SOIL SURVEY OF
Monroe County, Pennsylvania

United States Department of Agriculture
Soil Conservation Service

In cooperation with the
Pennsylvania State University,
College of Agriculture, and the
Pennsylvania Department of Environmental Resources,
State Conservation Commission

HOW TO USE

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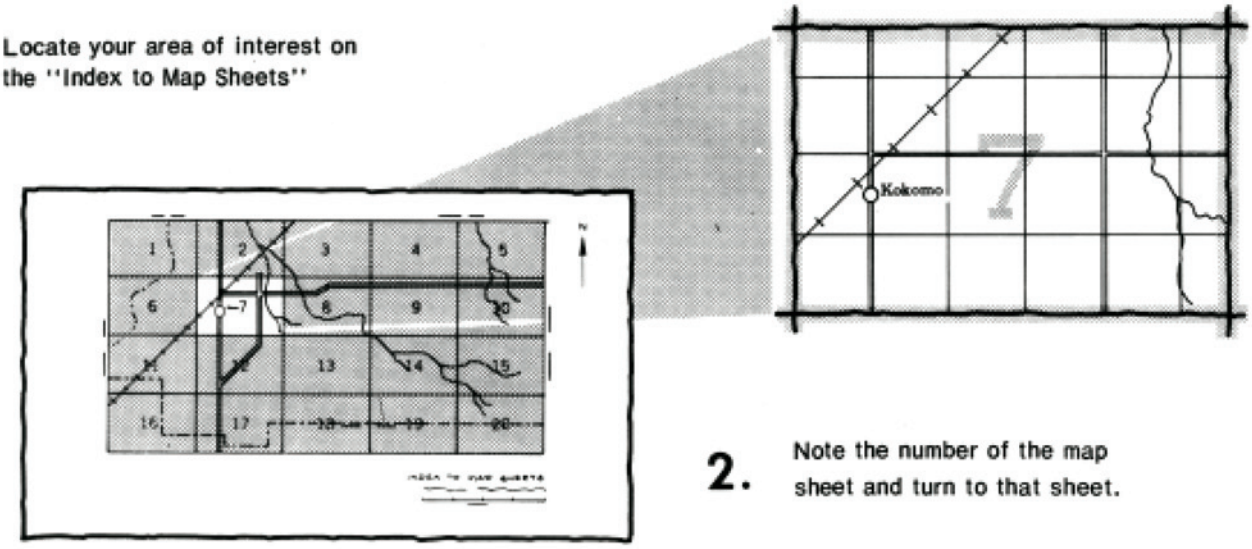

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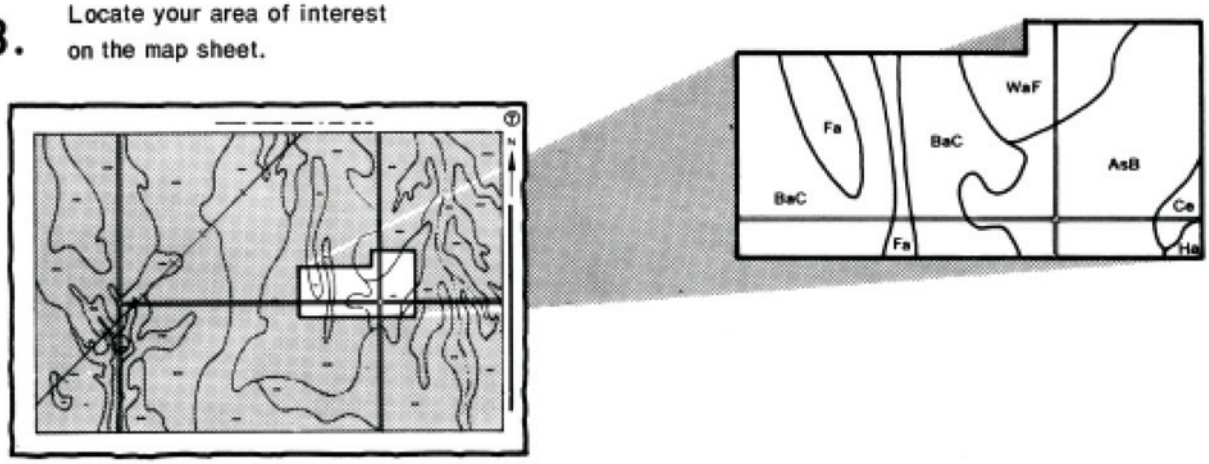

