eastern white pine, loblolly pine, Virginia pine
	northern red oak	65	43	
	Virginia pine	70	114	
4B:				
Urban land	---	---	---	---
Sassafras	loblolly pine	85	114	eastern white pine, loblolly pine, yellow-poplar
	Virginia pine	70	114	
	white oak	70	57	
	yellow-poplar	80	72	
Neabsco	loblolly pine	70	86	eastern white pine, loblolly pine, Virginia pine
	northern red oak	65	43	
	Virginia pine	70	114	
4C:				
Urban land	---	---	---	---
Sassafras	loblolly pine	85	114	eastern white pine, loblolly pine, yellow-poplar
	Virginia pine	70	114	
	white oak	70	57	
	yellow-poplar	80	72	

Forestland Productivity—Continued

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber	
			cu ft/ac	
Neabsco	loblolly pine	70	86	eastern white pine, loblolly pine, Virginia pine
	northern red oak	65	43	
	Virginia pine	70	114	
5: Arlington National Cemetery	---	---	---	---
6B: Glenelg	black oak	78	57	black walnut, eastern white pine, shortleaf pine, Virginia pine, yellow-poplar
	hickory	75	---	
	shortleaf pine	70	114	
	Virginia pine	70	114	
	white oak	75	57	
	yellow-poplar	87	86	
6C: Glenelg	black oak	78	57	black walnut, eastern white pine, shortleaf pine, Virginia pine, yellow-poplar
	hickory	75	---	
	shortleaf pine	70	114	
	Virginia pine	70	114	
	white oak	75	57	
	yellow-poplar	87	86	
6D: Glenelg	black oak	78	57	black walnut, eastern white pine, shortleaf pine, Virginia pine, yellow-poplar
	hickory	75	---	
	shortleaf pine	70	114	
	Virginia pine	70	114	
	white oak	75	57	
	yellow-poplar	87	86	
Manor	black oak	80	57	eastern white pine, shortleaf pine, Virginia pine, yellow-poplar
	shortleaf pine	80	129	
	Virginia pine	80	114	
	yellow-poplar	90	86	
7A: Glenelg	black oak	78	57	black walnut, eastern white pine, shortleaf pine, Virginia pine, yellow-poplar
	hickory	75	---	
	shortleaf pine	70	114	
	Virginia pine	70	114	
	white oak	75	57	
	yellow-poplar	87	86	
Urban land	---	---	---	---
7B: Glenelg	black oak	78	57	black walnut, eastern white pine, shortleaf pine, Virginia pine, yellow-poplar
	hickory	75	---	
	shortleaf pine	70	114	
	Virginia pine	70	114	
	white oak	75	57	
	yellow-poplar	87	86	
Urban land	---	---	---	---

Forestland Productivity—Continued

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber	
			cu ft/ac	
7C:				
Glenelg	black oak	78	57	black walnut,
	hickory	75	---	eastern white
	shortleaf pine	70	114	pine, shortleaf
	Virginia pine	70	114	pine, Virginia
	white oak	75	57	pine, yellow-
	yellow-poplar	87	86	poplar
Urban land	---	---	---	---
7D:				
Glenelg	black oak	78	57	black walnut,
	hickory	75	---	eastern white
	shortleaf pine	70	114	pine, shortleaf
	Virginia pine	70	114	pine, Virginia
	white oak	75	57	pine, yellow-
	yellow-poplar	87	86	poplar
Urban land	---	---	---	---
9B:				
Sassafras	loblolly pine	85	114	eastern white pine,
	Virginia pine	70	114	loblolly pine,
	white oak	70	57	yellow-poplar
	yellow-poplar	80	72	
9C:				
Sassafras	loblolly pine	85	114	eastern white pine,
	Virginia pine	70	114	loblolly pine,
	white oak	70	57	yellow-poplar
	yellow-poplar	80	72	
9D:				
Sassafras	loblolly pine	85	114	eastern white pine,
	Virginia pine	70	114	loblolly pine,
	white oak	70	57	yellow-poplar
	yellow-poplar	80	72	
10B:				
Urban land	---	---	---	---
Glenelg	black oak	78	57	black walnut,
	hickory	75	---	eastern white
	shortleaf pine	70	114	pine, shortleaf
	Virginia pine	70	114	pine, Virginia
	white oak	75	57	pine, yellow-
	yellow-poplar	87	86	poplar
10C:				
Urban land	---	---	---	---
Glenelg	black oak	78	57	black walnut,
	hickory	75	---	eastern white
	shortleaf pine	70	114	pine, shortleaf
	Virginia pine	70	114	pine, Virginia
	white oak	75	57	pine, yellow-
	yellow-poplar	87	86	poplar

Forestland Productivity—Continued

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber	
			cu ft/ac	
10D:				
Urban land	---	---	---	---
Glenelg	black oak	78	57	black walnut, eastern white pine, shortleaf pine, Virginia pine, yellow-poplar
	hickory	75	---	
	shortleaf pine	70	114	
	Virginia pine	70	114	
	white oak	75	57	
	yellow-poplar	87	86	
11B:				
Urban land	---	---	---	---
Sassafras	loblolly pine	85	114	eastern white pine, loblolly pine, yellow-poplar
	Virginia pine	70	114	
	white oak	70	57	
	yellow-poplar	80	72	
11C:				
Urban land	---	---	---	---
Sassafras	loblolly pine	85	114	eastern white pine, loblolly pine, yellow-poplar
	Virginia pine	70	114	
	white oak	70	57	
	yellow-poplar	80	72	
11D:				
Urban land	---	---	---	---
Sassafras	loblolly pine	85	114	eastern white pine, loblolly pine, yellow-poplar
	Virginia pine	70	114	
	white oak	70	57	
	yellow-poplar	80	72	
12:				
Urban land	---	---	---	---
Udorthents	---	---	---	---
13:				
Udorthents	---	---	---	---
15A:				
Sassafras	loblolly pine	85	114	eastern white pine, loblolly pine, yellow-poplar
	Virginia pine	70	114	
	white oak	70	57	
	yellow-poplar	80	72	
Urban land	---	---	---	---
15C:				
Sassafras	loblolly pine	85	114	eastern white pine, loblolly pine, yellow-poplar
	Virginia pine	70	114	
	white oak	70	57	
	yellow-poplar	80	72	
Urban land	---	---	---	---

Forestland Productivity—Continued

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber	
			cu ft/ac	
15D:				
Sassafras	loblolly pine	85	114	eastern white pine, loblolly pine, yellow-poplar
	Virginia pine	70	114	
	white oak	70	57	
	yellow-poplar	80	72	
Urban land	---	---	---	---
16B:				
Urban land	---	---	---	---
Woodstown	loblolly pine	85	114	eastern white pine, loblolly pine, yellow-poplar
	sweetgum	90	100	
	white oak	80	57	
	yellow-poplar	90	86	

Haul Roads, Log Landings, and Soil Rutting on Forestland

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Limitations affecting construction of haul roads and log landings		Suitability for log landings		Soil rutting hazard	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1A:						
Hatboro	Severe		Poorly suited		Severe	
	Flooding	1.00	Flooding	1.00	Low strength	1.00
	Low strength	0.50	Wetness	1.00		
			Low strength	0.50		
2A:						
Codorus	Severe		Poorly suited		Severe	
	Flooding	1.00	Flooding	1.00	Low strength	1.00
	Low strength	0.50	Low strength	0.50		
			Wetness	0.50		
Hatboro	Severe		Poorly suited		Severe	
	Flooding	1.00	Flooding	1.00	Low strength	1.00
	Low strength	0.50	Wetness	1.00		
			Low strength	0.50		
3A:						
Urban land	Not rated		Not rated		Not rated	
Codorus	Severe		Poorly suited		Severe	
	Flooding	1.00	Flooding	1.00	Low strength	1.00
	Low strength	0.50	Low strength	0.50		
			Wetness	0.50		
4A:						
Sassafras	Slight		Well suited		Moderate	
					Low strength	0.50
Urban land	Not rated		Not rated		Not rated	
Neabsco	Moderate		Moderately suited		Severe	
	Low strength	0.50	Sandiness	0.50	Low strength	1.00
	Sandiness	0.50	Low strength	0.50		
			Wetness	0.50		
4B:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Slight		Well suited		Moderate	
					Low strength	0.50
Neabsco	Moderate		Moderately suited		Severe	
	Low strength	0.50	Sandiness	0.50	Low strength	1.00
	Sandiness	0.50	Low strength	0.50		
			Wetness	0.50		
4C:						
Urban land	Not rated		Not rated		Not rated	

Haul Roads, Log Landings, and Soil Rutting on Forestland—Continued

Map symbol and soil name	Limitations affecting construction of haul roads and log landings		Suitability for log landings		Soil rutting hazard	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Sassafras	Slight		Moderately suited		Moderate	
			Slope	0.50	Low strength	0.50
Neabsco	Moderate		Moderately suited		Severe	
	Low strength	0.50	Slope	0.50	Low strength	1.00
	Sandiness	0.50	Sandiness	0.50		
			Low strength	0.50		
5:						
Arlington National Cemetery	Not rated		Not rated		Not rated	
6B:						
Glenelg	Moderate		Moderately suited		Severe	
	Low strength	0.50	Low strength	0.50	Low strength	1.00
6C:						
Glenelg	Moderate		Moderately suited		Severe	
	Low strength	0.50	Slope	0.50	Low strength	1.00
			Low strength	0.50		
6D:						
Glenelg	Moderate		Poorly suited		Severe	
	Slope	0.50	Slope	1.00	Low strength	1.00
			Low strength	0.50		
Manor	Moderate		Poorly suited		Moderate	
	Slope	0.50	Slope	1.00	Low strength	0.50
7A:						
Glenelg	Moderate		Moderately suited		Severe	
	Low strength	0.50	Low strength	0.50	Low strength	1.00
Urban land	Not rated		Not rated		Not rated	
7B:						
Glenelg	Moderate		Moderately suited		Severe	
	Low strength	0.50	Low strength	0.50	Low strength	1.00
Urban land	Not rated		Not rated		Not rated	
7C:						
Glenelg	Moderate		Moderately suited		Severe	
	Low strength	0.50	Slope	0.50	Low strength	1.00
			Low strength	0.50		
Urban land	Not rated		Not rated		Not rated	
7D:						
Glenelg	Moderate		Poorly suited		Severe	
	Slope	0.50	Slope	1.00	Low strength	1.00
			Low strength	0.50		

Haul Roads, Log Landings, and Soil Rutting on Forestland—Continued

Map symbol and soil name	Limitations affecting construction of haul roads and log landings		Suitability for log landings		Soil rutting hazard	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Urban land	Not rated		Not rated		Not rated	
9B:						
Sassafras	Slight		Well suited		Moderate Low strength	0.50
9C:						
Sassafras	Slight		Moderately suited Slope	0.50	Moderate Low strength	0.50
9D:						
Sassafras	Moderate Slope	0.50	Poorly suited Slope	1.00	Moderate Low strength	0.50
10B:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Moderate Low strength	0.50	Moderately suited Low strength	0.50	Severe Low strength	1.00
10C:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Moderate Low strength	0.50	Moderately suited Slope Low strength	0.50 0.50	Severe Low strength	1.00
10D:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Moderate Slope	0.50	Poorly suited Slope Low strength	1.00 0.50	Severe Low strength	1.00
11B:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Slight		Well suited		Moderate Low strength	0.50
11C:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Slight		Moderately suited Slope	0.50	Moderate Low strength	0.50

Haul Roads, Log Landings, and Soil Rutting on Forestland—Continued

Map symbol and soil name	Limitations affecting construction of haul roads and log landings		Suitability for log landings		Soil rutting hazard	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
11D:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Moderate Slope	0.50	Poorly suited Slope	1.00	Moderate Low strength	0.50
12:						
Urban land	Not rated		Not rated		Not rated	
Udorthents	Not rated		Not rated		Not rated	
13:						
Udorthents	Not rated		Not rated		Not rated	
15A:						
Sassafras	Slight		Well suited		Moderate Low strength	0.50
Urban land	Not rated		Not rated		Not rated	
15C:						
Sassafras	Slight		Moderately suited Slope	0.50	Moderate Low strength	0.50
Urban land	Not rated		Not rated		Not rated	
15D:						
Sassafras	Moderate Slope	0.50	Poorly suited Slope	1.00	Moderate Low strength	0.50
Urban land	Not rated		Not rated		Not rated	
16B:						
Urban land	Not rated		Not rated		Not rated	
Woodstown	Slight		Well suited		Moderate Low strength	0.50

Hazard of Erosion and Suitability for Roads on Forestland

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Hazard of off-road or off-trail erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1A:						
Hatboro	Slight		Slight		Poorly suited	
					Flooding	1.00
					Wetness	1.00
					Low strength	0.50
2A:						
Codorus	Slight		Slight		Poorly suited	
					Flooding	1.00
					Low strength	0.50
					Wetness	0.50
Hatboro	Slight		Slight		Poorly suited	
					Flooding	1.00
					Wetness	1.00
					Low strength	0.50
3A:						
Urban land	Not rated		Not rated		Not rated	
Codorus	Slight		Slight		Poorly suited	
					Flooding	1.00
					Low strength	0.50
					Wetness	0.50
4A:						
Sassafras	Slight		Slight		Well suited	
Urban land	Not rated		Not rated		Not rated	
Neabsco	Slight		Slight		Moderately suited	
					Sandiness	0.50
					Low strength	0.50
					Wetness	0.50
4B:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Slight		Moderate		Well suited	
			Slope/erodibility	0.50		
Neabsco	Slight		Moderate		Moderately suited	
			Slope/erodibility	0.50	Sandiness	0.50
					Low strength	0.50
					Wetness	0.50

Hazard of Erosion and Suitability for Roads on Forestland—Continued

Map symbol and soil name	Hazard of off-road or off-trail erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4C:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Slight		Moderate		Moderately suited	
			Slope/erodibility	0.50	Slope	0.50
Neabsco	Slight		Severe		Moderately suited	
			Slope/erodibility	0.95	Slope	0.50
					Sandiness	0.50
					Low strength	0.50
5:						
Arlington National Cemetery	Not rated		Not rated		Not rated	
6B:						
Glenelg	Slight		Moderate		Moderately suited	
			Slope/erodibility	0.50	Low strength	0.50
6C:						
Glenelg	Moderate		Severe		Moderately suited	
	Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	0.50
					Low strength	0.50
6D:						
Glenelg	Moderate		Severe		Poorly suited	
	Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
					Low strength	0.50
Manor	Moderate		Severe		Poorly suited	
	Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
7A:						
Glenelg	Slight		Slight		Moderately suited	
					Low strength	0.50
Urban land	Not rated		Not rated		Not rated	
7B:						
Glenelg	Slight		Moderate		Moderately suited	
			Slope/erodibility	0.50	Low strength	0.50
Urban land	Not rated		Not rated		Not rated	
7C:						
Glenelg	Moderate		Severe		Moderately suited	
	Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	0.50
					Low strength	0.50
Urban land	Not rated		Not rated		Not rated	

Hazard of Erosion and Suitability for Roads on Forestland—Continued

Map symbol and soil name	Hazard of off-road or off-trail erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7D:						
Glenelg	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Low strength	1.00 0.50
Urban land	Not rated		Not rated		Not rated	
9B:						
Sassafras	Slight		Moderate Slope/erodibility	0.50	Well suited	
9C:						
Sassafras	Slight		Moderate Slope/erodibility	0.50	Moderately suited Slope	0.50
9D:						
Sassafras	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
10B:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Slight		Moderate Slope/erodibility	0.50	Moderately suited Low strength	0.50
10C:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Moderately suited Slope Low strength	0.50 0.50
10D:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope Low strength	1.00 0.50
11B:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Slight		Moderate Slope/erodibility	0.50	Well suited	

Hazard of Erosion and Suitability for Roads on Forestland—Continued

Map symbol and soil name	Hazard of off-road or off-trail erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
11C:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Slight		Moderate Slope/erodibility	0.50	Moderately suited Slope	0.50
11D:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
12:						
Urban land	Not rated		Not rated		Not rated	
Udorthents	Not rated		Not rated		Not rated	
13:						
Udorthents	Not rated		Not rated		Not rated	
15A:						
Sassafras	Slight		Slight		Well suited	
Urban land	Not rated		Not rated		Not rated	
15C:						
Sassafras	Slight		Moderate Slope/erodibility	0.50	Moderately suited Slope	0.50
Urban land	Not rated		Not rated		Not rated	
15D:						
Sassafras	Moderate Slope/erodibility	0.50	Severe Slope/erodibility	0.95	Poorly suited Slope	1.00
Urban land	Not rated		Not rated		Not rated	
16B:						
Urban land	Not rated		Not rated		Not rated	
Woodstown	Slight		Moderate Slope/erodibility	0.50	Well suited	

Forestland Planting and Harvesting

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Suitability for hand planting		Suitability for mechanical planting		Suitability for use of harvesting equipment	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1A:						
Hatboro	Well suited		Well suited		Moderately suited	
					Low strength	0.50
2A:						
Codorus	Well suited		Well suited		Moderately suited	
					Low strength	0.50
Hatboro	Well suited		Well suited		Moderately suited	
					Low strength	0.50
3A:						
Urban land	Not rated		Not rated		Not rated	
Codorus	Well suited		Well suited		Moderately suited	
					Low strength	0.50
4A:						
Sassafras	Moderately suited		Moderately suited		Well suited	
	Stickiness; high plasticity index	0.50	Stickiness; high plasticity index	0.50		
			Rock fragments	0.50		
Urban land	Not rated		Not rated		Not rated	
Neabsco	Moderately suited		Moderately suited		Moderately suited	
	Sandiness	0.50	Sandiness	0.50	Low strength	0.50
					Sandiness	0.50
4B:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Moderately suited		Moderately suited		Well suited	
	Stickiness; high plasticity index	0.50	Slope	0.50		
			Stickiness; high plasticity index	0.50		
			Rock fragments	0.50		
Neabsco	Moderately suited		Moderately suited		Moderately suited	
	Sandiness	0.50	Sandiness	0.50	Low strength	0.50
			Slope	0.50	Sandiness	0.50
4C:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Moderately suited		Moderately suited		Well suited	
	Stickiness; high plasticity index	0.50	Slope	0.50		
			Stickiness; high plasticity index	0.50		
			Rock fragments	0.50		