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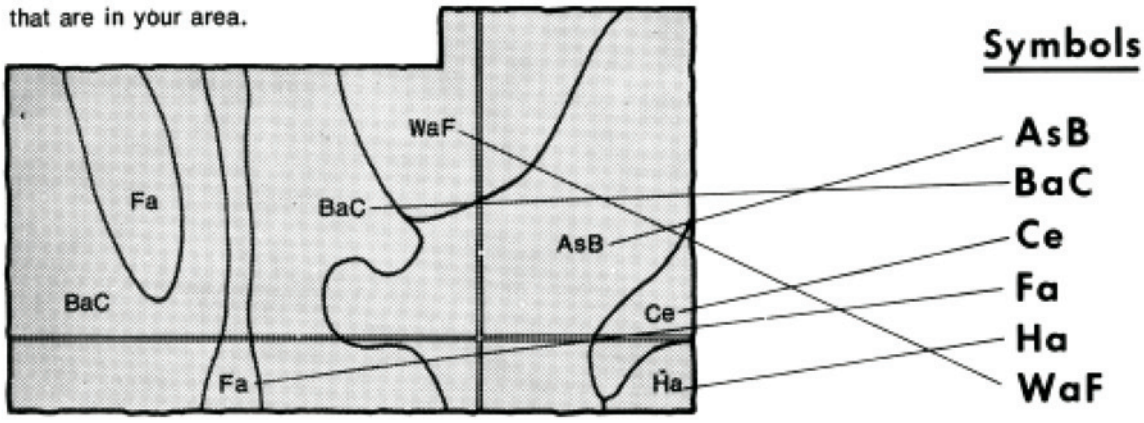

THIS SOIL SURVEY

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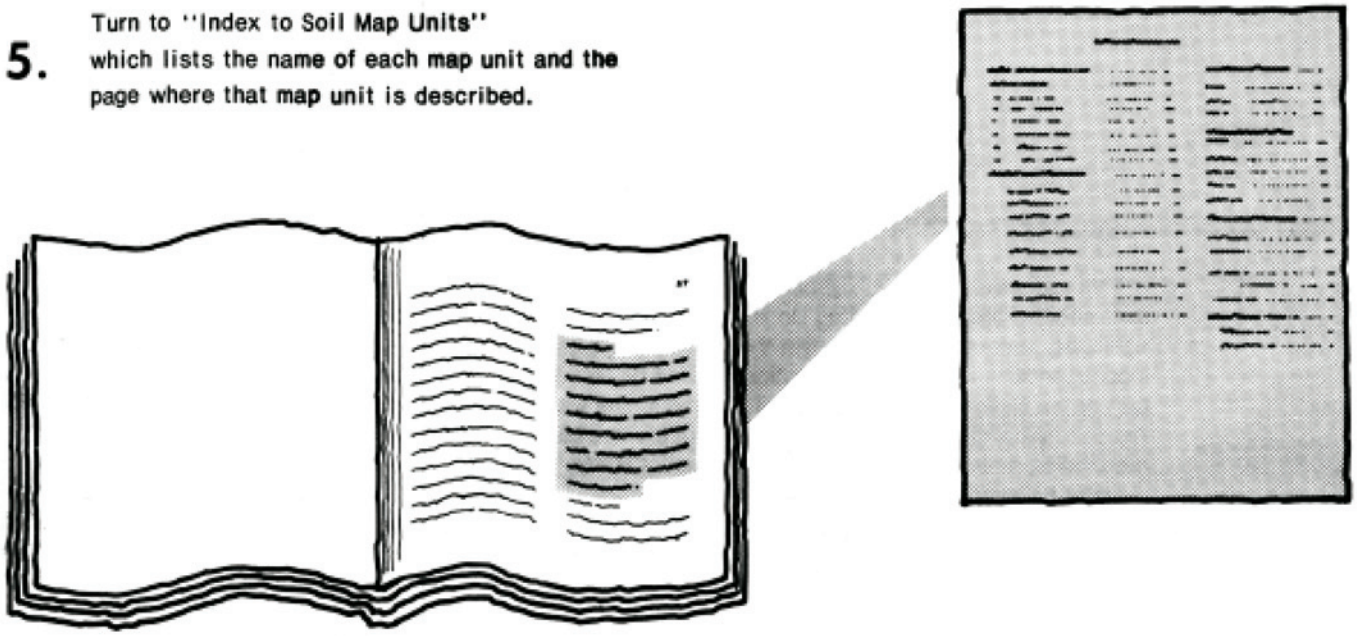
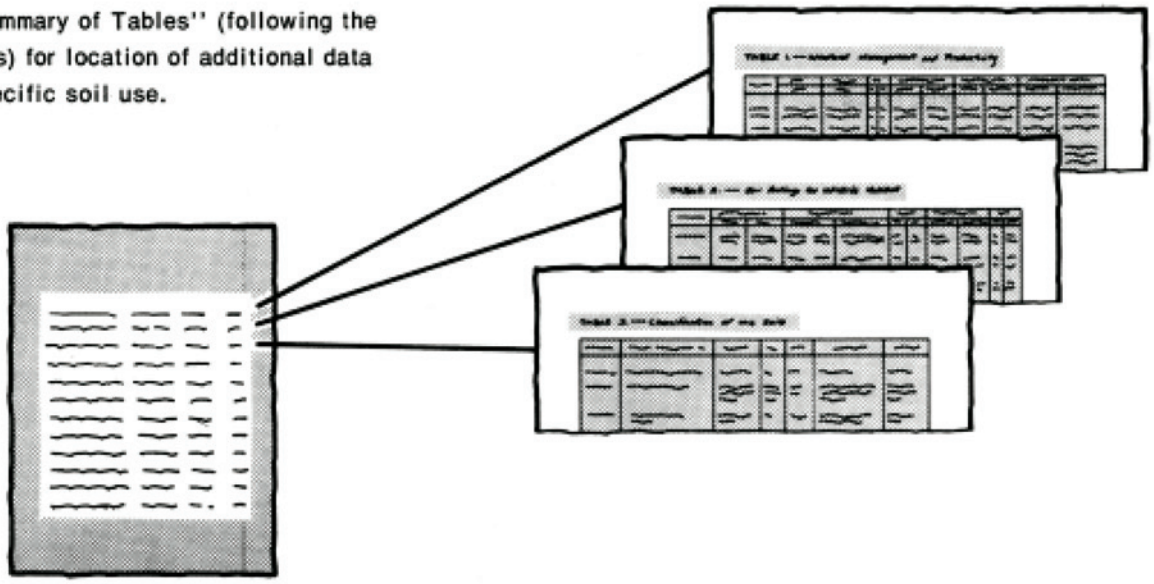