Forestland Planting and Harvesting—Continued

Map symbol and soil name	Suitability for hand planting		Suitability for mechanical planting		Suitability for use of harvesting equipment	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Neabsco	Moderately suited Sandiness	0.50	Moderately suited Slope Sandiness	0.50 0.50	Moderately suited Low strength Sandiness	0.50 0.50
5:						
Arlington National Cemetery	Not rated		Not rated		Not rated	
6B:						
Glenelg	Well suited		Moderately suited Slope	0.50	Moderately suited Low strength	0.50
6C:						
Glenelg	Well suited		Moderately suited Slope	0.50	Moderately suited Low strength	0.50
6D:						
Glenelg	Well suited		Poorly suited Slope	0.75	Moderately suited Low strength Slope	0.50 0.50
Manor	Well suited		Poorly suited Slope	0.75	Moderately suited Slope	0.50
7A:						
Glenelg	Well suited		Well suited		Moderately suited Low strength	0.50
Urban land	Not rated		Not rated		Not rated	
7B:						
Glenelg	Well suited		Moderately suited Slope	0.50	Moderately suited Low strength	0.50
Urban land	Not rated		Not rated		Not rated	
7C:						
Glenelg	Well suited		Moderately suited Slope	0.50	Moderately suited Low strength	0.50
Urban land	Not rated		Not rated		Not rated	
7D:						
Glenelg	Well suited		Poorly suited Slope	0.75	Moderately suited Low strength Slope	0.50 0.50
Urban land	Not rated		Not rated		Not rated	

Forestland Planting and Harvesting—Continued

Map symbol and soil name	Suitability for hand planting		Suitability for mechanical planting		Suitability for use of harvesting equipment	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
9B:						
Sassafras	Moderately suited Stickiness; high plasticity index	0.50	Moderately suited Slope Stickiness; high plasticity index Rock fragments	0.50 0.50 0.50	Well suited	
9C:						
Sassafras	Moderately suited Stickiness; high plasticity index	0.50	Moderately suited Slope Stickiness; high plasticity index Rock fragments	0.50 0.50 0.50	Well suited	
9D:						
Sassafras	Moderately suited Stickiness; high plasticity index	0.50	Poorly suited Slope Stickiness; high plasticity index Rock fragments	0.75 0.50 0.50	Moderately suited Slope	0.50
10B:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Well suited		Moderately suited Slope	0.50	Moderately suited Low strength	0.50
10C:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Well suited		Moderately suited Slope	0.50	Moderately suited Low strength	0.50
10D:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Well suited		Poorly suited Slope	0.75	Moderately suited Low strength Slope	0.50 0.50
11B:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Moderately suited Stickiness; high plasticity index	0.50	Moderately suited Slope Stickiness; high plasticity index Rock fragments	0.50 0.50 0.50	Well suited	
11C:						
Urban land	Not rated		Not rated		Not rated	

Forestland Planting and Harvesting—Continued

Map symbol and soil name	Suitability for hand planting		Suitability for mechanical planting		Suitability for use of harvesting equipment	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Sassafras	Moderately suited Stickiness; high plasticity index	0.50	Moderately suited Slope Stickiness; high plasticity index Rock fragments	0.50 0.50 0.50	Well suited	
11D:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Moderately suited Stickiness; high plasticity index	0.50	Poorly suited Slope Stickiness; high plasticity index Rock fragments	0.75 0.50 0.50	Moderately suited Slope	0.50
12:						
Urban land	Not rated		Not rated		Not rated	
Udorthents	Not rated		Not rated		Not rated	
13:						
Udorthents	Not rated		Not rated		Not rated	
15A:						
Sassafras	Moderately suited Stickiness; high plasticity index	0.50	Moderately suited Stickiness; high plasticity index Rock fragments	0.50 0.50	Well suited	
Urban land	Not rated		Not rated		Not rated	
15C:						
Sassafras	Moderately suited Stickiness; high plasticity index	0.50	Moderately suited Slope Stickiness; high plasticity index Rock fragments	0.50 0.50 0.50	Well suited	
Urban land	Not rated		Not rated		Not rated	
15D:						
Sassafras	Moderately suited Stickiness; high plasticity index	0.50	Poorly suited Slope Stickiness; high plasticity index Rock fragments	0.75 0.50 0.50	Moderately suited Slope	0.50
Urban land	Not rated		Not rated		Not rated	
16B:						
Urban land	Not rated		Not rated		Not rated	
Woodstown	Well suited		Moderately suited Slope	0.50	Well suited	

Forestland Site Preparation

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Suitability for mechanical site preparation (surface)		Suitability for mechanical site preparation (deep)	
	Rating class and limiting features	Value	Rating class and limiting features	Value
1A:				
Hatboro	Well suited		Well suited	
2A:				
Codorus	Well suited		Well suited	
Hatboro	Well suited		Well suited	
3A:				
Urban land	Not rated		Not rated	
Codorus	Well suited		Well suited	
4A:				
Sassafras	Well suited		Well suited	
Urban land	Not rated		Not rated	
Neabsco	Well suited		Well suited	
4B:				
Urban land	Not rated		Not rated	
Sassafras	Well suited		Well suited	
Neabsco	Well suited		Well suited	
4C:				
Urban land	Not rated		Not rated	
Sassafras	Well suited		Well suited	
Neabsco	Well suited		Well suited	
5:				
Arlington National Cemetery	Not rated		Not rated	
6B:				
Glenelg	Well suited		Well suited	
6C:				
Glenelg	Well suited		Well suited	
6D:				
Glenelg	Poorly suited Slope	0.50	Poorly suited Slope	0.50

Forestland Site Preparation—Continued

Map symbol and soil name	Suitability for mechanical site preparation (surface)		Suitability for mechanical site preparation (deep)	
	Rating class and limiting features	Value	Rating class and limiting features	Value
Manor	Poorly suited Slope	0.50	Poorly suited Slope	0.50
7A:				
Glenelg	Well suited		Well suited	
Urban land	Not rated		Not rated	
7B:				
Glenelg	Well suited		Well suited	
Urban land	Not rated		Not rated	
7C:				
Glenelg	Well suited		Well suited	
Urban land	Not rated		Not rated	
7D:				
Glenelg	Poorly suited Slope	0.50	Poorly suited Slope	0.50
Urban land	Not rated		Not rated	
9B:				
Sassafras	Well suited		Well suited	
9C:				
Sassafras	Well suited		Well suited	
9D:				
Sassafras	Poorly suited Slope	0.50	Poorly suited Slope	0.50
10B:				
Urban land	Not rated		Not rated	
Glenelg	Well suited		Well suited	
10C:				
Urban land	Not rated		Not rated	
Glenelg	Well suited		Well suited	
10D:				
Urban land	Not rated		Not rated	
Glenelg	Poorly suited Slope	0.50	Poorly suited Slope	0.50

Forestland Site Preparation—Continued

Map symbol and soil name	Suitability for mechanical site preparation (surface)		Suitability for mechanical site preparation (deep)	
	Rating class and limiting features	Value	Rating class and limiting features	Value
11B:				
Urban land	Not rated		Not rated	
Sassafras	Well suited		Well suited	
11C:				
Urban land	Not rated		Not rated	
Sassafras	Well suited		Well suited	
11D:				
Urban land	Not rated		Not rated	
Sassafras	Poorly suited Slope	0.50	Poorly suited Slope	0.50
12:				
Urban land	Not rated		Not rated	
Udorthents	Not rated		Not rated	
13:				
Udorthents	Not rated		Not rated	
15A:				
Sassafras	Well suited		Well suited	
Urban land	Not rated		Not rated	
15C:				
Sassafras	Well suited		Well suited	
Urban land	Not rated		Not rated	
15D:				
Sassafras	Poorly suited Slope	0.50	Poorly suited Slope	0.50
Urban land	Not rated		Not rated	
16B:				
Urban land	Not rated		Not rated	
Woodstown	Well suited		Well suited	

Damage by Fire and Seedling Mortality on Forestland

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Potential for damage to soil by fire		Potential for seedling mortality	
	Rating class and limiting features	Value	Rating class and limiting features	Value
1A:				
Hatboro	Low Texture/rock fragments	0.10	High Wetness	1.00
2A:				
Codorus	Low Texture/rock fragments	0.10	Low	
Hatboro	Low Texture/rock fragments	0.10	High Wetness	1.00
3A:				
Urban land	Not rated		Not rated	
Codorus	Low Texture/rock fragments	0.10	Low	
4A:				
Sassafras	Moderate Texture/rock fragments	0.50	Low	
Urban land	Not rated		Not rated	
Neabsco	Low Texture/rock fragments	0.10	Low	
4B:				
Urban land	Not rated		Not rated	
Sassafras	Moderate Texture/rock fragments	0.50	Low	
Neabsco	Low Texture/rock fragments	0.10	Low	
4C:				
Urban land	Not rated		Not rated	

Damage by Fire and Seedling Mortality on Forestland—Continued

Map symbol and soil name	Potential for damage to soil by fire		Potential for seedling mortality	
	Rating class and limiting features	Value	Rating class and limiting features	Value
Sassafras	Moderate Texture/rock fragments	0.50	Low	
Neabsco	Low Texture/rock fragments	0.10	Low	
5: Arlington National Cemetery	Not rated		Not rated	
6B: Glenelg	Low Texture/rock fragments	0.10	Low	
6C: Glenelg	Low Texture/rock fragments	0.10	Low	
6D: Glenelg	Low Texture/rock fragments	0.10	Low	
Manor	Moderate Texture/rock fragments	0.50	Low	
7A: Glenelg	Low Texture/rock fragments	0.10	Low	
Urban land	Not rated		Not rated	
7B: Glenelg	Low Texture/rock fragments	0.10	Low	
Urban land	Not rated		Not rated	
7C: Glenelg	Low Texture/rock fragments	0.10	Low	
Urban land	Not rated		Not rated	
7D: Glenelg	Low Texture/rock fragments	0.10	Low	

Damage by Fire and Seedling Mortality on Forestland—Continued

Map symbol and soil name	Potential for damage to soil by fire		Potential for seedling mortality	
	Rating class and limiting features	Value	Rating class and limiting features	Value
Urban land	Not rated		Not rated	
9B:				
Sassafras	Moderate Texture/rock fragments	0.50	Low	
9C:				
Sassafras	Moderate Texture/rock fragments	0.50	Low	
9D:				
Sassafras	Moderate Texture/rock fragments	0.50	Low	
10B:				
Urban land	Not rated		Not rated	
Glenelg	Low Texture/rock fragments	0.10	Low	
10C:				
Urban land	Not rated		Not rated	
Glenelg	Low Texture/rock fragments	0.10	Low	
10D:				
Urban land	Not rated		Not rated	
Glenelg	Low Texture/rock fragments	0.10	Low	
11B:				
Urban land	Not rated		Not rated	
Sassafras	Moderate Texture/rock fragments	0.50	Low	
11C:				
Urban land	Not rated		Not rated	
Sassafras	Moderate Texture/rock fragments	0.50	Low	

Damage by Fire and Seedling Mortality on Forestland—Continued

Map symbol and soil name	Potential for damage to soil by fire		Potential for seedling mortality	
	Rating class and limiting features	Value	Rating class and limiting features	Value
11D:				
Urban land	Not rated		Not rated	
Sassafras	Moderate Texture/rock fragments	0.50	Low	
12:				
Urban land	Not rated		Not rated	
Udorthents	Not rated		Not rated	
13:				
Udorthents	Not rated		Not rated	
15A:				
Sassafras	Moderate Texture/rock fragments	0.50	Low	
Urban land	Not rated		Not rated	
15C:				
Sassafras	Moderate Texture/rock fragments	0.50	Low	
Urban land	Not rated		Not rated	
15D:				
Sassafras	Moderate Texture/rock fragments	0.50	Low	
Urban land	Not rated		Not rated	
16B:				
Urban land	Not rated		Not rated	
Woodstown	Moderate Texture/rock fragments	0.50	Low	

Camp Areas, Picnic Areas, and Playgrounds

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1A:						
Hatboro	Very limited		Very limited		Very limited	
	Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
	Flooding	1.00	Flooding	0.40	Flooding	1.00
2A:						
Codorus	Very limited		Somewhat limited		Very limited	
	Flooding	1.00	Depth to saturated zone	0.75	Flooding	1.00
	Depth to saturated zone	0.98	Flooding	0.40	Depth to saturated zone	0.98
Hatboro	Very limited		Very limited		Very limited	
	Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
	Flooding	1.00	Flooding	0.40	Flooding	1.00
3A:						
Urban land	Not rated		Not rated		Not rated	
Codorus	Very limited		Somewhat limited		Very limited	
	Flooding	1.00	Depth to saturated zone	0.75	Flooding	1.00
	Depth to saturated zone	0.98	Flooding	0.40	Depth to saturated zone	0.98
4A:						
Sassafras	Somewhat limited		Somewhat limited		Very limited	
	Gravel content	0.54	Gravel content	0.54	Gravel content	1.00
Urban land	Not rated		Not rated		Not rated	
Neabsco	Very limited		Very limited		Very limited	
	Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
	Depth to saturated zone	0.81	Depth to saturated zone	0.48	Depth to saturated zone	0.81
4B:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Somewhat limited		Somewhat limited		Very limited	
	Gravel content	0.54	Gravel content	0.54	Gravel content	1.00
					Slope	0.97
Neabsco	Very limited		Very limited		Very limited	
	Slow water movement	1.00	Slow water movement	1.00	Slow water movement	1.00
	Depth to saturated zone	0.81	Depth to saturated zone	0.48	Slope	0.97
					Depth to saturated zone	0.81
4C:						
Urban land	Not rated		Not rated		Not rated	

Camp Areas, Picnic Areas, and Playgrounds—Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Sassafras	Somewhat limited		Somewhat limited		Very limited	
	Gravel content	0.54	Gravel content	0.54	Slope	1.00
	Slope	0.50	Slope	0.50	Gravel content	1.00
Neabsco	Very limited		Very limited		Very limited	
	Slow water movement	1.00	Slow water movement	1.00	Slope	1.00
	Depth to saturated zone	0.81	Slope	0.50	Slow water movement	1.00
	Slope	0.50	Depth to saturated zone	0.48	Depth to saturated zone	0.81
5:						
Arlington National Cemetery	Not rated		Not rated		Not rated	
6B:						
Glenelg	Not limited		Not limited		Somewhat limited	
					Slope	0.88
					Gravel content	0.78
6C:						
Glenelg	Somewhat limited		Somewhat limited		Very limited	
	Slope	0.37	Slope	0.37	Slope	1.00
					Gravel content	0.78
6D:						
Glenelg	Very limited		Very limited		Very limited	
	Slope	1.00	Slope	1.00	Slope	1.00
					Gravel content	0.78
Manor	Very limited		Very limited		Very limited	
	Slope	1.00	Slope	1.00	Slope	1.00
					Gravel content	0.22
7A:						
Glenelg	Not limited		Not limited		Somewhat limited	
					Gravel content	0.78
Urban land	Not rated		Not rated		Not rated	
7B:						
Glenelg	Not limited		Not limited		Somewhat limited	
					Slope	0.88
					Gravel content	0.78
Urban land	Not rated		Not rated		Not rated	
7C:						
Glenelg	Somewhat limited		Somewhat limited		Very limited	
	Slope	0.37	Slope	0.37	Slope	1.00
					Gravel content	0.78
Urban land	Not rated		Not rated		Not rated	
7D:						
Glenelg	Very limited		Very limited		Very limited	
	Slope	1.00	Slope	1.00	Slope	1.00
					Gravel content	0.78

Camp Areas, Picnic Areas, and Playgrounds—Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Urban land	Not rated		Not rated		Not rated	
9B:						
Sassafras	Somewhat limited		Somewhat limited		Very limited	
	Gravel content	0.54	Gravel content	0.54	Gravel content	1.00
					Slope	0.97
9C:						
Sassafras	Somewhat limited		Somewhat limited		Very limited	
	Gravel content	0.54	Gravel content	0.54	Slope	1.00
	Slope	0.37	Slope	0.37	Gravel content	1.00
9D:						
Sassafras	Very limited		Very limited		Very limited	
	Slope	1.00	Slope	1.00	Slope	1.00
	Gravel content	0.54	Gravel content	0.54	Gravel content	1.00
10B:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Not limited		Not limited		Somewhat limited	
					Slope	0.88
					Gravel content	0.78
10C:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Somewhat limited		Somewhat limited		Very limited	
	Slope	0.37	Slope	0.37	Slope	1.00
					Gravel content	0.78
10D:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Very limited		Very limited		Very limited	
	Slope	1.00	Slope	1.00	Slope	1.00
					Gravel content	0.78
11B:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Somewhat limited		Somewhat limited		Very limited	
	Gravel content	0.54	Gravel content	0.54	Gravel content	1.00
					Slope	0.97
11C:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Somewhat limited		Somewhat limited		Very limited	
	Gravel content	0.54	Gravel content	0.54	Slope	1.00
	Slope	0.50	Slope	0.50	Gravel content	1.00
11D:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Very limited		Very limited		Very limited	
	Slope	1.00	Slope	1.00	Slope	1.00
	Gravel content	0.54	Gravel content	0.54	Gravel content	1.00

Camp Areas, Picnic Areas, and Playgrounds—Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
12:						
Urban land	Not rated		Not rated		Not rated	
Udorthents	Not rated		Not rated		Not rated	
13:						
Udorthents	Not rated		Not rated		Not rated	
15A:						
Sassafras	Somewhat limited		Somewhat limited		Very limited	
	Gravel content	0.54	Gravel content	0.54	Gravel content	1.00
Urban land	Not rated		Not rated		Not rated	
15C:						
Sassafras	Somewhat limited		Somewhat limited		Very limited	
	Gravel content	0.54	Gravel content	0.54	Slope	1.00
	Slope	0.50	Slope	0.50	Gravel content	1.00
Urban land	Not rated		Not rated		Not rated	
15D:						
Sassafras	Very limited		Very limited		Very limited	
	Slope	1.00	Slope	1.00	Slope	1.00
	Gravel content	0.54	Gravel content	0.54	Gravel content	1.00
Urban land	Not rated		Not rated		Not rated	
16B:						
Urban land	Not rated		Not rated		Not rated	
Woodstown	Not limited		Not limited		Somewhat limited	
					Slope	0.88

Paths, Trails, and Golf Fairways

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Paths and trails		Off-road motorcycle trails		Golf fairways	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1A:						
Hatboro	Very limited		Very limited		Very limited	
	Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
	Flooding	0.40	Flooding	0.40	Depth to saturated zone	1.00
2A:						
Codorus	Somewhat limited		Somewhat limited		Very limited	
	Depth to saturated zone	0.44	Depth to saturated zone	0.44	Flooding	1.00
	Flooding	0.40	Flooding	0.40	Depth to saturated zone	0.75
Hatboro	Very limited		Very limited		Very limited	
	Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
	Flooding	0.40	Flooding	0.40	Depth to saturated zone	1.00
3A:						
Urban land	Not rated		Not rated		Not rated	
Codorus	Somewhat limited		Somewhat limited		Very limited	
	Depth to saturated zone	0.44	Depth to saturated zone	0.44	Flooding	1.00
	Flooding	0.40	Flooding	0.40	Depth to saturated zone	0.75
4A:						
Sassafras	Not limited		Not limited		Somewhat limited	
					Gravel content	0.54
					Large stones content	0.01
Urban land	Not rated		Not rated		Not rated	
Neabsco	Somewhat limited		Somewhat limited		Somewhat limited	
	Depth to saturated zone	0.11	Depth to saturated zone	0.11	Depth to saturated zone	0.48
4B:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Not limited		Not limited		Somewhat limited	
					Gravel content	0.54
					Large stones content	0.01
Neabsco	Somewhat limited		Somewhat limited		Somewhat limited	
	Depth to saturated zone	0.11	Depth to saturated zone	0.11	Depth to saturated zone	0.48
4C:						
Urban land	Not rated		Not rated		Not rated	

Paths, Trails, and Golf Fairways—Continued

Map symbol and soil name	Paths and trails		Off-road motorcycle trails		Golf fairways	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Sassafras	Not limited		Not limited		Somewhat limited	
					Gravel content	0.54
					Slope	0.50
					Large stones content	0.01
Neabsco	Somewhat limited		Somewhat limited		Somewhat limited	
	Depth to saturated zone	0.11	Depth to saturated zone	0.11	Slope	0.50
					Depth to saturated zone	0.48
5:						
Arlington National Cemetery	Not rated		Not rated		Not rated	
6B:						
Glenelg	Not limited		Not limited		Not limited	
6C:						
Glenelg	Very limited		Very limited		Somewhat limited	
	Water erosion	1.00	Water erosion	1.00	Slope	0.37
6D:						
Glenelg	Very limited		Very limited		Very limited	
	Water erosion	1.00	Water erosion	1.00	Slope	1.00
	Slope	1.00				
Manor	Very limited		Not limited		Very limited	
	Slope	1.00			Slope	1.00
7A:						
Glenelg	Not limited		Not limited		Not limited	
Urban land	Not rated		Not rated		Not rated	
7B:						
Glenelg	Not limited		Not limited		Not limited	
Urban land	Not rated		Not rated		Not rated	
7C:						
Glenelg	Very limited		Very limited		Somewhat limited	
	Water erosion	1.00	Water erosion	1.00	Slope	0.37
Urban land	Not rated		Not rated		Not rated	
7D:						
Glenelg	Very limited		Very limited		Very limited	
	Water erosion	1.00	Water erosion	1.00	Slope	1.00
	Slope	0.50				
Urban land	Not rated		Not rated		Not rated	
9B:						
Sassafras	Not limited		Not limited		Somewhat limited	
					Gravel content	0.54
					Large stones content	0.01

Paths, Trails, and Golf Fairways—Continued

Map symbol and soil name	Paths and trails		Off-road motorcycle trails		Golf fairways	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
9C:						
Sassafras	Not limited		Not limited		Somewhat limited	
					Gravel content	0.54
					Slope	0.37
					Large stones content	0.01
9D:						
Sassafras	Somewhat limited		Not limited		Very limited	
	Slope	0.50			Slope	1.00
					Gravel content	0.54
					Large stones content	0.01
10B:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Not limited		Not limited		Not limited	
10C:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Very limited		Very limited		Somewhat limited	
	Water erosion	1.00	Water erosion	1.00	Slope	0.37
10D:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Very limited		Very limited		Very limited	
	Water erosion	1.00	Water erosion	1.00	Slope	1.00
	Slope	0.50				
11B:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Not limited		Not limited		Somewhat limited	
					Gravel content	0.54
					Large stones content	0.01
11C:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Not limited		Not limited		Somewhat limited	
					Gravel content	0.54
					Slope	0.50
					Large stones content	0.01
11D:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Somewhat limited		Not limited		Very limited	
	Slope	0.50			Slope	1.00
					Gravel content	0.54
					Large stones content	0.01

Paths, Trails, and Golf Fairways—Continued

Map symbol and soil name	Paths and trails		Off-road motorcycle trails		Golf fairways	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
12:						
Urban land	Not rated		Not rated		Not rated	
Udorthents	Not rated		Not rated		Not rated	
13:						
Udorthents	Not rated		Not rated		Not rated	
15A:						
Sassafras	Not limited		Not limited		Somewhat limited	
					Gravel content	0.54
					Large stones content	0.01
Urban land	Not rated		Not rated		Not rated	
15C:						
Sassafras	Not limited		Not limited		Somewhat limited	
					Gravel content	0.54
					Slope	0.50
					Large stones content	0.01
Urban land	Not rated		Not rated		Not rated	
15D:						
Sassafras	Somewhat limited		Not limited		Very limited	
	Slope	0.50			Slope	1.00
					Gravel content	0.54
					Large stones content	0.01
Urban land	Not rated		Not rated		Not rated	
16B:						
Urban land	Not rated		Not rated		Not rated	
Woodstown	Not limited		Not limited		Not limited	

Dwellings and Small Commercial Buildings

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1A:						
Hatboro	Very limited		Very limited		Very limited	
	Flooding	1.00	Flooding	1.00	Flooding	1.00
	Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
2A:						
Codorus	Very limited		Very limited		Very limited	
	Flooding	1.00	Flooding	1.00	Flooding	1.00
	Depth to saturated zone	0.98	Depth to saturated zone	1.00	Depth to saturated zone	0.98
Hatboro	Very limited		Very limited		Very limited	
	Flooding	1.00	Flooding	1.00	Flooding	1.00
	Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
3A:						
Urban land	Not rated		Not rated		Not rated	
Codorus	Very limited		Very limited		Very limited	
	Flooding	1.00	Flooding	1.00	Flooding	1.00
	Depth to saturated zone	0.98	Depth to saturated zone	1.00	Depth to saturated zone	0.98
4A:						
Sassafras	Not limited		Not limited		Not limited	
Urban land	Not rated		Not rated		Not rated	
Neabsco	Somewhat limited		Very limited		Somewhat limited	
	Depth to saturated zone	0.81	Depth to saturated zone	1.00	Depth to saturated zone	0.81
4B:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Not limited		Not limited		Somewhat limited	
					Slope	0.28
Neabsco	Somewhat limited		Very limited		Somewhat limited	
	Depth to saturated zone	0.81	Depth to saturated zone	1.00	Depth to saturated zone	0.81
					Slope	0.28
4C:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Somewhat limited		Somewhat limited		Very limited	
	Slope	0.50	Slope	0.50	Slope	1.00
Neabsco	Somewhat limited		Very limited		Very limited	
	Depth to saturated zone	0.81	Depth to saturated zone	1.00	Slope	1.00
	Slope	0.50	Slope	0.50	Depth to saturated zone	0.81

Dwellings and Small Commercial Buildings—Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
5:						
Arlington National Cemetery	Not rated		Not rated		Not rated	
6B:						
Glenelg	Not limited		Not limited		Somewhat limited Slope	0.12
6C:						
Glenelg	Somewhat limited Slope	0.37	Somewhat limited Slope	0.37	Very limited Slope	1.00
6D:						
Glenelg	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
Manor	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
7A:						
Glenelg	Not limited		Not limited		Not limited	
Urban land	Not rated		Not rated		Not rated	
7B:						
Glenelg	Not limited		Not limited		Somewhat limited Slope	0.12
Urban land	Not rated		Not rated		Not rated	
7C:						
Glenelg	Somewhat limited Slope	0.37	Somewhat limited Slope	0.37	Very limited Slope	1.00
Urban land	Not rated		Not rated		Not rated	
7D:						
Glenelg	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
Urban land	Not rated		Not rated		Not rated	
9B:						
Sassafras	Not limited		Not limited		Somewhat limited Slope	0.28
9C:						
Sassafras	Somewhat limited Slope	0.37	Somewhat limited Slope	0.37	Very limited Slope	1.00
9D:						
Sassafras	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
10B:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Not limited		Not limited		Somewhat limited Slope	0.12

Dwellings and Small Commercial Buildings—Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
10C:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Somewhat limited Slope	0.37	Somewhat limited Slope	0.37	Very limited Slope	1.00
10D:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
11B:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Not limited		Not limited		Somewhat limited Slope	0.28
11C:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Somewhat limited Slope	0.50	Somewhat limited Slope	0.50	Very limited Slope	1.00
11D:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
12:						
Urban land	Not rated		Not rated		Not rated	
Udorthents	Not rated		Not rated		Not rated	
13:						
Udorthents	Not rated		Not rated		Not rated	
15A:						
Sassafras	Not limited		Not limited		Not limited	
Urban land	Not rated		Not rated		Not rated	
15C:						
Sassafras	Somewhat limited Slope	0.50	Somewhat limited Slope	0.50	Very limited Slope	1.00
Urban land	Not rated		Not rated		Not rated	
15D:						
Sassafras	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
Urban land	Not rated		Not rated		Not rated	

Dwellings and Small Commercial Buildings—Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
16B:						
Urban land	Not rated		Not rated		Not rated	
Woodstown	Not limited		Very limited Depth to saturated zone	0.99	Somewhat limited Slope	0.12

Roads and Streets, Shallow Excavations, and Lawns and Landscaping

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Local roads and streets		Shallow excavations		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1A:						
Hatboro	Very limited		Very limited		Very limited	
	Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
	Flooding	1.00	Flooding	0.80	Depth to saturated zone	1.00
	Low strength	1.00	Cutbanks cave	0.10		
2A:						
Codorus	Very limited		Very limited		Very limited	
	Flooding	1.00	Depth to saturated zone	1.00	Flooding	1.00
	Low strength	1.00	Cutbanks cave	1.00	Depth to saturated zone	0.75
	Depth to saturated zone	0.75	Flooding	0.80		
Hatboro	Very limited		Very limited		Very limited	
	Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
	Flooding	1.00	Flooding	0.80	Depth to saturated zone	1.00
	Low strength	1.00	Cutbanks cave	0.10		
3A:						
Urban land	Not rated		Not rated		Not rated	
Codorus	Very limited		Very limited		Very limited	
	Flooding	1.00	Depth to saturated zone	1.00	Flooding	1.00
	Low strength	1.00	Cutbanks cave	1.00	Depth to saturated zone	0.75
	Depth to saturated zone	0.75	Flooding	0.80		
4A:						
Sassafras	Somewhat limited		Very limited		Somewhat limited	
	Frost action	0.50	Cutbanks cave	1.00	Gravel content	0.54
					Large stones content	0.01
Urban land	Not rated		Not rated		Not rated	
Neabsco	Somewhat limited		Very limited		Somewhat limited	
	Frost action	0.50	Depth to saturated zone	1.00	Depth to saturated zone	0.48
	Depth to saturated zone	0.48	Cutbanks cave	1.00		
			Dense layer	0.50		
4B:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Somewhat limited		Very limited		Somewhat limited	
	Frost action	0.50	Cutbanks cave	1.00	Gravel content	0.54
					Large stones content	0.01

Roads and Streets, Shallow Excavations, and Lawns and Landscaping—Continued

Map symbol and soil name	Local roads and streets		Shallow excavations		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Neabsco	Somewhat limited		Very limited		Somewhat limited	
	Frost action	0.50	Depth to saturated zone	1.00	Depth to saturated zone	0.48
	Depth to saturated zone	0.48	Cutbanks cave	1.00		
			Dense layer	0.50		
4C:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Somewhat limited		Very limited		Somewhat limited	
	Slope	0.50	Cutbanks cave	1.00	Gravel content	0.54
	Frost action	0.50	Slope	0.50	Slope	0.50
					Large stones content	0.01
Neabsco	Somewhat limited		Very limited		Somewhat limited	
	Slope	0.50	Depth to saturated zone	1.00	Slope	0.50
	Frost action	0.50	Cutbanks cave	1.00	Depth to saturated zone	0.48
	Depth to saturated zone	0.48	Slope	0.50		
5:						
Arlington National Cemetery	Not rated		Not rated		Not rated	
6B:						
Glenelg	Somewhat limited		Somewhat limited		Not limited	
	Frost action	0.50	Cutbanks cave	0.10		
6C:						
Glenelg	Somewhat limited		Somewhat limited		Somewhat limited	
	Frost action	0.50	Slope	0.37	Slope	0.37
	Slope	0.37	Cutbanks cave	0.10		
6D:						
Glenelg	Very limited		Very limited		Very limited	
	Slope	1.00	Slope	1.00	Slope	1.00
	Frost action	0.50	Cutbanks cave	0.10		
Manor	Very limited		Very limited		Very limited	
	Slope	1.00	Slope	1.00	Slope	1.00
	Frost action	0.50	Cutbanks cave	1.00		
7A:						
Glenelg	Somewhat limited		Somewhat limited		Not limited	
	Frost action	0.50	Cutbanks cave	0.10		
Urban land	Not rated		Not rated		Not rated	
7B:						
Glenelg	Somewhat limited		Somewhat limited		Not limited	
	Frost action	0.50	Cutbanks cave	0.10		
Urban land	Not rated		Not rated		Not rated	
7C:						
Glenelg	Somewhat limited		Somewhat limited		Somewhat limited	
	Frost action	0.50	Slope	0.37	Slope	0.37
	Slope	0.37	Cutbanks cave	0.10		

Roads and Streets, Shallow Excavations, and Lawns and Landscaping—Continued

Map symbol and soil name	Local roads and streets		Shallow excavations		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Urban land	Not rated		Not rated		Not rated	
7D:						
Glenelg	Very limited		Very limited		Very limited	
	Slope	1.00	Slope	1.00	Slope	1.00
	Frost action	0.50	Cutbanks cave	0.10		
Urban land	Not rated		Not rated		Not rated	
9B:						
Sassafras	Somewhat limited		Very limited		Somewhat limited	
	Frost action	0.50	Cutbanks cave	1.00	Gravel content	0.54
					Large stones content	0.01
9C:						
Sassafras	Somewhat limited		Very limited		Somewhat limited	
	Frost action	0.50	Cutbanks cave	1.00	Gravel content	0.54
	Slope	0.37	Slope	0.37	Slope	0.37
					Large stones content	0.01
9D:						
Sassafras	Very limited		Very limited		Very limited	
	Slope	1.00	Slope	1.00	Slope	1.00
	Frost action	0.50	Cutbanks cave	1.00	Gravel content	0.54
					Large stones content	0.01
10B:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Somewhat limited		Somewhat limited		Not limited	
	Frost action	0.50	Cutbanks cave	0.10		
10C:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Somewhat limited		Somewhat limited		Somewhat limited	
	Frost action	0.50	Slope	0.37	Slope	0.37
	Slope	0.37	Cutbanks cave	0.10		
10D:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Very limited		Very limited		Very limited	
	Slope	1.00	Slope	1.00	Slope	1.00
	Frost action	0.50	Cutbanks cave	0.10		
11B:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Somewhat limited		Very limited		Somewhat limited	
	Frost action	0.50	Cutbanks cave	1.00	Gravel content	0.54
					Large stones content	0.01

Roads and Streets, Shallow Excavations, and Lawns and Landscaping—Continued

Map symbol and soil name	Local roads and streets		Shallow excavations		Lawns and landscaping	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
11C:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Somewhat limited		Very limited		Somewhat limited	
	Slope	0.50	Cutbanks cave	1.00	Gravel content	0.54
	Frost action	0.50	Slope	0.50	Slope	0.50
					Large stones content	0.01
11D:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Very limited		Very limited		Very limited	
	Slope	1.00	Slope	1.00	Slope	1.00
	Frost action	0.50	Cutbanks cave	1.00	Gravel content	0.54
					Large stones content	0.01
12:						
Urban land	Not rated		Not rated		Not rated	
Udorthents	Not rated		Not rated		Not rated	
13:						
Udorthents	Not rated		Not rated		Not rated	
15A:						
Sassafras	Somewhat limited		Very limited		Somewhat limited	
	Frost action	0.50	Cutbanks cave	1.00	Gravel content	0.54
					Large stones content	0.01
Urban land	Not rated		Not rated		Not rated	
15C:						
Sassafras	Somewhat limited		Very limited		Somewhat limited	
	Slope	0.50	Cutbanks cave	1.00	Gravel content	0.54
	Frost action	0.50	Slope	0.50	Slope	0.50
					Large stones content	0.01
Urban land	Not rated		Not rated		Not rated	
15D:						
Sassafras	Very limited		Very limited		Very limited	
	Slope	1.00	Slope	1.00	Slope	1.00
	Frost action	0.50	Cutbanks cave	1.00	Gravel content	0.54
					Large stones content	0.01
Urban land	Not rated		Not rated		Not rated	
16B:						
Urban land	Not rated		Not rated		Not rated	
Woodstown	Somewhat limited		Very limited		Not limited	
	Frost action	0.50	Depth to saturated zone	0.99		
			Cutbanks cave	0.10		

Sewage Disposal

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons	
	Rating class and limiting features	Value	Rating class and limiting features	Value
1A:				
Hatboro	Very limited		Very limited	
	Flooding	1.00	Flooding	1.00
	Depth to saturated zone	1.00	Depth to saturated zone	1.00
	Slow water movement	0.50	Seepage	0.50
2A:				
Codorus	Very limited		Very limited	
	Flooding	1.00	Flooding	1.00
	Depth to saturated zone	1.00	Depth to saturated zone	1.00
	Seepage, bottom layer	1.00	Seepage	1.00
Hatboro	Very limited		Very limited	
	Flooding	1.00	Flooding	1.00
	Depth to saturated zone	1.00	Depth to saturated zone	1.00
	Slow water movement	0.50	Seepage	0.50
3A:				
Urban land	Not rated		Not rated	
Codorus	Very limited		Very limited	
	Flooding	1.00	Flooding	1.00
	Depth to saturated zone	1.00	Depth to saturated zone	1.00
	Seepage, bottom layer	1.00	Seepage	1.00
4A:				
Sassafras	Very limited		Very limited	
	Seepage, bottom layer	1.00	Seepage	1.00
	Slow water movement	0.50		
Urban land	Not rated		Not rated	
Neabsco	Very limited		Very limited	
	Slow water movement	1.00	Seepage	1.00
	Depth to saturated zone	1.00	Depth to saturated zone	0.94
	Seepage, bottom layer	1.00		