6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



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

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

Major fieldwork for this soil survey was completed in the period 1966-74. Soil names and descriptions were approved in 1975. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1974. This survey was made cooperatively by the Soil Conservation Service, The Pennsylvania State University, College of Agriculture, and the Pennsylvania Department of Environmental Resources, State Conservation Commission. It is part of the technical assistance furnished to the Monroe County Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: Pleasant Valley in southwestern Monroe County.

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Foreword

The Soil Survey of Monroe County contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

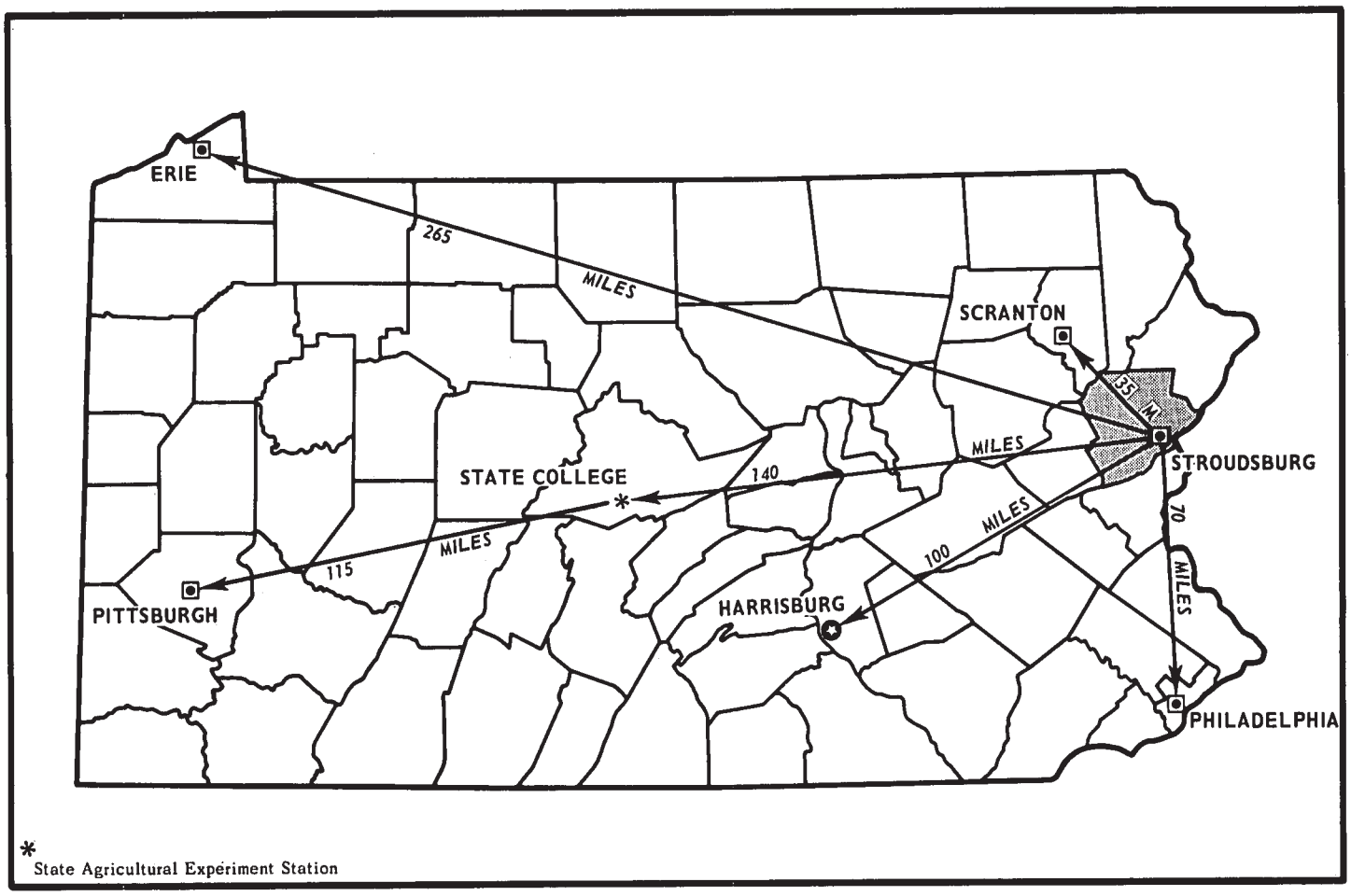
Great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to septic tank absorption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

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

This soil survey can be useful in the conservation, development, and productive use of soil, water, and other resources.

Graham T. Munkittrick

Graham T. Munkittrick
State Conservationist
Soil Conservation Service



Location of Monroe County in Pennsylvania.

SOIL SURVEY OF MONROE COUNTY, PENNSYLVANIA

By Garland H. Lipscomb, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in cooperation with the Pennsylvania State University, College of Agriculture, and the Pennsylvania Department of Environmental Resources, State Conservation Commission

MONROE COUNTY is in northeastern Pennsylvania. It is on the eastern border of the State and is separated from New Jersey and New York by the Delaware River. The county has a total area of 611 square miles, or 391,040 acres. In 1970, the population was 45,422. East Stroudsburg, population 7,894, and Stroudsburg, population 5,451, are the two largest boroughs. Stroudsburg, in the southeastern part of the county, is the county seat.

Monroe County is centrally located in relation to a number of large metropolitan areas. This influences tourism, which is the major source of revenue in the county. More than 15 million people live within 100 miles of Stroudsburg. New York to the east; Philadelphia, Allentown, Bethlehem, and Easton to the south; Harrisburg to the west; and Scranton and Wilkes-Barre to the north are all within a two-hour drive of the county. The county has many natural attractions, such as mountains, streams, waterfalls, and the Delaware Water Gap; and man-made attractions, such as lakes, ski areas, and other recreational facilities.

As a result of glaciation, which covered the mountainous surface of the county, most of the soils are too stony for cultivation. About 81 percent of the county presently is used for woodland. Most woodland is young northern hardwood. In 1969, 33,518 acres was farmland. Most farms are in the southern part of the county. The most important farm products, according to farm income and sales, are livestock, poultry, and their products. Corn is the most extensive crop. Many areas that were once cleared for farming presently are idle or are reverting to trees. There are many second homes and recreation developments scattered throughout the county.