Sewage Disposal—Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons	
	Rating class and limiting features	Value	Rating class and limiting features	Value
4B:				
Urban land	Not rated		Not rated	
Sassafras	Very limited		Very limited	
	Seepage, bottom layer	1.00	Seepage	1.00
	Slow water movement	0.50	Slope	0.82
Neabsco	Very limited		Very limited	
	Slow water movement	1.00	Seepage	1.00
	Depth to saturated zone	1.00	Depth to saturated zone	0.94
	Seepage, bottom layer	1.00	Slope	0.82
4C:				
Urban land	Not rated		Not rated	
Sassafras	Very limited		Very limited	
	Seepage, bottom layer	1.00	Slope	1.00
	Slope	0.50	Seepage	1.00
	Slow water movement	0.50		
Neabsco	Very limited		Very limited	
	Slow water movement	1.00	Slope	1.00
	Depth to saturated zone	1.00	Seepage	1.00
	Seepage, bottom layer	1.00	Depth to saturated zone	0.94
5:				
Arlington National Cemetery	Not rated		Not rated	
6B:				
Glenelg	Somewhat limited		Somewhat limited	
	Slow water movement	0.50	Slope	0.68
			Seepage	0.50
6C:				
Glenelg	Somewhat limited		Very limited	
	Slow water movement	0.50	Slope	1.00
	Slope	0.37	Seepage	0.50
6D:				
Glenelg	Very limited		Very limited	
	Slope	1.00	Slope	1.00
	Slow water movement	0.50	Seepage	0.50

Sewage Disposal—Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons	
	Rating class and limiting features	Value	Rating class and limiting features	Value
Manor	Very limited		Very limited	
	Slope	1.00	Slope	1.00
	Seepage, bottom layer	1.00	Seepage	1.00
	Slow water movement	0.50		
7A:				
Glenelg	Somewhat limited		Somewhat limited	
	Slow water movement	0.50	Seepage	0.50
Urban land	Not rated		Not rated	
7B:				
Glenelg	Somewhat limited		Somewhat limited	
	Slow water movement	0.50	Slope	0.68
			Seepage	0.50
Urban land	Not rated		Not rated	
7C:				
Glenelg	Somewhat limited		Very limited	
	Slow water movement	0.50	Slope	1.00
			Seepage	0.50
	Slope	0.37		
Urban land	Not rated		Not rated	
7D:				
Glenelg	Very limited		Very limited	
	Slope	1.00	Slope	1.00
	Slow water movement	0.50	Seepage	0.50
Urban land	Not rated		Not rated	
9B:				
Sassafras	Very limited		Very limited	
	Seepage, bottom layer	1.00	Seepage	1.00
			Slope	0.82
	Slow water movement	0.50		
9C:				
Sassafras	Very limited		Very limited	
	Seepage, bottom layer	1.00	Slope	1.00
			Seepage	1.00
	Slow water movement	0.50		
	Slope	0.37		
9D:				
Sassafras	Very limited		Very limited	
	Slope	1.00	Slope	1.00
	Seepage, bottom layer	1.00	Seepage	1.00
	Slow water movement	0.50		

Sewage Disposal—Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons	
	Rating class and limiting features	Value	Rating class and limiting features	Value
10B:				
Urban land	Not rated		Not rated	
Glenelg	Somewhat limited		Somewhat limited	
	Slow water movement	0.50	Slope	0.68
			Seepage	0.50
10C:				
Urban land	Not rated		Not rated	
Glenelg	Somewhat limited		Very limited	
	Slow water movement	0.50	Slope	1.00
			Seepage	0.50
	Slope	0.37		
10D:				
Urban land	Not rated		Not rated	
Glenelg	Very limited		Very limited	
	Slope	1.00	Slope	1.00
	Slow water movement	0.50	Seepage	0.50
11B:				
Urban land	Not rated		Not rated	
Sassafras	Very limited		Very limited	
	Seepage, bottom layer	1.00	Seepage	1.00
			Slope	0.82
	Slow water movement	0.50		
11C:				
Urban land	Not rated		Not rated	
Sassafras	Very limited		Very limited	
	Seepage, bottom layer	1.00	Slope	1.00
			Seepage	1.00
	Slope	0.50		
	Slow water movement	0.50		
11D:				
Urban land	Not rated		Not rated	
Sassafras	Very limited		Very limited	
	Slope	1.00	Slope	1.00
	Seepage, bottom layer	1.00	Seepage	1.00
	Slow water movement	0.50		
12:				
Urban land	Not rated		Not rated	
Udorthents	Not rated		Not rated	
13:				
Udorthents	Not rated		Not rated	

Sewage Disposal—Continued

Map symbol and soil name	Septic tank absorption fields		Sewage lagoons	
	Rating class and limiting features	Value	Rating class and limiting features	Value
15A:				
Sassafras	Very limited		Very limited	
	Seepage, bottom layer	1.00	Seepage	1.00
	Slow water movement	0.50		
Urban land	Not rated		Not rated	
15C:				
Sassafras	Very limited		Very limited	
	Seepage, bottom layer	1.00	Slope	1.00
			Seepage	1.00
	Slope	0.50		
	Slow water movement	0.50		
Urban land	Not rated		Not rated	
15D:				
Sassafras	Very limited		Very limited	
	Slope	1.00	Slope	1.00
	Seepage, bottom layer	1.00	Seepage	1.00
	Slow water movement	0.50		
Urban land	Not rated		Not rated	
16B:				
Urban land	Not rated		Not rated	
Woodstown	Very limited		Very limited	
	Depth to saturated zone	1.00	Depth to saturated zone	1.00
	Seepage, bottom layer	1.00	Seepage	1.00
			Slope	0.68

Landfills

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1A:						
Hatboro	Very limited		Very limited		Very limited	
	Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
	Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
	Too clayey	0.50				
2A:						
Codorus	Very limited		Very limited		Very limited	
	Flooding	1.00	Flooding	1.00	Depth to saturated zone	0.99
	Depth to saturated zone	1.00	Depth to saturated zone	1.00		
	Seepage, bottom layer	1.00				
Hatboro	Very limited		Very limited		Very limited	
	Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
	Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	0.50
	Too clayey	0.50				
3A:						
Urban land	Not rated		Not limited		Not rated	
Codorus	Very limited		Very limited		Very limited	
	Flooding	1.00	Flooding	1.00	Depth to saturated zone	0.99
	Depth to saturated zone	1.00	Depth to saturated zone	1.00		
	Seepage, bottom layer	1.00				
4A:						
Sassafras	Very limited		Not limited		Somewhat limited	
	Seepage, bottom layer	1.00			Gravel content	0.07
Urban land	Not rated		Not limited		Not rated	
Neabsco	Very limited		Somewhat limited		Somewhat limited	
	Depth to saturated zone	1.00	Depth to saturated zone	0.94	Depth to saturated zone	0.96
	Seepage, bottom layer	1.00			Seepage	0.21
					Gravel content	0.01
4B:						
Urban land	Not rated		Not limited		Not rated	
Sassafras	Very limited		Not limited		Somewhat limited	
	Seepage, bottom layer	1.00			Gravel content	0.07

Landfills—Continued

Map symbol and soil name	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Neabsco	Very limited		Somewhat limited		Somewhat limited	
	Depth to saturated zone	1.00	Depth to saturated zone	0.94	Depth to saturated zone	0.96
	Seepage, bottom layer	1.00			Seepage	0.21
					Gravel content	0.01
4C:						
Urban land	Not rated		Somewhat limited		Not rated	
			Slope	0.50		
Sassafras	Very limited		Somewhat limited		Somewhat limited	
	Seepage, bottom layer	1.00	Slope	0.50	Slope	0.50
	Slope	0.50			Gravel content	0.07
Neabsco	Very limited		Somewhat limited		Somewhat limited	
	Depth to saturated zone	1.00	Depth to saturated zone	0.94	Depth to saturated zone	0.96
	Seepage, bottom layer	1.00	Slope	0.50	Slope	0.50
	Slope	0.50			Seepage	0.21
5:						
Arlington National Cemetery	Not rated		Somewhat limited		Not rated	
			Slope	0.01		
6B:						
Glenelg	Not limited		Not limited		Not limited	
6C:						
Glenelg	Somewhat limited		Somewhat limited		Somewhat limited	
	Slope	0.37	Slope	0.37	Slope	0.37
6D:						
Glenelg	Very limited		Very limited		Very limited	
	Slope	1.00	Slope	1.00	Slope	1.00
Manor	Very limited		Very limited		Very limited	
	Slope	1.00	Slope	1.00	Slope	1.00
	Seepage, bottom layer	1.00	Seepage	1.00	Too sandy	0.50
	Too sandy	0.50			Seepage	0.21
7A:						
Glenelg	Not limited		Not limited		Not limited	
Urban land	Not rated		Not limited		Not rated	
7B:						
Glenelg	Not limited		Not limited		Not limited	
Urban land	Not rated		Not limited		Not rated	
7C:						
Glenelg	Somewhat limited		Somewhat limited		Somewhat limited	
	Slope	0.37	Slope	0.37	Slope	0.37
Urban land	Not rated		Somewhat limited		Not rated	
			Slope	0.37		

Landfills—Continued

Map symbol and soil name	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7D:						
Glenelg	Very limited		Very limited		Very limited	
	Slope	1.00	Slope	1.00	Slope	1.00
Urban land	Not rated		Very limited		Not rated	
			Slope	1.00		
9B:						
Sassafras	Very limited		Not limited		Somewhat limited	
	Seepage, bottom layer	1.00			Gravel content	0.07
9C:						
Sassafras	Very limited		Somewhat limited		Somewhat limited	
	Seepage, bottom layer	1.00	Slope	0.37	Slope	0.37
	Slope	0.37			Gravel content	0.07
9D:						
Sassafras	Very limited		Very limited		Very limited	
	Slope	1.00	Slope	1.00	Slope	1.00
	Seepage, bottom layer	1.00			Gravel content	0.07
10B:						
Urban land	Not rated		Not limited		Not rated	
Glenelg	Not limited		Not limited		Not limited	
10C:						
Urban land	Not rated		Somewhat limited		Not rated	
			Slope	0.37		
Glenelg	Somewhat limited		Somewhat limited		Somewhat limited	
	Slope	0.37	Slope	0.37	Slope	0.37
10D:						
Urban land	Not rated		Very limited		Not rated	
			Slope	1.00		
Glenelg	Very limited		Very limited		Very limited	
	Slope	1.00	Slope	1.00	Slope	1.00
11B:						
Urban land	Not rated		Not limited		Not rated	
Sassafras	Very limited		Not limited		Somewhat limited	
	Seepage, bottom layer	1.00			Gravel content	0.07
11C:						
Urban land	Not rated		Somewhat limited		Not rated	
			Slope	0.50		
Sassafras	Very limited		Somewhat limited		Somewhat limited	
	Seepage, bottom layer	1.00	Slope	0.50	Slope	0.50
	Slope	0.50			Gravel content	0.07

Landfills—Continued

Map symbol and soil name	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
11D:						
Urban land	Not rated		Very limited Slope	1.00	Not rated	
Sassafras	Very limited Slope Seepage, bottom layer	1.00 1.00	Very limited Slope	1.00	Very limited Slope Gravel content	1.00 0.07
12:						
Urban land	Not rated		Somewhat limited Slope	0.16	Not rated	
Udorthents	Not rated		Somewhat limited Slope	0.16	Not rated	
13:						
Udorthents	Not rated		Not limited		Not rated	
15A:						
Sassafras	Very limited Seepage, bottom layer	1.00	Not limited		Somewhat limited Gravel content	0.07
Urban land	Not rated		Not limited		Not rated	
15C:						
Sassafras	Very limited Seepage, bottom layer Slope	1.00 0.50	Somewhat limited Slope	0.50	Somewhat limited Slope Gravel content	0.50 0.07
Urban land	Not rated		Somewhat limited Slope	0.50	Not rated	
15D:						
Sassafras	Very limited Slope Seepage, bottom layer	1.00 1.00	Very limited Slope	1.00	Very limited Slope Gravel content	1.00 0.07
Urban land	Not rated		Very limited Slope	1.00	Not rated	
16B:						
Urban land	Not rated		Not limited		Not rated	
Woodstown	Very limited Depth to saturated zone Seepage, bottom layer	1.00 1.00	Very limited Depth to saturated zone Seepage	1.00 1.00	Somewhat limited Depth to saturated zone Seepage	0.44 0.21

Source of Gravel and Sand

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The ratings given for the thickest layer are for the thickest layer above and excluding the bottom layer. The numbers in the value columns range from 0.00 to 0.99. The greater the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel. See text for further explanation of ratings in this table.)

Map symbol and soil name	Potential source of gravel		Potential source of sand	
	Rating class	Value	Rating class	Value
1A:				
Hatboro	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
2A:				
Codorus	Poor		Fair	
	Bottom layer	0.00	Thickest layer	0.00
	Thickest layer	0.00	Bottom layer	0.03
Hatboro	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
3A:				
Urban land	Not rated		Not rated	
Codorus	Poor		Fair	
	Bottom layer	0.00	Thickest layer	0.00
	Thickest layer	0.00	Bottom layer	0.03
4A:				
Sassafras	Poor		Fair	
	Bottom layer	0.00	Thickest layer	0.00
	Thickest layer	0.00	Bottom layer	0.12
Urban land	Not rated		Not rated	
Neabsco	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
4B:				
Urban land	Not rated		Not rated	
Sassafras	Poor		Fair	
	Bottom layer	0.00	Thickest layer	0.00
	Thickest layer	0.00	Bottom layer	0.12
Neabsco	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
4C:				
Urban land	Not rated		Not rated	

Source of Gravel and Sand—Continued

Map symbol and soil name	Potential source of gravel		Potential source of sand	
	Rating class	Value	Rating class	Value
Sassafras	Poor		Fair	
	Bottom layer	0.00	Thickest layer	0.00
	Thickest layer	0.00	Bottom layer	0.12
Neabsco	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
5:				
Arlington National Cemetery	Not rated		Not rated	
6B:				
Glenelg	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
6C:				
Glenelg	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
6D:				
Glenelg	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
Manor	Poor		Fair	
	Bottom layer	0.00	Thickest layer	0.04
	Thickest layer	0.00	Bottom layer	0.10
7A:				
Glenelg	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
Urban land	Not rated		Not rated	
7B:				
Glenelg	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
Urban land	Not rated		Not rated	
7C:				
Glenelg	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
Urban land	Not rated		Not rated	
7D:				
Glenelg	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00

Source of Gravel and Sand—Continued

Map symbol and soil name	Potential source of gravel		Potential source of sand	
	Rating class	Value	Rating class	Value
Urban land	Not rated		Not rated	
9B:				
Sassafras	Poor		Fair	
	Bottom layer	0.00	Thickest layer	0.00
	Thickest layer	0.00	Bottom layer	0.12
9C:				
Sassafras	Poor		Fair	
	Bottom layer	0.00	Thickest layer	0.00
	Thickest layer	0.00	Bottom layer	0.12
9D:				
Sassafras	Poor		Fair	
	Bottom layer	0.00	Thickest layer	0.00
	Thickest layer	0.00	Bottom layer	0.12
10B:				
Urban land	Not rated		Not rated	
Glenelg	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
10C:				
Urban land	Not rated		Not rated	
Glenelg	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
10D:				
Urban land	Not rated		Not rated	
Glenelg	Poor		Poor	
	Bottom layer	0.00	Bottom layer	0.00
	Thickest layer	0.00	Thickest layer	0.00
11B:				
Urban land	Not rated		Not rated	
Sassafras	Poor		Fair	
	Bottom layer	0.00	Thickest layer	0.00
	Thickest layer	0.00	Bottom layer	0.12
11C:				
Urban land	Not rated		Not rated	
Sassafras	Poor		Fair	
	Bottom layer	0.00	Thickest layer	0.00
	Thickest layer	0.00	Bottom layer	0.12
11D:				
Urban land	Not rated		Not rated	

Source of Gravel and Sand—Continued

Map symbol and soil name	Potential source of gravel		Potential source of sand	
	Rating class	Value	Rating class	Value
Sassafras	Poor		Fair	
	Bottom layer	0.00	Thickest layer	0.00
	Thickest layer	0.00	Bottom layer	0.12
12:				
Urban land	Not rated		Not rated	
Udorthents	Not rated		Not rated	
13:				
Udorthents	Not rated		Not rated	
15A:				
Sassafras	Poor		Fair	
	Bottom layer	0.00	Thickest layer	0.00
	Thickest layer	0.00	Bottom layer	0.12
Urban land	Not rated		Not rated	
15C:				
Sassafras	Poor		Fair	
	Bottom layer	0.00	Thickest layer	0.00
	Thickest layer	0.00	Bottom layer	0.12
Urban land	Not rated		Not rated	
15D:				
Sassafras	Poor		Fair	
	Bottom layer	0.00	Thickest layer	0.00
	Thickest layer	0.00	Bottom layer	0.12
Urban land	Not rated		Not rated	
16B:				
Urban land	Not rated		Not rated	
Woodstown	Poor		Fair	
	Bottom layer	0.00	Thickest layer	0.00
	Thickest layer	0.00	Bottom layer	0.03

Source of Reclamation Material, Roadfill, and Topsoil

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1A:						
Hatboro	Fair		Poor		Poor	
	Organic matter content low	0.12	Wetness depth	0.00	Wetness depth	0.00
	Too acid	0.88	Low strength	0.00		
	Water erosion	0.99				
2A:						
Codorus	Fair		Poor		Poor	
	Organic matter content low	0.12	Low strength	0.00	Hard to reclaim (rock fragments)	0.00
	Too acid	0.54	Wetness depth	0.14	Wetness depth	0.14
Hatboro	Fair		Poor		Poor	
	Organic matter content low	0.12	Wetness depth	0.00	Wetness depth	0.00
	Too acid	0.88	Low strength	0.00		
	Water erosion	0.99				
3A:						
Urban land	Not rated		Not rated		Not rated	
Codorus	Fair		Poor		Poor	
	Organic matter content low	0.12	Low strength	0.00	Hard to reclaim (rock fragments)	0.00
	Too acid	0.54	Wetness depth	0.14	Wetness depth	0.14
4A:						
Sassafras	Fair		Good		Fair	
	Too acid	0.12			Rock fragments	0.12
	Organic matter content low	0.12			Too acid	0.59
					Hard to reclaim (rock fragments)	0.68
Urban land	Not rated		Not rated		Not rated	
Neabsco	Fair		Fair		Poor	
	Organic matter content low	0.12	Wetness depth	0.29	Hard to reclaim (rock fragments)	0.00
	Too acid	0.32			Wetness depth	0.29
					Rock fragments	0.88
4B:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Fair		Good		Fair	
	Too acid	0.12			Rock fragments	0.12
	Organic matter content low	0.12			Too acid	0.59
					Hard to reclaim (rock fragments)	0.68

Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map symbol and soil name	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Neabsco	Fair		Fair		Poor	
	Organic matter content low	0.12	Wetness depth	0.29	Hard to reclaim (rock fragments)	0.00
	Too acid	0.32			Wetness depth	0.29
					Rock fragments	0.88
4C:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Fair		Good		Fair	
	Too acid	0.12			Rock fragments	0.12
	Organic matter content low	0.12			Slope	0.50
					Too acid	0.59
Neabsco	Fair		Fair		Poor	
	Organic matter content low	0.12	Wetness depth	0.29	Hard to reclaim (rock fragments)	0.00
	Too acid	0.32			Wetness depth	0.29
					Slope	0.50
5:						
Arlington National Cemetery	Not rated		Not rated		Not rated	
6B:						
Glenelg	Fair		Good		Fair	
	Organic matter content low	0.12			Hard to reclaim (rock fragments)	0.54
	Too acid	0.50			Rock fragments	0.99
	Water erosion	0.99				
6C:						
Glenelg	Fair		Good		Fair	
	Organic matter content low	0.12			Hard to reclaim (rock fragments)	0.54
	Too acid	0.50			Slope	0.63
	Water erosion	0.99			Rock fragments	0.99
6D:						
Glenelg	Fair		Poor		Poor	
	Organic matter content low	0.12	Slope	0.00	Slope	0.00
	Too acid	0.50			Hard to reclaim (rock fragments)	0.54
	Water erosion	0.99			Rock fragments	0.99
Manor	Fair		Poor		Poor	
	Organic matter content low	0.12	Slope	0.00	Slope	0.00
	Too acid	0.50			Too acid	0.76
	Water erosion	0.68			Rock fragments	0.88
7A:						
Glenelg	Fair		Good		Fair	
	Organic matter content low	0.12			Hard to reclaim (rock fragments)	0.54
	Too acid	0.50			Rock fragments	0.99
	Water erosion	0.99				

Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map symbol and soil name	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Urban land	Not rated		Not rated		Not rated	
7B:						
Glenelg	Fair		Good		Fair	
	Organic matter content low	0.12			Hard to reclaim (rock fragments)	0.54
	Too acid	0.50			Rock fragments	0.99
	Water erosion	0.99				
Urban land	Not rated		Not rated		Not rated	
7C:						
Glenelg	Fair		Good		Fair	
	Organic matter content low	0.12			Hard to reclaim (rock fragments)	0.54
	Too acid	0.50			Slope	0.63
	Water erosion	0.99			Rock fragments	0.99
Urban land	Not rated		Not rated		Not rated	
7D:						
Glenelg	Fair		Fair		Poor	
	Organic matter content low	0.12	Slope	0.50	Slope	0.00
	Too acid	0.50			Hard to reclaim (rock fragments)	0.54
	Water erosion	0.99			Rock fragments	0.99
Urban land	Not rated		Not rated		Not rated	
9B:						
Sassafras	Fair		Good		Fair	
	Too acid	0.12			Rock fragments	0.12
	Organic matter content low	0.12			Too acid	0.59
					Hard to reclaim (rock fragments)	0.68
9C:						
Sassafras	Fair		Good		Fair	
	Too acid	0.12			Rock fragments	0.12
	Organic matter content low	0.12			Too acid	0.59
					Slope	0.63
9D:						
Sassafras	Fair		Fair		Poor	
	Too acid	0.12	Slope	0.50	Slope	0.00
	Organic matter content low	0.12			Rock fragments	0.12
					Too acid	0.59
10B:						
Urban land	Not rated		Not rated		Not rated	

Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map symbol and soil name	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Glenelg	Fair		Good		Fair	
	Organic matter content low	0.12			Hard to reclaim (rock fragments)	0.54
	Too acid	0.50			Rock fragments	0.99
	Water erosion	0.99				
10C:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Fair		Good		Fair	
	Organic matter content low	0.12			Hard to reclaim (rock fragments)	0.54
	Too acid	0.50			Slope	0.63
	Water erosion	0.99			Rock fragments	0.99
10D:						
Urban land	Not rated		Not rated		Not rated	
Glenelg	Fair		Fair		Poor	
	Organic matter content low	0.12	Slope	0.50	Slope	0.00
	Too acid	0.50			Hard to reclaim (rock fragments)	0.54
	Water erosion	0.99			Rock fragments	0.99
11B:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Fair		Good		Fair	
	Too acid	0.12			Rock fragments	0.12
	Organic matter content low	0.12			Too acid	0.59
					Hard to reclaim (rock fragments)	0.68
11C:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Fair		Good		Fair	
	Too acid	0.12			Rock fragments	0.12
	Organic matter content low	0.12			Slope	0.50
					Too acid	0.59
11D:						
Urban land	Not rated		Not rated		Not rated	
Sassafras	Fair		Fair		Poor	
	Too acid	0.12	Slope	0.50	Slope	0.00
	Organic matter content low	0.12			Rock fragments	0.12
					Too acid	0.59
12:						
Urban land	Not rated		Not rated		Not rated	
Udorthents	Not rated		Not rated		Not rated	

Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map symbol and soil name	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
13:						
Udorthents	Not rated		Not rated		Not rated	
15A:						
Sassafras	Fair		Good		Fair	
	Too acid	0.12			Rock fragments	0.12
	Organic matter content low	0.12			Too acid	0.59
					Hard to reclaim (rock fragments)	0.68
Urban land	Not rated		Not rated		Not rated	
15C:						
Sassafras	Fair		Good		Fair	
	Too acid	0.12			Rock fragments	0.12
	Organic matter content low	0.12			Slope	0.50
					Too acid	0.59
Urban land	Not rated		Not rated		Not rated	
15D:						
Sassafras	Fair		Fair		Poor	
	Too acid	0.12	Slope	0.50	Slope	0.00
	Organic matter content low	0.12			Rock fragments	0.12
					Too acid	0.59
Urban land	Not rated		Not rated		Not rated	
16B:						
Urban land	Not rated		Not rated		Not rated	
Woodstown	Fair		Fair		Fair	
	Organic matter content low	0.12	Wetness depth	0.91	Too acid	0.59
	Too acid	0.50			Wetness depth	0.91

Ponds and Embankments

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1A:						
Hatboro	Somewhat limited		Very limited		Somewhat limited	
	Seepage	0.70	Depth to saturated zone	1.00	Slow refill	0.30
					Cutbanks cave	0.10
			Piping	0.12		
2A:						
Codorus	Very limited		Very limited		Very limited	
	Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	1.00
			Piping	0.52		
			Seepage	0.03		
Hatboro	Somewhat limited		Very limited		Somewhat limited	
	Seepage	0.70	Depth to saturated zone	1.00	Slow refill	0.30
					Cutbanks cave	0.10
			Piping	0.12		
3A:						
Urban land	Not limited		Not rated		Not rated	
Codorus	Very limited		Very limited		Very limited	
	Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	1.00
			Piping	0.52		
			Seepage	0.03		
4A:						
Sassafras	Very limited		Somewhat limited		Very limited	
	Seepage	1.00	Seepage	0.12	Depth to water	1.00
Urban land	Not limited		Not rated		Not rated	
Neabsco	Very limited		Very limited		Very limited	
	Seepage	1.00	Depth to saturated zone	1.00	Depth to water	1.00
4B:						
Urban land	Somewhat limited		Not rated		Not rated	
	Slope	0.50				
Sassafras	Very limited		Somewhat limited		Very limited	
	Seepage	1.00	Seepage	0.12	Depth to water	1.00
	Slope	0.50				
Neabsco	Very limited		Very limited		Very limited	
	Seepage	1.00	Depth to saturated zone	1.00	Depth to water	1.00
	Slope	0.50				
4C:						
Urban land	Very limited		Not rated		Not rated	
	Slope	1.00				

Ponds and Embankments—Continued

Map symbol and soil name	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Sassafras	Very limited		Somewhat limited		Very limited	
	Slope	1.00	Seepage	0.12	Depth to water	1.00
	Seepage	1.00				
Neabsco	Very limited		Very limited		Very limited	
	Slope	1.00	Depth to saturated zone	1.00	Depth to water	1.00
	Seepage	1.00				
5:						
Arlington National Cemetery	Very limited		Not rated		Not rated	
	Slope	1.00				
6B:						
Glenelg	Somewhat limited		Somewhat limited		Very limited	
	Seepage	0.70	Piping	0.96	Depth to water	1.00
	Slope	0.32				
6C:						
Glenelg	Very limited		Somewhat limited		Very limited	
	Slope	1.00	Piping	0.96	Depth to water	1.00
	Seepage	0.70				
6D:						
Glenelg	Very limited		Somewhat limited		Very limited	
	Slope	1.00	Piping	0.96	Depth to water	1.00
	Seepage	0.70				
Manor	Very limited		Somewhat limited		Very limited	
	Slope	1.00	Seepage	0.10	Depth to water	1.00
	Seepage	1.00				
7A:						
Glenelg	Somewhat limited		Somewhat limited		Very limited	
	Seepage	0.70	Piping	0.96	Depth to water	1.00
Urban land	Not limited		Not rated		Not rated	
7B:						
Glenelg	Somewhat limited		Somewhat limited		Very limited	
	Seepage	0.70	Piping	0.96	Depth to water	1.00
	Slope	0.32				
Urban land	Somewhat limited		Not rated		Not rated	
	Slope	0.32				
7C:						
Glenelg	Very limited		Somewhat limited		Very limited	
	Slope	1.00	Piping	0.96	Depth to water	1.00
	Seepage	0.70				
Urban land	Very limited		Not rated		Not rated	
	Slope	1.00				
7D:						
Glenelg	Very limited		Somewhat limited		Very limited	
	Slope	1.00	Piping	0.96	Depth to water	1.00
	Seepage	0.70				

Ponds and Embankments—Continued

Map symbol and soil name	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
Urban land	Very limited		Not rated		Not rated	
	Slope	1.00				
9B:						
Sassafras	Very limited		Somewhat limited		Very limited	
	Seepage	1.00	Seepage	0.12	Depth to water	1.00
	Slope	0.50				
9C:						
Sassafras	Very limited		Somewhat limited		Very limited	
	Slope	1.00	Seepage	0.12	Depth to water	1.00
	Seepage	1.00				
9D:						
Sassafras	Very limited		Somewhat limited		Very limited	
	Slope	1.00	Seepage	0.12	Depth to water	1.00
	Seepage	1.00				
10B:						
Urban land	Somewhat limited		Not rated		Not rated	
	Slope	0.32				
Glenelg	Somewhat limited		Somewhat limited		Very limited	
	Seepage	0.70	Piping	0.96	Depth to water	1.00
	Slope	0.32				
10C:						
Urban land	Very limited		Not rated		Not rated	
	Slope	1.00				
Glenelg	Very limited		Somewhat limited		Very limited	
	Slope	1.00	Piping	0.96	Depth to water	1.00
	Seepage	0.70				
10D:						
Urban land	Very limited		Not rated		Not rated	
	Slope	1.00				
Glenelg	Very limited		Somewhat limited		Very limited	
	Slope	1.00	Piping	0.96	Depth to water	1.00
	Seepage	0.70				
11B:						
Urban land	Somewhat limited		Not rated		Not rated	
	Slope	0.50				
Sassafras	Very limited		Somewhat limited		Very limited	
	Seepage	1.00	Seepage	0.12	Depth to water	1.00
	Slope	0.50				
11C:						
Urban land	Very limited		Not rated		Not rated	
	Slope	1.00				
Sassafras	Very limited		Somewhat limited		Very limited	
	Slope	1.00	Seepage	0.12	Depth to water	1.00
	Seepage	1.00				

Ponds and Embankments—Continued

Map symbol and soil name	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
11D:						
Urban land	Very limited		Not rated		Not rated	
	Slope	1.00				
Sassafras	Very limited		Somewhat limited		Very limited	
	Slope	1.00	Seepage	0.12	Depth to water	1.00
	Seepage	1.00				
12:						
Urban land	Very limited		Not rated		Not rated	
	Slope	1.00				
Udorthents	Very limited		Not rated		Not rated	
	Slope	1.00				
13:						
Udorthents	Somewhat limited		Not rated		Not rated	
	Slope	0.32				
15A:						
Sassafras	Very limited		Somewhat limited		Very limited	
	Seepage	1.00	Seepage	0.12	Depth to water	1.00
Urban land	Not limited		Not rated		Not rated	
15C:						
Sassafras	Very limited		Somewhat limited		Very limited	
	Slope	1.00	Seepage	0.12	Depth to water	1.00
	Seepage	1.00				
Urban land	Very limited		Not rated		Not rated	
	Slope	1.00				
15D:						
Sassafras	Very limited		Somewhat limited		Very limited	
	Slope	1.00	Seepage	0.12	Depth to water	1.00
	Seepage	1.00				
Urban land	Very limited		Not rated		Not rated	
	Slope	1.00				
16B:						
Urban land	Somewhat limited		Not rated		Not rated	
	Slope	0.32				
Woodstown	Very limited		Somewhat limited		Somewhat limited	
	Seepage	1.00	Depth to saturated zone	0.84	Cutbanks cave	0.10
	Slope	0.32	Seepage	0.03	Depth to saturated zone	0.07

Engineering Properties

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
1A:												
Hatboro---	0-6	Silt loam, loam, sandy loam	CL, CL-ML, ML, SC-SM	A-4, A-6, A-2-4	0	0	95-100	85-100	55-100	30-90	25-39	6-13
	6-23	Loam, silty clay loam, silt loam, sandy clay loam	CL	A-4, A-6, A-7-6	0	0	95-100	85-100	75-100	51-95	24-44	9-25
	23-60	Sandy clay loam, sandy loam, silt loam, clay loam, silty clay loam, extremely gravelly sandy loam, very gravelly sandy loam, gravelly sandy loam	SC-SM, SP, SC, CL	A-7-6, A-2-4, A-6, A-4	0	0	95-100	10-100	7-100	4-95	20-44	6-25
2A:												
Codorus---	0-8	Loam, silt loam	CL	A-7-6, A-4, A-6	0	0	90-100	80-100	75-100	55-90	27-41	9-17
	8-50	Clay loam, loam, silt loam, silty clay loam	CL	A-6, A-7-6	0	0	90-100	80-100	75-100	55-95	27-44	12-25
	50-62	Stratified very gravelly sand to loam	SM, GM, SC-SM, GP	A-4, A-2-4	0	0	50-100	20-100	14-70	3-44	16-25	NP-7
Hatboro---	0-6	Silt loam, loam, sandy loam	ML, SC-SM, CL-ML, CL	A-2-4, A-6, A-4	0	0	95-100	85-100	55-100	30-90	25-39	6-13
	6-23	Loam, silty clay loam, silt loam, sandy clay loam	CL	A-7-6, A-6, A-4	0	0	95-100	85-100	75-100	51-95	24-44	9-25
	23-60	Sandy clay loam, sandy loam, silt loam, clay loam, silty clay loam, extremely gravelly sandy loam, very gravelly sandy loam, gravelly sandy loam	SC-SM, CL, SC, SP	A-6, A-4, A-2-4, A-7-6	0	0	95-100	10-100	7-100	4-95	20-44	6-25
3A:												
Urban land---	---	---	---	---	---	---	---	---	---	---	---	---

Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
Codorus---------	0-8	Loam, silt loam	CL	A-6, A-4, A-7-6	0	0	90-100	80-100	75-100	55-90	27-41	9-17
	8-50	Clay loam, loam, silt loam, silty clay loam	CL	A-6, A-7-6	0	0	90-100	80-100	75-100	55-95	27-44	12-25
	50-62	Stratified very gravelly sand to loam	SM, GM, SC-SM, GP	A-4, A-2-4	0	0	50-100	20-100	14-70	3-44	16-25	NP-7
4A:												
Sassafras-------	0-6	Gravelly sandy loam, gravelly loam, sandy loam, loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0-10	60-100	50-100	30-95	15-75	24-41	7-19
	6-40	Gravelly sandy clay loam, gravelly loam, sandy clay loam, loam	GC, SC, GC-GM, CL	A-2-6, A-6	0	0	60-100	50-100	40-95	20-75	27-44	12-25
	40-60	Gravelly loamy sand, gravelly sandy loam, loamy sand, sandy loam	SC-SM, GC-GM, SM, GM	A-2-4, A-1-b	0	0	60-100	50-100	25-75	10-40	0-32	NP-13
Urban land------	---	---	---	---	---	---	---	---	---	---	---	---
Neabsco---------	0-8	Loam, silt loam, sandy loam	CL, CL-ML, ML	A-4	0	0	95-100	85-100	55-100	30-90	16-31	2-10
	8-17	Clay loam, sandy clay loam, loam	CL, SC	A-4, A-6	0	0	95-100	85-100	70-100	30-80	23-38	6-14
	17-36	Loam, sandy loam, sandy clay loam, gravelly sandy loam	CL-ML, SC-SM, CL	A-4, A-6, A-2-4	0	0	80-100	50-95	30-90	15-70	20-38	4-14
	36-52	Clay loam, loam, gravelly clay loam	SC, CL	A-6, A-4	0	0-3	70-95	50-95	45-95	35-75	20-38	4-14
	52-72	Very gravelly sandy loam, very gravelly sand, clay	CL-ML, SC, SC-SM, SM	A-6, A-4, A-7, A-2-6, A-1	0	1-5	50-95	30-95	15-95	2-90	16-52	2-22
4B:												
Urban land------	---	---	---	---	---	---	---	---	---	---	---	---
Sassafras-------	0-6	Gravelly sandy loam, gravelly loam, sandy loam, loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0-10	60-100	50-100	30-95	15-75	24-41	7-19
	6-40	Gravelly sandy clay loam, gravelly loam, sandy clay loam, loam	SC, GC, GC-GM, CL	A-6, A-2-6	0	0	60-100	50-100	40-95	20-75	27-44	12-25
	40-60	Gravelly loamy sand, gravelly sandy loam, loamy sand, sandy loam	SM, GC-GM, SC-SM, GM	A-1-b, A-2-4	0	0	60-100	50-100	25-75	10-40	0-32	NP-13

Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
Neabsco---------	0-8	Loam, silt loam, sandy loam	CL, CL-ML, ML	A-4	0	0	95-100	85-100	55-100	30-90	16-31	2-10
	8-17	Clay loam, sandy clay loam, loam	SC, CL	A-6, A-4	0	0	95-100	85-100	70-100	30-80	23-38	6-14
	17-36	Loam, sandy loam, sandy clay loam, gravelly sandy loam	SC-SM, CL-ML, CL	A-6, A-2-4, A-4	0	0	80-100	50-95	30-90	15-70	20-38	4-14
	36-52	Clay loam, loam, gravelly clay loam	SC, CL	A-4, A-6	0	0-3	70-95	50-95	45-95	35-75	20-38	4-14
	52-72	Very gravelly sandy loam, very gravelly sand, clay	SC, SM, CL-ML, SC-SM	A-6, A-4, A-2-6, A-1, A-7	0	1-5	50-95	30-95	15-95	2-90	16-52	2-22
4C:												
Urban land------	---	---	---	---	---	---	---	---	---	---	---	---
Sassafras-------	0-6	Gravelly sandy loam, gravelly loam, sandy loam, loam	CL, CL-ML, SC, SC-SM	A-4, A-2-4	0	0-10	60-100	50-100	30-95	15-75	24-41	7-19
	6-40	Gravelly sandy clay loam, gravelly loam, sandy clay loam, loam	SC, GC-GM, CL, GC	A-2-6, A-6	0	0	60-100	50-100	40-95	20-75	27-44	12-25
	40-60	Gravelly loamy sand, gravelly sandy loam, loamy sand, sandy loam	SM, GM, GC-GM, SC-SM	A-2-4, A-1-b	0	0	60-100	50-100	25-75	10-40	0-32	NP-13
Neabsco---------	0-8	Loam, silt loam, sandy loam	CL-ML, CL, ML	A-4	0	0	95-100	85-100	55-100	30-90	16-31	2-10
	8-17	Clay loam, sandy clay loam, loam	CL, SC	A-4, A-6	0	0	95-100	85-100	70-100	30-80	23-38	6-14
	17-36	Loam, sandy loam, sandy clay loam, gravelly sandy loam	CL, CL-ML, SC-SM	A-6, A-2-4, A-4	0	0	80-100	50-95	30-90	15-70	20-38	4-14
	36-52	Clay loam, loam, gravelly clay loam	CL, SC	A-4, A-6	0	0-3	70-95	50-95	45-95	35-75	20-38	4-14
	52-72	Very gravelly sandy loam, very gravelly sand, clay	CL-ML, SC, SM, SC-SM	A-7, A-2-6, A-4, A-6, A-1	0	1-5	50-95	30-95	15-95	2-90	16-52	2-22
5:												
Arlington National Cemetery-------	---	---	---	---	---	---	---	---	---	---	---	---

Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
6B:												
Glenelg	0-6	Loam, silt loam, channery silt loam	SC, CL	A-7-6, A-4, A-6	0	0	77-100	51-100	46-99	38-83	27-41	9-17
	6-27	Silt loam, channery silt loam, clay loam, silty clay loam, loam	SC, CL	A-7-6, A-7, A-6	0	0-9	83-100	60-100	54-100	48-93	29-42	13-22
	27-71	Very gravelly sandy loam, loam, channery loam, silt loam	SM, SC, CL, CL-ML	A-6, A-4, A-2-4	0	2-19	76-96	39-92	31-87	21-63	16-32	2-13
6C:												
Glenelg	0-6	Loam, channery silt loam, silt loam	SC, CL	A-6, A-4, A-7-6	0	0	77-100	51-100	46-99	38-83	27-41	9-17
	6-27	Silt loam, clay loam, channery silt loam, silty clay loam, loam	CL, SC	A-7-6, A-7, A-6	0	0-9	83-100	60-100	54-100	48-93	29-42	13-22
	27-71	Very gravelly sandy loam, loam, channery loam, silt loam	CL-ML, CL, SM, SC	A-2-4, A-4, A-6	0	2-19	76-96	39-92	31-87	21-63	16-32	2-13
6D:												
Glenelg	0-6	Loam, channery silt loam, silt loam	SC, CL	A-6, A-4, A-7-6	0	0	77-100	51-100	46-99	38-83	27-41	9-17
	6-27	Clay loam, channery silt loam, silt loam, silty clay loam, loam	SC, CL	A-7-6, A-7, A-6	0	0-9	83-100	60-100	54-100	48-93	29-42	13-22
	27-71	Very gravelly sandy loam, loam, channery loam, silt loam	CL, CL-ML, SC, SM	A-2-4, A-4, A-6	0	2-19	76-96	39-92	31-87	21-63	16-32	2-13
Manor	0-6	Sandy loam, loam	SC, SM, ML, GM	A-4, A-2-4, A-2-6	0	0	85-98	80-95	50-95	25-75	18-43	3-18
	6-26	Sandy loam, loam	CL, GC, SC	A-6, A-2-4, A-2-6, A-4	0	0	85-98	80-95	50-95	25-75	20-36	6-17
	26-60	Loamy sand, sandy loam, loam	CL-ML, ML, SM, SC-SM	A-6, A-4, A-1, A-2	0	0-3	85-100	80-100	40-95	10-75	16-32	2-13

Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
7A:												
Glenelg---	0-6	Loam, channery silt loam, silt loam	SC, CL	A-6, A-4, A-7-6	0	0	77-100	51-100	46-99	38-83	27-41	9-17
	6-27	Channery silt loam, clay loam, silt loam, silty clay loam, loam	SC, CL	A-7-6, A-7, A-6	0	0-9	83-100	60-100	54-100	48-93	29-42	13-22
	27-71	Very gravelly sandy loam, channery loam, loam, silt loam	SC, SM, CL, CL-ML	A-6, A-4, A-2-4	0	2-19	76-96	39-92	31-87	21-63	16-32	2-13
Urban land---	---	---	---	---	---	---	---	---	---	---	---	---
7B:												
Glenelg---	0-6	Loam, channery silt loam, silt loam	SC, CL	A-6, A-7-6, A-4	0	0	77-100	51-100	46-99	38-83	27-41	9-17
	6-27	Channery silt loam, clay loam, silt loam, silty clay loam, loam	SC, CL	A-7-6, A-7, A-6	0	0-9	83-100	60-100	54-100	48-93	29-42	13-22
	27-71	Very gravelly sandy loam, channery loam, loam, silt loam	SC, CL, CL-ML, SM	A-4, A-6, A-2-4	0	2-19	76-96	39-92	31-87	21-63	16-32	2-13
Urban land---	---	---	---	---	---	---	---	---	---	---	---	---
7C:												
Glenelg---	0-6	Loam, channery silt loam, silt loam	SC, CL	A-7-6, A-4, A-6	0	0	77-100	51-100	46-99	38-83	27-41	9-17
	6-27	Clay loam, channery silt loam, silt loam, silty clay loam, loam	SC, CL	A-7-6, A-7, A-6	0	0-9	83-100	60-100	54-100	48-93	29-42	13-22
	27-71	Very gravelly sandy loam, channery loam, loam, silt loam	SM, CL, SC, CL-ML	A-2-4, A-4, A-6	0	2-19	76-96	39-92	31-87	21-63	16-32	2-13
Urban land---	---	---	---	---	---	---	---	---	---	---	---	---
7D:												
Glenelg---	0-6	Loam, channery silt loam, silt loam	SC, CL	A-6, A-4, A-7-6	0	0	77-100	51-100	46-99	38-83	27-41	9-17
	6-27	Silt loam, channery silt loam, clay loam, silty clay loam, loam	SC, CL	A-7-6, A-7, A-6	0	0-9	83-100	60-100	54-100	48-93	29-42	13-22
	27-71	Very gravelly sandy loam, loam, channery loam, silt loam	CL-ML, CL, SC, SM	A-6, A-4, A-2-4	0	2-19	76-96	39-92	31-87	21-63	16-32	2-13

Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
Urban land------	---	---	---	---	---	---	---	---	---	---	---	---
9B:												
Sassafras-------	0-6	Gravelly sandy loam, gravelly loam, sandy loam, loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0-10	60-100	50-100	30-95	15-75	24-41	7-19
	6-40	Gravelly sandy clay loam, gravelly loam, sandy clay loam, loam	SC, GC, CL, GC-GM	A-2-6, A-6	0	0	60-100	50-100	40-95	20-75	27-44	12-25
	40-60	Gravelly loamy sand, gravelly sandy loam, loamy sand, sandy loam	SC-SM, GC-GM, SM, GM	A-1-b, A-2-4	0	0	60-100	50-100	25-75	10-40	0-32	NP-13
9C:												
Sassafras-------	0-6	Gravelly sandy loam, gravelly loam, sandy loam, loam	SC-SM, CL, CL-ML, SC	A-2-4, A-4	0	0-10	60-100	50-100	30-95	15-75	24-41	7-19
	6-40	Gravelly sandy clay loam, gravelly loam, sandy clay loam, loam	SC, GC, CL, GC-GM	A-2-6, A-6	0	0	60-100	50-100	40-95	20-75	27-44	12-25
	40-60	Gravelly loamy sand, gravelly sandy loam, loamy sand, sandy loam	SC-SM, GC-GM, SM, GM	A-1-b, A-2-4	0	0	60-100	50-100	25-75	10-40	0-32	NP-13
9D:												
Sassafras-------	0-6	Gravelly sandy loam, gravelly loam, sandy loam, loam	CL-ML, SC-SM, CL, SC	A-4, A-2-4	0	0-10	60-100	50-100	30-95	15-75	24-41	7-19
	6-40	Gravelly sandy clay loam, gravelly loam, sandy clay loam, loam	GC-GM, CL, GC, SC	A-2-6, A-6	0	0	60-100	50-100	40-95	20-75	27-44	12-25
	40-60	Gravelly loamy sand, gravelly sandy loam, loamy sand, sandy loam	GC-GM, SC-SM, GM, SM	A-1-b, A-2-4	0	0	60-100	50-100	25-75	10-40	0-32	NP-13

Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
10B:												
Urban land------	---	---	---	---	---	---	---	---	---	---	---	---
Glenelg---------	0-6	Loam, silt loam, channery silt loam	CL, SC	A-4, A-6, A-7-6	0	0	77-100	51-100	46-99	38-83	27-41	9-17
	6-27	Silt loam, channery silt loam, clay loam, silty clay loam, loam	CL, SC	A-7, A-7-6, A-6	0	0-9	83-100	60-100	54-100	48-93	29-42	13-22
	27-71	Very gravelly sandy loam, loam, channery loam, silt loam	CL-ML, CL, SC, SM	A-2-4, A-4, A-6	0	2-19	76-96	39-92	31-87	21-63	16-32	2-13
10C:												
Urban land------	---	---	---	---	---	---	---	---	---	---	---	---
Glenelg---------	0-6	Loam, channery silt loam, silt loam	SC, CL	A-7-6, A-4, A-6	0	0	77-100	51-100	46-99	38-83	27-41	9-17
	6-27	Clay loam, silt loam, channery silt loam, silty clay loam, loam	SC, CL	A-7-6, A-7, A-6	0	0-9	83-100	60-100	54-100	48-93	29-42	13-22
	27-71	Very gravelly sandy loam, loam, channery loam, silt loam	SM, SC, CL, CL-ML	A-2-4, A-4, A-6	0	2-19	76-96	39-92	31-87	21-63	16-32	2-13
10D:												
Urban land------	---	---	---	---	---	---	---	---	---	---	---	---
Glenelg---------	0-6	Loam, channery silt loam, silt loam	SC, CL	A-7-6, A-6, A-4	0	0	77-100	51-100	46-99	38-83	27-41	9-17
	6-27	Silt loam, channery silt loam, clay loam, silty clay loam, loam	SC, CL	A-6, A-7, A-7-6	0	0-9	83-100	60-100	54-100	48-93	29-42	13-22
	27-71	Very gravelly sandy loam, loam, channery loam, silt loam	SC, CL, SM, CL-ML	A-6, A-4, A-2-4	0	2-19	76-96	39-92	31-87	21-63	16-32	2-13

Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
11B:												
Urban land------	---	---	---	---	---	---	---	---	---	---	---	---
Sassafras-------	0-6	Gravelly sandy loam, gravelly loam, sandy loam, loam	CL-ML, SC, CL, SC-SM	A-4, A-2-4	0	0-10	60-100	50-100	30-95	15-75	24-41	7-19
	6-40	Gravelly sandy clay loam, gravelly loam, sandy clay loam, loam	CL, GC, GC-GM, SC	A-2-6, A-6	0	0	60-100	50-100	40-95	20-75	27-44	12-25
	40-60	Gravelly loamy sand, gravelly sandy loam, loamy sand, sandy loam	GM, SC-SM, GC-GM, SM	A-2-4, A-1-b	0	0	60-100	50-100	25-75	10-40	0-32	NP-13
11C:												
Urban land------	---	---	---	---	---	---	---	---	---	---	---	---
Sassafras-------	0-6	Gravelly sandy loam, gravelly loam, sandy loam, loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0-10	60-100	50-100	30-95	15-75	24-41	7-19
	6-40	Gravelly sandy clay loam, gravelly loam, sandy clay loam, loam	GC-GM, GC, SC, CL	A-2-6, A-6	0	0	60-100	50-100	40-95	20-75	27-44	12-25
	40-60	Gravelly loamy sand, gravelly sandy loam, loamy sand, sandy loam	GM, SM, GC-GM, SC-SM	A-1-b, A-2-4	0	0	60-100	50-100	25-75	10-40	0-32	NP-13
11D:												
Urban land------	---	---	---	---	---	---	---	---	---	---	---	---
Sassafras-------	0-6	Gravelly sandy loam, gravelly loam, sandy loam, loam	CL, CL-ML, SC, SC-SM	A-4, A-2-4	0	0-10	60-100	50-100	30-95	15-75	24-41	7-19
	6-40	Gravelly sandy clay loam, gravelly loam, sandy clay loam, loam	SC, GC-GM, CL, GC	A-2-6, A-6	0	0	60-100	50-100	40-95	20-75	27-44	12-25
	40-60	Gravelly loamy sand, gravelly sandy loam, loamy sand, sandy loam	SM, GC-GM, SC-SM, GM	A-1-b, A-2-4	0	0	60-100	50-100	25-75	10-40	0-32	NP-13
12:												
Urban land------	---	---	---	---	---	---	---	---	---	---	---	---
Udorthents------	---	---	---	---	---	---	---	---	---	---	---	---

Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
13:												
Udorthents	---	---	---	---	---	---	---	---	---	---	---	---
15A:												
Sassafras	0-6	Gravelly sandy loam, gravelly loam, sandy loam, loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0-10	60-100	50-100	30-95	15-75	24-41	7-19
	6-40	Gravelly sandy clay loam, gravelly loam, sandy clay loam, loam	GC, CL, GC-GM, SC	A-2-6, A-6	0	0	60-100	50-100	40-95	20-75	27-44	12-25
	40-60	Gravelly loamy sand, gravelly sandy loam, loamy sand, sandy loam	GC-GM, SM, GM, SC-SM	A-1-b, A-2-4	0	0	60-100	50-100	25-75	10-40	0-32	NP-13
Urban land	---	---	---	---	---	---	---	---	---	---	---	---
15C:												
Sassafras	0-6	Gravelly sandy loam, gravelly loam, sandy loam, loam	CL, CL-ML, SC, SC-SM	A-4, A-2-4	0	0-10	60-100	50-100	30-95	15-75	24-41	7-19
	6-40	Gravelly sandy clay loam, gravelly loam, sandy clay loam, loam	GC, SC, GC-GM, CL	A-6, A-2-6	0	0	60-100	50-100	40-95	20-75	27-44	12-25
	40-60	Gravelly loamy sand, gravelly sandy loam, loamy sand, sandy loam	SC-SM, GM, SM, GC-GM	A-1-b, A-2-4	0	0	60-100	50-100	25-75	10-40	0-32	NP-13
Urban land	---	---	---	---	---	---	---	---	---	---	---	---
15D:												
Sassafras	0-6	Gravelly sandy loam, gravelly loam, sandy loam, loam	CL, SC, CL-ML, SC-SM	A-4, A-2-4	0	0-10	60-100	50-100	30-95	15-75	24-41	7-19
	6-40	Gravelly sandy clay loam, gravelly loam, sandy clay loam, loam	SC, GC, CL, GC-GM	A-2-6, A-6	0	0	60-100	50-100	40-95	20-75	27-44	12-25
	40-60	Gravelly loamy sand, gravelly sandy loam, loamy sand, sandy loam	SC-SM, GC-GM, SM, GM	A-1-b, A-2-4	0	0	60-100	50-100	25-75	10-40	0-32	NP-13
Urban land	---	---	---	---	---	---	---	---	---	---	---	---

Engineering Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
16B:												
Urban land------	---	---	---	---	---	---	---	---	---	---	---	---
Woodstown-------	0-11	Fine sandy loam, sandy loam, loam	CL-ML, SC-SM, SM	A-2, A-4	0	0	90-100	80-100	48-95	24-75	18-33	2-12
	11-29	Sandy clay loam, loam, sandy loam	SC-SM, SC, CL	A-2, A-6	0	0	90-100	80-100	48-90	24-60	27-40	12-21
	29-70	Sand, sandy loam, gravelly loamy sand, sandy clay loam, silt loam	SP-SM, SM, SC-SM	A-3, A-2, A-1	0	0	80-100	70-95	35-86	5-56	16-35	NP-16