Soil erosion, low available water capacity in rapidly permeable soils, and insufficient drainage in wet soils are the major problems in areas that are presently farmed. In areas that are developed for homesites and recreation, the major soil problems are wetness, slow permeability, and shallow depth to bedrock. Many homes and other buildings constructed in these areas have wet basements and malfunctioning sewage systems.

Monroe County was once considered a warm-season vacation area. However, with the addition of ski slopes and other winter activity developments, the county has become a four-season tourist area.

General nature of the county

This section gives general information concerning Monroe County. It discusses geology, water, climate, and farming in the county.

Geology

Bruce A. Benton, geologist, Soil Conservation Service, assisted in preparing this section.

Monroe County is divided into two physiographic provinces. The northern two-thirds of the county is in the Pocono Plateau section and Glaciated Low Plateau section of the Appalachian Plateaus province. The southern one-third is in the Appalachian Mountain section of the Valley and Ridge province (*5*). Each province reflects different topographic and geologic features, which influence formation of the soils.

The northern nine-tenths of the survey area is underlain by Devonian rocks, and the southern one-tenth is underlain primarily by older Silurian rocks.

The Catskill Formation, the youngest Devonian formation in the county, covers nearly two-thirds of Monroe County in the north. The remaining Devonian rocks, made up of marine beds, Hamilton Group, and Onondaga Formation, are in the south. These formations lie in southwest-northeast oriented bands. The Hamilton Group lies in a wide band between narrow bands of marine beds and Onondaga Formation. The Catskill Formation and marine beds outcrop are in the southeastern part of the county below Brodheadsville.

The extreme southern part of the county is underlain by the Keyser, Tonoloway, Bloomsburg, and McKenzie Formations of Silurian age. These formations also lie in narrow southwest-northeast oriented bands (*5*).

The lithology of Devonian rocks varies significantly throughout the county. The Catskill Formation is a nonmarine deposit of red to brownish shale and sandstone; marine beds are made up of gray to olive brown shale, graywacke, and sandstone; Hamilton Group is a fossiliferous, brown to olive shale with interbedded sandstone; and Onondaga Formation is a fossiliferous, greenish blue, thin-bedded shale and dark blue to black medium-bedded limestone (*5*). The Catskill sandstone was quarried at one time as a source of flagstone and crushed stone (*6*). Lower Devonian and Silurian limestones are potential sources of crushed stone (*6*).

The structural geology in Monroe County varies in complexity. In the Pocono Plateau section, bedrock dips gently southeastward, but in the Appalachian Mountain section, more complex anticlinal and synclinal features are present. Several minor folds are located near East Stroudsburg, and most of the major fold structures are located southwest toward Carbon County. Axes of the folds are oriented northeast with bedding dip ranging from 25 to 40 degrees (*6*).

Monroe County was covered several times by glaciers. During the Pleistocene epoch, the glacier moved generally southward except where topographic features influenced its movement. The Wisconsin Glaciation was the last advance. It covered all but the southwest quarter of Monroe County. The southwest quarter was covered by the earlier Illinoian and Jerseyan advances.

Each glacial advance and retreat eroded, mixed, and redeposited material from bedrock, older soil, and glacial deposits. The common deposits in Monroe County are stratified drift, unstratified drift, and lacustrine deposits where each has distinctive topographic and lithologic features.

Unstratified drift, the largest glacial deposit in the county, was deposited by an advancing or stagnant ice sheet. These deposits, commonly known as till, are a homogeneous mixture of clay, silt, sand, and gravel. The commom landforms of unstratified drift are lateral moraines, ground moraines, end moraines, hummocky stagnation drift, and drumlins (*3*).

Two forms of stratified drift are common in the county—ice-contact drift and proglacial deposits. Both were deposited during glacial retreat as material washing directly from melting ice sheets. The common landforms of ice-contact drift are kames, kame terraces, and eskers. The proglacial landforms are outwash plains, valley trains, and deltaic deposits (*3*). Many of these features are sources of sand and gravel. The lithology varies with lithology of the local bedrock; however, since much of Monroe County is underlain by the Catskill Formation, sandstone particles are common (*3*).

Glaciolacustrine deposits also occur in Monroe County to a lesser extent. Glacial lakes that formed during glacial retreat left several feet of varved sediment. An example of lacustrine deposits is in the broad Beakleyville-Marshall Creek Valley (*3*).