Physical Soil Properties

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
1A:														
Hatboro	0-6	15-82	5-80	10-20	1.20-1.40	4.00-14.00	0.16-0.22	0.0-2.9	2.0-4.0	.37	.43	5	5	56
	6-23	15-80	5-80	15-35	1.20-1.40	4.00-14.00	0.16-0.20	0.0-2.9	0.0-0.5	.32	.32			
	23-60	15-82	5-80	10-35	1.20-1.50	4.00-14.00	0.10-0.14	0.0-2.9	0.0-0.5	.24	.24			
2A:														
Codorus	0-8	15-52	28-80	15-25	1.20-1.40	4.00-14.00	0.14-0.20	0.0-2.9	1.0-3.0	.32	.37	5	5	56
	8-50	15-52	15-80	18-35	1.20-1.50	4.00-14.00	0.14-0.18	0.0-2.9	0.0-0.5	.24	.28			
	50-62	24-90	10-50	5-12	1.20-1.50	14.00-141.00	0.04-0.08	0.0-2.9	0.0-0.5	.02	.10			
Hatboro	0-6	15-82	5-80	10-20	1.20-1.40	4.00-14.00	0.16-0.22	0.0-2.9	2.0-4.0	.37	.43	5	5	56
	6-23	15-80	5-80	15-35	1.20-1.40	4.00-14.00	0.16-0.20	0.0-2.9	0.0-0.5	.32	.32			
	23-60	15-82	5-80	10-35	1.20-1.50	4.00-14.00	0.10-0.14	0.0-2.9	0.0-0.5	.24	.24			
3A:														
Urban land	---	---	---	---	---	---	---	---	---	---	---	--	---	---
Codorus	0-8	15-52	28-80	15-25	1.20-1.40	4.00-14.00	0.14-0.20	0.0-2.9	1.0-3.0	.32	.37	5	5	56
	8-50	15-52	15-80	18-35	1.20-1.50	4.00-14.00	0.14-0.18	0.0-2.9	0.0-0.5	.24	.28			
	50-62	24-90	10-50	5-12	1.20-1.50	14.00-141.00	0.04-0.08	0.0-2.9	0.0-0.5	.02	.10			
4A:														
Sassafras	0-6	45-80	10-30	12-27	1.30-1.40	4.00-42.00	0.10-0.14	0.0-2.9	1.0-2.0	.20	.28	5	4	86
	6-40	50-70	5-30	18-35	1.35-1.50	4.00-14.00	0.11-0.22	0.0-2.9	0.0-0.5	.15	.24			
	40-60	60-90	5-30	2-20	1.35-1.50	4.00-141.00	0.04-0.12	0.0-2.9	0.0-0.5	.05	.10			
Urban land	---	---	---	---	---	---	---	---	---	---	---	--	---	---
Neabsco	0-8	15-82	5-80	10-27	1.00-1.25	4.00-14.00	0.18-0.24	0.0-2.9	1.0-3.0	.32	.32	3	5	56
	8-17	20-80	5-50	18-35	1.20-1.30	4.00-14.00	0.14-0.24	0.0-2.9	0.0-0.5	.24	.24			
	17-36	24-82	5-50	15-35	1.70-1.90	0.01-0.42	0.10-0.14	0.0-2.9	0.0-0.5	.24	.24			
	36-52	20-52	15-50	15-35	1.20-1.50	4.00-14.00	0.10-0.14	0.0-2.9	0.0-0.5	.24	.28			
	52-72	5-90	5-39	4-50	1.20-1.50	4.00-42.00	0.08-0.12	0.0-2.9	0.0-0.5	.20	.24			
4B:														
Urban land	---	---	---	---	---	---	---	---	---	---	---	--	---	---
Sassafras	0-6	45-80	10-30	12-27	1.30-1.40	4.00-42.00	0.10-0.14	0.0-2.9	1.0-2.0	.20	.28	5	4	86
	6-40	50-70	5-30	18-35	1.35-1.50	4.00-14.00	0.11-0.22	0.0-2.9	0.0-0.5	.15	.24			
	40-60	60-90	5-30	2-20	1.35-1.50	4.00-141.00	0.04-0.12	0.0-2.9	0.0-0.5	.05	.10			

Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
Neabsco	0-8	15-82	5-80	10-27	1.00-1.25	4.00-14.00	0.18-0.24	0.0-2.9	1.0-3.0	.32	.32	3	5	56
	8-17	20-80	5-50	18-35	1.20-1.30	4.00-14.00	0.14-0.24	0.0-2.9	0.0-0.5	.24	.24			
	17-36	24-82	5-50	15-35	1.70-1.90	0.01-0.42	0.10-0.14	0.0-2.9	0.0-0.5	.24	.24			
	36-52	20-52	15-50	15-35	1.20-1.50	4.00-14.00	0.10-0.14	0.0-2.9	0.0-0.5	.24	.28			
	52-72	5-90	5-39	4-50	1.20-1.50	4.00-42.00	0.08-0.12	0.0-2.9	0.0-0.5	.20	.24			
4C:														
Urban land	---	---	---	---	---	---	---	---	---	---	---	--	---	---
Sassafras	0-6	45-80	10-30	12-27	1.30-1.40	4.00-42.00	0.10-0.14	0.0-2.9	1.0-2.0	.20	.28	5	4	86
	6-40	50-70	5-30	18-35	1.35-1.50	4.00-14.00	0.11-0.22	0.0-2.9	0.0-0.5	.15	.24			
	40-60	60-90	5-30	2-20	1.35-1.50	4.00-141.00	0.04-0.12	0.0-2.9	0.0-0.5	.05	.10			
Neabsco	0-8	15-82	5-80	10-27	1.00-1.25	4.00-14.00	0.18-0.24	0.0-2.9	1.0-3.0	.32	.32	3	5	56
	8-17	20-80	5-50	18-35	1.20-1.30	4.00-14.00	0.14-0.24	0.0-2.9	0.0-0.5	.24	.24			
	17-36	24-82	5-50	15-35	1.70-1.90	0.01-0.42	0.10-0.14	0.0-2.9	0.0-0.5	.24	.24			
	36-52	20-52	15-50	15-35	1.20-1.50	4.00-14.00	0.10-0.14	0.0-2.9	0.0-0.5	.24	.28			
	52-72	5-90	5-39	4-50	1.20-1.50	4.00-42.00	0.08-0.12	0.0-2.9	0.0-0.5	.20	.24			
5:														
Arlington National Cemetery	---	---	---	---	---	---	---	---	---	---	---	--	---	---
6B:														
Glenelg	0-6	15-50	28-80	15-25	1.10-1.40	4.00-14.00	0.14-0.24	0.0-2.9	1.0-3.0	.37	.43	5	6	48
	6-27	15-50	20-80	20-32	1.20-1.60	4.00-14.00	0.14-0.20	0.0-2.9	0.0-0.5	.32	.37			
	27-71	15-80	5-80	5-20	1.20-1.40	4.00-14.00	0.10-0.20	0.0-2.9	0.0-0.5	.24	.32			
6C:														
Glenelg	0-6	15-50	28-80	15-25	1.10-1.40	4.00-14.00	0.14-0.24	0.0-2.9	1.0-3.0	.37	.43	5	6	48
	6-27	15-50	20-80	20-32	1.20-1.60	4.00-14.00	0.14-0.20	0.0-2.9	0.0-0.5	.32	.37			
	27-71	15-80	5-80	5-20	1.20-1.40	4.00-14.00	0.10-0.20	0.0-2.9	0.0-0.5	.24	.32			
6D:														
Glenelg	0-6	15-50	28-80	15-25	1.10-1.40	4.00-14.00	0.14-0.24	0.0-2.9	1.0-3.0	.37	.43	5	6	48
	6-27	15-50	20-80	20-32	1.20-1.60	4.00-14.00	0.14-0.20	0.0-2.9	0.0-0.5	.32	.37			
	27-71	15-80	5-80	5-20	1.20-1.40	4.00-14.00	0.10-0.20	0.0-2.9	0.0-0.5	.24	.32			
Manor	0-6	40-80	15-40	7-27	1.20-1.40	4.00-14.00	0.10-0.14	0.0-2.9	0.2-3.0	.24	.28	5	6	48
	6-26	35-75	15-30	10-25	1.20-1.50	4.00-14.00	0.10-0.14	0.0-2.9	0.0-0.5	.32	.37			
	26-60	45-90	2-30	5-20	1.25-1.50	4.00-42.00	0.10-0.20	0.0-2.9	0.0-0.5	.49	.55			

Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
7A:														
Glenelg	0-6	15-50	28-80	15-25	1.10-1.40	4.00-14.00	0.14-0.24	0.0-2.9	1.0-3.0	.37	.43	5	6	48
	6-27	15-50	20-80	20-32	1.20-1.60	4.00-14.00	0.14-0.20	0.0-2.9	0.0-0.5	.32	.37			
	27-71	15-80	5-80	5-20	1.20-1.40	4.00-14.00	0.10-0.20	0.0-2.9	0.0-0.5	.24	.32			
Urban land	---	---	---	---	---	---	---	---	---	---	---	--	---	---
7B:														
Glenelg	0-6	15-50	28-80	15-25	1.10-1.40	4.00-14.00	0.14-0.24	0.0-2.9	1.0-3.0	.37	.43	5	6	48
	6-27	15-50	20-80	20-32	1.20-1.60	4.00-14.00	0.14-0.20	0.0-2.9	0.0-0.5	.32	.37			
	27-71	15-80	5-80	5-20	1.20-1.40	4.00-14.00	0.10-0.20	0.0-2.9	0.0-0.5	.24	.32			
Urban land	---	---	---	---	---	---	---	---	---	---	---	--	---	---
7C:														
Glenelg	0-6	15-50	28-80	15-25	1.10-1.40	4.00-14.00	0.14-0.24	0.0-2.9	1.0-3.0	.37	.43	5	6	48
	6-27	15-50	20-80	20-32	1.20-1.60	4.00-14.00	0.14-0.20	0.0-2.9	0.0-0.5	.32	.37			
	27-71	15-80	5-80	5-20	1.20-1.40	4.00-14.00	0.10-0.20	0.0-2.9	0.0-0.5	.24	.32			
Urban land	---	---	---	---	---	---	---	---	---	---	---	--	---	---
7D:														
Glenelg	0-6	15-50	28-80	15-25	1.10-1.40	4.00-14.00	0.14-0.24	0.0-2.9	1.0-3.0	.37	.43	5	6	48
	6-27	15-50	20-80	20-32	1.20-1.60	4.00-14.00	0.14-0.20	0.0-2.9	0.0-0.5	.32	.37			
	27-71	15-80	5-80	5-20	1.20-1.40	4.00-14.00	0.10-0.20	0.0-2.9	0.0-0.5	.24	.32			
Urban land	---	---	---	---	---	---	---	---	---	---	---	--	---	---
9B:														
Sassafras	0-6	45-80	10-30	12-27	1.30-1.40	4.00-42.00	0.10-0.14	0.0-2.9	1.0-2.0	.20	.28	5	4	86
	6-40	50-70	5-30	18-35	1.35-1.50	4.00-14.00	0.11-0.22	0.0-2.9	0.0-0.5	.15	.24			
	40-60	60-90	5-30	2-20	1.35-1.50	4.00-141.00	0.04-0.12	0.0-2.9	0.0-0.5	.05	.10			
9C:														
Sassafras	0-6	45-80	10-30	12-27	1.30-1.40	4.00-42.00	0.10-0.14	0.0-2.9	1.0-2.0	.20	.28	5	4	86
	6-40	50-70	5-30	18-35	1.35-1.50	4.00-14.00	0.11-0.22	0.0-2.9	0.0-0.5	.15	.24			
	40-60	60-90	5-30	2-20	1.35-1.50	4.00-141.00	0.04-0.12	0.0-2.9	0.0-0.5	.05	.10			
9D:														
Sassafras	0-6	45-80	10-30	12-27	1.30-1.40	4.00-42.00	0.10-0.14	0.0-2.9	1.0-2.0	.20	.28	5	4	86
	6-40	50-70	5-30	18-35	1.35-1.50	4.00-14.00	0.11-0.22	0.0-2.9	0.0-0.5	.15	.24			
	40-60	60-90	5-30	2-20	1.35-1.50	4.00-141.00	0.04-0.12	0.0-2.9	0.0-0.5	.05	.10			

Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
10B:														
Urban land	---	---	---	---	---	---	---	---	---	---	---	--	---	---
Glenelg	0-6	15-50	28-80	15-25	1.10-1.40	4.00-14.00	0.14-0.24	0.0-2.9	1.0-3.0	.37	.43	5	6	48
	6-27	15-50	20-80	20-32	1.20-1.60	4.00-14.00	0.14-0.20	0.0-2.9	0.0-0.5	.32	.37			
	27-71	15-80	5-80	5-20	1.20-1.40	4.00-14.00	0.10-0.20	0.0-2.9	0.0-0.5	.24	.32			
10C:														
Urban land	---	---	---	---	---	---	---	---	---	---	---	--	---	---
Glenelg	0-6	15-50	28-80	15-25	1.10-1.40	4.00-14.00	0.14-0.24	0.0-2.9	1.0-3.0	.37	.43	5	6	48
	6-27	15-50	20-80	20-32	1.20-1.60	4.00-14.00	0.14-0.20	0.0-2.9	0.0-0.5	.32	.37			
	27-71	15-80	5-80	5-20	1.20-1.40	4.00-14.00	0.10-0.20	0.0-2.9	0.0-0.5	.24	.32			
10D:														
Urban land	---	---	---	---	---	---	---	---	---	---	---	--	---	---
Glenelg	0-6	15-50	28-80	15-25	1.10-1.40	4.00-14.00	0.14-0.24	0.0-2.9	1.0-3.0	.37	.43	5	6	48
	6-27	15-50	20-80	20-32	1.20-1.60	4.00-14.00	0.14-0.20	0.0-2.9	0.0-0.5	.32	.37			
	27-71	15-80	5-80	5-20	1.20-1.40	4.00-14.00	0.10-0.20	0.0-2.9	0.0-0.5	.24	.32			
11B:														
Urban land	---	---	---	---	---	---	---	---	---	---	---	--	---	---
Sassafras	0-6	45-80	10-30	12-27	1.30-1.40	4.00-42.00	0.10-0.14	0.0-2.9	1.0-2.0	.20	.28	5	4	86
	6-40	50-70	5-30	18-35	1.35-1.50	4.00-14.00	0.11-0.22	0.0-2.9	0.0-0.5	.15	.24			
	40-60	60-90	5-30	2-20	1.35-1.50	4.00-141.00	0.04-0.12	0.0-2.9	0.0-0.5	.05	.10			
11C:														
Urban land	---	---	---	---	---	---	---	---	---	---	---	--	---	---
Sassafras	0-6	45-80	10-30	12-27	1.30-1.40	4.00-42.00	0.10-0.14	0.0-2.9	1.0-2.0	.20	.28	5	4	86
	6-40	50-70	5-30	18-35	1.35-1.50	4.00-14.00	0.11-0.22	0.0-2.9	0.0-0.5	.15	.24			
	40-60	60-90	5-30	2-20	1.35-1.50	4.00-141.00	0.04-0.12	0.0-2.9	0.0-0.5	.05	.10			
11D:														
Urban land	---	---	---	---	---	---	---	---	---	---	---	--	---	---
Sassafras	0-6	45-80	10-30	12-27	1.30-1.40	4.00-42.00	0.10-0.14	0.0-2.9	1.0-2.0	.20	.28	5	4	86
	6-40	50-70	5-30	18-35	1.35-1.50	4.00-14.00	0.11-0.22	0.0-2.9	0.0-0.5	.15	.24			
	40-60	60-90	5-30	2-20	1.35-1.50	4.00-141.00	0.04-0.12	0.0-2.9	0.0-0.5	.05	.10			

Physical Soil Properties—Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
12:														
Urban land	---	---	---	---	---	---	---	---	---	---	---	--	---	---
Udorthents	---	---	---	---	---	---	---	---	---	---	---	--	---	---
13:														
Udorthents	---	---	---	---	---	---	---	---	---	---	---	--	---	---
15A:														
Sassafras	0-6	45-80	10-30	12-27	1.30-1.40	4.00-42.00	0.10-0.14	0.0-2.9	1.0-2.0	.20	.28	5	4	86
	6-40	50-70	5-30	18-35	1.35-1.50	4.00-14.00	0.11-0.22	0.0-2.9	0.0-0.5	.15	.24			
	40-60	60-90	5-30	2-20	1.35-1.50	4.00-141.00	0.04-0.12	0.0-2.9	0.0-0.5	.05	.10			
Urban land	---	---	---	---	---	---	---	---	---	---	---	--	---	---
15C:														
Sassafras	0-6	45-80	10-30	12-27	1.30-1.40	4.00-42.00	0.10-0.14	0.0-2.9	1.0-2.0	.20	.28	5	4	86
	6-40	50-70	5-30	18-35	1.35-1.50	4.00-14.00	0.11-0.22	0.0-2.9	0.0-0.5	.15	.24			
	40-60	60-90	5-30	2-20	1.35-1.50	4.00-141.00	0.04-0.12	0.0-2.9	0.0-0.5	.05	.10			
Urban land	---	---	---	---	---	---	---	---	---	---	---	--	---	---
15D:														
Sassafras	0-6	45-80	10-30	12-27	1.30-1.40	4.00-42.00	0.10-0.14	0.0-2.9	1.0-2.0	.20	.28	5	4	86
	6-40	50-70	5-30	18-35	1.35-1.50	4.00-14.00	0.11-0.22	0.0-2.9	0.0-0.5	.15	.24			
	40-60	60-90	5-30	2-20	1.35-1.50	4.00-141.00	0.04-0.12	0.0-2.9	0.0-0.5	.05	.10			
Urban land	---	---	---	---	---	---	---	---	---	---	---	--	---	---
16B:														
Urban land	---	---	---	---	---	---	---	---	---	---	---	--	---	---
Woodstown	0-11	24-82	5-50	5-18	1.00-1.40	4.00-42.00	0.08-0.16	0.0-2.9	1.0-2.0	.24	.24	4	3	86
	11-29	24-82	5-50	18-30	1.35-1.70	1.40-42.00	0.06-0.16	0.0-2.9	0.0-0.5	.28	.28			
	29-70	15-90	5-50	5-24	1.35-1.65	4.00-42.00	0.06-0.16	0.0-2.9	0.0-0.5	.28	.28			