Recent deposits of alluvium, fans, colluvium, and peat have formed since glaciation. They are generally thin deposits found in flood plains, at the base of slopes, and in bogs. The alluvial deposits are generally stratified clay, silt, sand, and gravel. Colluvium is a coarse and loose deposit formed along mountain slopes. Peat contains partially decomposed plant material and is commonly in bogs. One active peat mine is in the northwestern part of the county near Blakeslee. Several potentially mineable areas are also in northwestern Monroe County (*4*).

Water

Bruce A. Benton, geologist, assisted in preparing this section.

Precipitation in Monroe County averages 44 to 45 inches per year, and runoff averages 25 inches.

The primary sources of water in the county are drilled wells, springs, and storage reservoirs fed by streams, springs, or drilled wells. Rural domestic water comes from drilled wells and springs, and urban areas use public storage reservoirs.

Glacial deposits cover most of the county with drift of varying thickness. These deposits rarely yield enough water for either domestic or industrial use. However, some wells drilled into gravel lenses have adequate yield and good quality. Areas of deep valley fill of drift are Paradise Valley and areas in Shoemaker, Stroudsburg, and Brodheadsville.

In most cases the largest well yields are found in the underlying bedrock. The Catskill Formation (sandstone and conglomerate), which covers nearly two-thirds of the county in the Pocono Plateau section, gives moderate to large yields of soft water. Many of the wells are relatively shallow and are used for domestic consumption. The remaining one-third of the county, in the Appalachian Mountain section to the south, is made up of older Devonian and Silurian Formations. Some of the large yields are found in sandstone beds of the Hamilton Group, Onondaga Formation (limestone), and shales of the Clinton Group. The quality is generally good except for hardness in the limestone areas. Other sandstone and shale formations vary in yield and quality. Hydrogen sulfite is common in water from the marine beds and Hamilton Group.

Monroe County has many artesian aquifers in glacial deposits and in bedrock. Some flowing wells are in the glacial deposits and in the Catskill sandstone in the Pocono Plateau section. Also, some flowing wells are in the Clinton Formation and the Cayuga Group and in the Appalachian Mountain section to the south.

Climate

Monroe County is in the mountainous resort area of eastern Pennsylvania. The terrain is mainly forested rolling mountains dotted with many lakes, swamps, and waterfalls. The elevation varies from 404 feet along the Delaware River to 2,215 feet at Pimple Hill. The higher elevations have pleasantly cool summers, cold winters with abundant snowfall, and persistent snow cover. This part of Monroe County has a refreshing mountain climate. The climatic details in the following paragraphs are based on data from Tobyhanna and Mt. Pocono, Pennsylvania, for the period 1941-70 unless otherwise stated.

During summer, warm sunny days and low humidity prevail. Temperature reaches the 70's and 80's in the afternoons and drops to the 50's and 60's at night. In July on 60 percent of the days, afternoon temperature reaches 80 degrees F, but 90 degree temperatures are recorded only occasionally during the summer. The only time in the history of Mt. Pocono when a temperature of 100 degrees F was reported was on July 3, 1911. Thunderstorms and afternoon showers reach a peak in June, July, and August. They occur on an average of 8 days per month and are usually of short duration. Sixty percent of the possible sunshine is received during the summer. The prevailing wind is from the southwest with an average speed of 7 miles per hour. The average relative humidity is 50 percent. The average growing season is 136 days. The last freeze in spring occurs on May 15, and the first in fall occur on September 28.

The warm summer days end early in September, but there are still many pleasant days with abundant sunshine and light wind through October. Maximum temperatures range from 65 to 75 degrees during the first half of September, but nights become quite chilly. By mid-September the low is more often below 55 degrees. The first freeze in the area can be expected by October 1, and freezing temperatures occur frequently during October. Thunderstorms decrease, and rainy periods are infrequent and short. Autumn is fairly dry in the area except for an occasional storm moving north along the eastern seaboard.

Winter normally begins by mid-November and extends through March. This season is rather cloudy, and high temperatures remain near freezing. Low temperatures are in the midteens through January and February but increase 5 to 7 degrees by the end of March. The lowest temperature recorded at Mt. Pocono was 35 degrees below zero on January 14, 1912. Rapidly moving weather systems provide considerable variation in day-to-day conditions. Precipitation during winter is frequent, usually as snow. Snowfall averages from 2 to 10 inches per storm but totals of more than 12 inches can be expected several times each winter. A total seasonal snowfall of 100 inches is received some years; however, the normal seasonal snowfall ranges from 50 to 60 inches. Snow covers the ground about 60 percent of the time during winter. The prevailing wind in winter is from the southwest at about 10 miles per hour. Relative humidity averages about 60 percent during this season.