Chemical Soil Properties

(Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Cation exchange capacity	Effective cation exchange capacity	Soil reaction
	Inches	meq/100 g	meq/100 g	pH
1A:				
Hatboro	0-6	8.0-16	6.0-12	4.5-7.3
	6-23	5.2-13	3.9-10	4.5-7.3
	23-60	3.5-13	2.6-10	5.6-6.5
2A:				
Codorus	0-8	6.0-13	4.3-9.8	4.5-6.0
	8-50	4.5-18	3.4-7.4	5.1-6.5
	50-62	2.6-6.4	1.0-3.0	5.1-6.5
Hatboro	0-6	8.0-16	6.0-12	4.5-7.3
	6-23	5.2-13	3.9-10	4.5-7.3
	23-60	3.5-13	2.6-10	5.6-6.5
3A:				
Urban land	---	---	---	---
Codorus	0-8	6.0-13	4.3-9.8	4.5-6.0
	8-50	4.5-18	3.4-7.4	5.1-6.5
	50-62	2.6-6.4	1.0-3.0	5.1-6.5
4A:				
Sassafras	0-6	5.2-11	4.0-8.4	3.6-5.5
	6-40	4.5-9.9	3.4-7.4	3.6-5.5
	40-60	1.2-6.1	0.9-4.6	3.6-5.5
Urban land	---	---	---	---
Neabsco	0-8	4.8-14	3.6-10	4.5-5.5
	8-17	4.5-9.9	3.4-7.4	4.5-5.5
	17-36	3.8-9.9	2.8-7.4	4.5-5.5
	36-52	3.8-9.9	2.8-7.4	4.5-5.5
	52-72	2.5-14	1.9-10	4.5-5.5
4B:				
Urban land	---	---	---	---
Sassafras	0-6	5.2-11	4.0-8.4	3.6-5.5
	6-40	4.5-9.9	3.4-7.4	3.6-5.5
	40-60	1.2-6.1	0.9-4.6	3.6-5.5
Neabsco	0-8	4.8-14	3.6-10	4.5-5.5
	8-17	4.5-9.9	3.4-7.4	4.5-5.5
	17-36	3.8-9.9	2.8-7.4	4.5-5.5
	36-52	3.8-9.9	2.8-7.4	4.5-5.5
	52-72	2.5-14	1.9-10	4.5-5.5
4C:				
Urban land	---	---	---	---
Sassafras	0-6	5.2-11	4.0-8.4	3.6-5.5
	6-40	4.5-9.9	3.4-7.4	3.6-5.5
	40-60	1.2-6.1	0.9-4.6	3.6-5.5

Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation exchange capacity	Effective cation exchange capacity	Soil reaction
	Inches	meq/100 g	meq/100 g	pH
Neabsco	0-8	4.8-14	3.6-10	4.5-5.5
	8-17	4.5-9.9	3.4-7.4	4.5-5.5
	17-36	3.8-9.9	2.8-7.4	4.5-5.5
	36-52	3.8-9.9	2.8-7.4	4.5-5.5
	52-72	2.5-14	1.9-10	4.5-5.5
5:				
Arlington National Cemetery	---	---	---	---
6B:				
Glenelg	0-6	7.5-16	5.6-12	4.5-5.5
	6-27	7.0-12	5.2-9.2	4.5-6.5
	27-71	1.8-8.1	1.3-6.1	4.5-6.5
6C:				
Glenelg	0-6	7.5-16	5.6-12	4.5-5.5
	6-27	7.0-12	5.2-9.2	4.5-6.5
	27-71	1.8-8.1	1.3-6.1	4.5-6.5
6D:				
Glenelg	0-6	7.5-16	5.6-12	4.5-5.5
	6-27	7.0-12	5.2-9.2	4.5-6.5
	27-71	1.8-8.1	1.3-6.1	4.5-6.5
Manor	0-6	2.3-14	1.7-10	4.5-6.5
	6-26	2.5-7.4	1.9-5.5	3.6-6.0
	26-60	1.2-6.1	0.9-4.6	3.6-6.0
7A:				
Glenelg	0-6	7.5-16	5.6-12	4.5-5.5
	6-27	7.0-12	5.2-9.2	4.5-6.5
	27-71	1.8-8.1	1.3-6.1	4.5-6.5
Urban land	---	---	---	---
7B:				
Glenelg	0-6	7.5-16	5.6-12	4.5-5.5
	6-27	7.0-12	5.2-9.2	4.5-6.5
	27-71	1.8-8.1	1.3-6.1	4.5-6.5
Urban land	---	---	---	---
7C:				
Glenelg	0-6	7.5-16	5.6-12	4.5-5.5
	6-27	7.0-12	5.2-9.2	4.5-6.5
	27-71	1.8-8.1	1.3-6.1	4.5-6.5
Urban land	---	---	---	---
7D:				
Glenelg	0-6	7.5-16	5.6-12	4.5-5.5
	6-27	7.0-12	5.2-9.2	4.5-6.5
	27-71	1.8-8.1	1.3-6.1	4.5-6.5
Urban land	---	---	---	---

Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation exchange capacity	Effective cation exchange capacity	Soil reaction
	Inches	meq/100 g	meq/100 g	pH
9B:				
Sassafras	0-6	5.2-11	4.0-8.4	3.6-5.5
	6-40	4.5-9.9	3.4-7.4	3.6-5.5
	40-60	1.2-6.1	0.9-4.6	3.6-5.5
9C:				
Sassafras	0-6	5.2-11	4.0-8.4	3.6-5.5
	6-40	4.5-9.9	3.4-7.4	3.6-5.5
	40-60	1.2-6.1	0.9-4.6	3.6-5.5
9D:				
Sassafras	0-6	5.2-11	4.0-8.4	3.6-5.5
	6-40	4.5-9.9	3.4-7.4	3.6-5.5
	40-60	1.2-6.1	0.9-4.6	3.6-5.5
10B:				
Urban land	---	---	---	---
Glenelg	0-6	7.5-16	5.6-12	4.5-5.5
	6-27	7.0-12	5.2-9.2	4.5-6.5
	27-71	1.8-8.1	1.3-6.1	4.5-6.5
10C:				
Urban land	---	---	---	---
Glenelg	0-6	7.5-16	5.6-12	4.5-5.5
	6-27	7.0-12	5.2-9.2	4.5-6.5
	27-71	1.8-8.1	1.3-6.1	4.5-6.5
10D:				
Urban land	---	---	---	---
Glenelg	0-6	7.5-16	5.6-12	4.5-5.5
	6-27	7.0-12	5.2-9.2	4.5-6.5
	27-71	1.8-8.1	1.3-6.1	4.5-6.5
11B:				
Urban land	---	---	---	---
Sassafras	0-6	5.2-11	4.0-8.4	3.6-5.5
	6-40	4.5-9.9	3.4-7.4	3.6-5.5
	40-60	1.2-6.1	0.9-4.6	3.6-5.5
11C:				
Urban land	---	---	---	---
Sassafras	0-6	5.2-11	4.0-8.4	3.6-5.5
	6-40	4.5-9.9	3.4-7.4	3.6-5.5
	40-60	1.2-6.1	0.9-4.6	3.6-5.5
11D:				
Urban land	---	---	---	---
Sassafras	0-6	5.2-11	4.0-8.4	3.6-5.5
	6-40	4.5-9.9	3.4-7.4	3.6-5.5
	40-60	1.2-6.1	0.9-4.6	3.6-5.5

Chemical Soil Properties—Continued

Map symbol and soil name	Depth	Cation exchange capacity	Effective cation exchange capacity	Soil reaction
	Inches	meq/100 g	meq/100 g	pH
12:				
Urban land	---	---	---	---
Udorthents	---	---	---	---
13:				
Udorthents	---	---	---	---
15A:				
Sassafras	0-6	5.2-11	4.0-8.4	3.6-5.5
	6-40	4.5-9.9	3.4-7.4	3.6-5.5
	40-60	1.2-6.1	0.9-4.6	3.6-5.5
Urban land	---	---	---	---
15C:				
Sassafras	0-6	5.2-11	4.0-8.4	3.6-5.5
	6-40	4.5-9.9	3.4-7.4	3.6-5.5
	40-60	1.2-6.1	0.9-4.6	3.6-5.5
Urban land	---	---	---	---
15D:				
Sassafras	0-6	5.2-11	4.0-8.4	3.6-5.5
	6-40	4.5-9.9	3.4-7.4	3.6-5.5
	40-60	1.2-6.1	0.9-4.6	3.6-5.5
Urban land	---	---	---	---
16B:				
Urban land	---	---	---	---
Woodstown	0-11	3.5-9.0	2.6-6.8	3.6-5.5
	11-29	4.5-8.6	3.4-6.5	3.6-5.5
	29-70	1.2-7.1	0.9-5.3	3.6-5.5

Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
1A:										
Hatboro	D	Low								
			Jan - May	0.0-0.5	>6.0	---	---	None	Very brief	Frequent
			Jun - Sep	---	---	---	---	None	---	None
			October	0.0-0.5	>6.0	---	---	None	---	None
			Nov - Dec	0.0-0.5	>6.0	---	---	None	Very brief	Frequent
2A:										
Codorus	C	Low								
			Jan - Apr	1.0-2.0	>6.0	---	---	None	Very brief	Frequent
			May - Oct	---	---	---	---	None	---	None
			November	1.0-2.0	>6.0	---	---	None	---	None
			December	1.0-2.0	>6.0	---	---	None	Very brief	Frequent
Hatboro	D	Low								
			Jan - May	0.0-0.5	>6.0	---	---	None	Very brief	Frequent
			Jun - Sep	---	---	---	---	None	---	None
			October	0.0-0.5	>6.0	---	---	None	---	None
			Nov - Dec	0.0-0.5	>6.0	---	---	None	Very brief	Frequent
3A:										
Urban land	---	Low								
			Jan - Dec	---	---	---	---	None	---	None
Codorus	C	Low								
			Jan - Apr	1.0-2.0	>6.0	---	---	None	Very brief	Frequent
			May - Oct	---	---	---	---	None	---	None
			November	1.0-2.0	>6.0	---	---	None	---	None
			December	1.0-2.0	>6.0	---	---	None	Very brief	Frequent
4A:										
Sassafras	B	Low								
			Jan - Dec	---	---	---	---	None	---	None
Urban land	---	High								
			Jan - Dec	---	---	---	---	None	---	None
Neabsco	C	High								
			Jan - Apr	1.0-2.5	1.5-4.5	---	---	None	---	None
			May - Oct	---	---	---	---	None	---	None
			Nov - Dec	1.0-2.5	1.5-4.5	---	---	None	---	None

Water Features—Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
4B:										
Urban land	---	High								
			Jan - Dec	---	---	---	---	None	---	None
Sassafras	B	Medium								
			Jan - Dec	---	---	---	---	None	---	None
Neabsco	C	Very high								
			Jan - Apr	1.0-2.5	1.5-4.5	---	---	None	---	None
			May - Oct	---	---	---	---	None	---	None
			Nov - Dec	1.0-2.5	1.5-4.5	---	---	None	---	None
4C:										
Urban land	---	High								
			Jan - Dec	---	---	---	---	None	---	None
Sassafras	B	Medium								
			Jan - Dec	---	---	---	---	None	---	None
Neabsco	C	Very high								
			Jan - Apr	1.0-2.5	1.5-4.5	---	---	None	---	None
			May - Oct	---	---	---	---	None	---	None
			Nov - Dec	1.0-2.5	1.5-4.5	---	---	None	---	None
5:										
Arlington National Cemetery	---	High								
			Jan - Dec	---	---	---	---	None	---	None
6B:										
Glenelg	B	Medium								
			Jan - Dec	---	---	---	---	None	---	None
6C:										
Glenelg	B	Medium								
			Jan - Dec	---	---	---	---	None	---	None
6D:										
Glenelg	B	High								
			Jan - Dec	---	---	---	---	None	---	None
Manor	B	High								
			Jan - Dec	---	---	---	---	None	---	None

Water Features—Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
7A:										
Glenelg	B	Low	Jan - Dec	---	---	---	---	None	---	None
Urban land	---	High	Jan - Dec	---	---	---	---	None	---	None
7B:										
Glenelg	B	Medium	Jan - Dec	---	---	---	---	None	---	None
Urban land	---	High	Jan - Dec	---	---	---	---	None	---	None
7C:										
Glenelg	B	Medium	Jan - Dec	---	---	---	---	None	---	None
Urban land	---	High	Jan - Dec	---	---	---	---	None	---	None
7D:										
Glenelg	B	High	Jan - Dec	---	---	---	---	None	---	None
Urban land	---	Very high	Jan - Dec	---	---	---	---	None	---	None
9B:										
Sassafras	B	Medium	Jan - Dec	---	---	---	---	None	---	None
9C:										
Sassafras	B	Medium	Jan - Dec	---	---	---	---	None	---	None
9D:										
Sassafras	B	Medium	Jan - Dec	---	---	---	---	None	---	None
10B:										
Urban land	---	High	Jan - Dec	---	---	---	---	None	---	None
Glenelg	B	Medium	Jan - Dec	---	---	---	---	None	---	None

Water Features—Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
10C:										
Urban land	---	High								
			Jan - Dec	---	---	---	---	None	---	None
Glenelg	B	Medium								
			Jan - Dec	---	---	---	---	None	---	None
10D:										
Urban land	---	High								
			Jan - Dec	---	---	---	---	None	---	None
Glenelg	B	High								
			Jan - Dec	---	---	---	---	None	---	None
11B:										
Urban land	---	High								
			Jan - Dec	---	---	---	---	None	---	None
Sassafras	B	Medium								
			Jan - Dec	---	---	---	---	None	---	None
11C:										
Urban land	---	High								
			Jan - Dec	---	---	---	---	None	---	None
Sassafras	B	Medium								
			Jan - Dec	---	---	---	---	None	---	None
11D:										
Urban land	---	High								
			Jan - Dec	---	---	---	---	None	---	None
Sassafras	B	Medium								
			Jan - Dec	---	---	---	---	None	---	None
12:										
Urban land	---	High								
			Jan - Dec	---	---	---	---	None	---	None
Udorthents	---	Medium								
			Jan - Dec	---	---	---	---	None	---	None
13:										
Udorthents	---	Medium								
			Jan - Dec	---	---	---	---	None	---	None

Water Features—Continued

Map symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	Ft	Ft				
15A:										
Sassafras	B	Low								
			Jan - Dec	---	---	---	---	None	---	None
Urban land	---	High								
			Jan - Dec	---	---	---	---	None	---	None
15C:										
Sassafras	B	Medium								
			Jan - Dec	---	---	---	---	None	---	None
Urban land	---	High								
			Jan - Dec	---	---	---	---	None	---	None
15D:										
Sassafras	B	Medium								
			Jan - Dec	---	---	---	---	None	---	None
Urban land	---	High								
			Jan - Dec	---	---	---	---	None	---	None
16B:										
Urban land	---	High								
			Jan - Dec	---	---	---	---	None	---	None
Woodstown	C	Low								
			Jan - Apr	1.5-3.5	>6.0	---	---	None	---	None
			May -Dec	---	---	---	---	None	---	None

Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
1A:							
Hatboro	---	---	---	---	Moderate	High	Moderate
2A:							
Codorus	---	---	---	---	Moderate	High	Moderate
Hatboro	---	---	---	---	Moderate	High	Moderate
3A:							
Urban land	---	---	---	---	None	---	---
Codorus	---	---	---	---	Moderate	High	Moderate
4A:							
Sassafras	---	---	---	---	Moderate	Low	High
Urban land	---	---	---	---	None	---	---
Neabsco	Fragipan	15-39	6-24	Noncemented	Moderate	Moderate	Moderate
4B:							
Urban land	---	---	---	---	None	---	---
Sassafras	---	---	---	---	Moderate	Low	High
Neabsco	Fragipan	15-39	6-24	Noncemented	Moderate	Moderate	Moderate
4C:							
Urban land	---	---	---	---	None	---	---
Sassafras	---	---	---	---	Moderate	Low	High
Neabsco	Fragipan	15-39	6-24	Noncemented	Moderate	Moderate	Moderate
5:							
Arlington National Cemetery	---	---	---	---	None	---	---
6B:							
Glenelg	---	---	---	---	Moderate	Low	High

Soil Features—Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
6C:							
Glenelg	---	---	---	---	Moderate	Low	High
6D:							
Glenelg	---	---	---	---	Moderate	Low	High
Manor	---	---	---	---	Moderate	Low	Moderate
7A:							
Glenelg	---	---	---	---	Moderate	Low	High
Urban land	---	---	---	---	None	---	---
7B:							
Glenelg	---	---	---	---	Moderate	Low	High
Urban land	---	---	---	---	None	---	---
7C:							
Glenelg	---	---	---	---	Moderate	Low	High
Urban land	---	---	---	---	None	---	---
7D:							
Glenelg	---	---	---	---	Moderate	Low	High
Urban land	---	---	---	---	None	---	---
9B:							
Sassafras	---	---	---	---	Moderate	Low	High
9C:							
Sassafras	---	---	---	---	Moderate	Low	High
9D:							
Sassafras	---	---	---	---	Moderate	Low	High
10B:							
Urban land	---	---	---	---	None	---	---
Glenelg	---	---	---	---	Moderate	Low	High

Soil Features—Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
10C:							
Urban land	---	---	---	---	None	---	---
Glenelg	---	---	---	---	Moderate	Low	High
10D:							
Urban land	---	---	---	---	None	---	---
Glenelg	---	---	---	---	Moderate	Low	High
11B:							
Urban land	---	---	---	---	None	---	---
Sassafras	---	---	---	---	Moderate	Low	High
11C:							
Urban land	---	---	---	---	None	---	---
Sassafras	---	---	---	---	Moderate	Low	High
11D:							
Urban land	---	---	---	---	None	---	---
Sassafras	---	---	---	---	Moderate	Low	High
12:							
Urban land	---	---	---	---	None	---	---
Udorthents	---	---	---	---	---	---	---
13:							
Udorthents	---	---	---	---	---	---	---
15A:							
Sassafras	---	---	---	---	Moderate	Low	High
Urban land	---	---	---	---	None	---	---
15C:							
Sassafras	---	---	---	---	Moderate	Low	High
Urban land	---	---	---	---	None	---	---

Soil Features—Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
15D:							
Sassafras	---	---	---	---	Moderate	Low	High
Urban land	---	---	---	---	None	---	---
16B:							
Urban land	---	---	---	---	None	---	---
Woodstown	---	---	---	---	Moderate	Moderate	High

Classification of the Soils

(An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series.)

Soil name	Family or higher taxonomic class
Codorus	Fine-loamy, mixed, active, mesic Fluvaquentic Dystrudepts
Glenelg	Fine-loamy, mixed, semiactive, mesic Typic Hapludults
Hatboro	Fine-loamy, mixed, active, nonacid, mesic Fluvaquentic Endoaquepts
Manor	Coarse-loamy, micaceous, mesic Typic Dystrudepts
Neabsco	Fine-loamy, siliceous, semiactive, mesic Typic Fragiudults
Sassafras	Fine-loamy, siliceous, semiactive, mesic Typic Hapludults
Udorthents	Udorthents
Woodstown	Fine-loamy, mixed, active, mesic Aquic Hapludults

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