Early in April short periods of warm weather indicate the beginning of spring. With the more direct and longer sunshine, temperature increases rapidly through April and May. The daily temperature range is greatest during spring. Some snow can fall in April, but most precipitation in spring is rain.

Areas at lower elevation near Stroudsburg have a milder climate with an annual mean temperature 4 degrees warmer, approximately 4 inches less precipitation, and a longer growing season than areas at higher elevation.

Table 1 summarizes the temperature and precipitation in the county. Table 2 summarizes the probabilities of the last freezing temperatures in spring and the first in fall.

Farming

In the past few years, the number of farms and the total acreage in farms in Monroe County have decreased, but the average size of the farms has increased. In 1964, the 378 farms in the county had an average of 128 acres per farm; and in 1969, 231 farms has an average of 145 acres. The total acreage decreased from 48,369 in 1964 to 33,518 in 1969.

During that period the average age of farmers remained about the same. In 1964, 36 farm operators in the county were 34 years old or younger, and 342 farmers were 35 years or older. In 1969 24 farmers were 34 years old or younger and 207 farmers were 35 years and older.

In 1969 Monroe County produced 152,061 bushels of corn for grain, 15,107 bushels of wheat, and 8,322 tons of hay. Irish potatoes and sweet potatoes were planted on 629 acres; vegetables, on 184 acres; and orchards, on 46 acres.

The number of cattle and calves on farms decreased from 4,195 in 1964 to 3,347 in 1969; the number of hogs and pigs decreased from 1,342 to 692; and the number of chickens decreased from 62,600 to 33,081. The number of sheep and lambs increased from 430 in 1964 to 531 in 1969.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material,

which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

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

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

General soil map for broad land use planning

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

The general soil map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

The soils in the survey area vary widely in their potential for major land uses. Table 3 shows the extent of the map units shown on the general soil map and gives general ratings of the potential of each, in relation to the other map units, for major land uses. Soil properties that pose limitations to the use are indicated. The ratings of soil potential are based on the assumption that practices in common use in the survey area are being used to overcome soil limitations. These ratings reflect the ease of overcoming the soil limitations and the probability of soil problems persisting after such practices are used.

Each map unit is rated for *cultivated farm crops, specialty crops, woodland, urban uses,* and *recreation areas*. Cultivated farm crops are those grown extensively by farmers in the survey area. Specialty crops include vegetables, fruits, and nursery crops grown on limited acreage and generally requiring intensive management. Woodland refers to land that is producing either trees native to the area or introduced species. Urban uses include residential, commercial, and industrial developments. Intensive recreation areas include campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic. Extensive recreation areas include those used for nature study and as wilderness.

The delineations on the general soil map of Monroe County have been matched with those on the general soil maps of adjacent counties. There a few minor discrepancies because of changes in series concept and legend design.

Descriptions of the map units

Dominantly deep soils formed in glacial till mainly in the Appalachian Plateau Province

The seven map units in this group are mainly on the Pocono Plateau and Low Plateau, mainly in the northern part of the county. They make up 51 percent of the county. Most areas in this group are wooded because of the numerous surface stones. A few areas were cleared and farmed in the past but now have reverted to woodland. Many areas are used for housing developments and recreation. Large areas of State forest and State game lands are in this group.

1. Lackawanna-Wellsboro-Oquaga

Nearly level to sloping, deep and moderately deep, well drained and moderately well drained soils underlain by reddish glacial till

This map unit covers about 18 percent of the county. It is mainly on the undulating broad part of the plateau, but one small area on low ridges is included in the southeastern part of the county. The soils are mainly nearly level to sloping, but some moderately steep soils are on knolls and in stream valleys (fig. 1).

Lackawanna soils are well drained but have a slowly permeable fragipan. Wellsboro soils are moderately well drained and have a seasonal high water table during wet periods. Oquaga soils are moderately deep and well drained.

Lackawanna soils make up about 34 percent of the map unit; Wellsboro soils, 24 percent; Oquaga soils, 20 percent; and minor soils 24 percent. Among the minor soils are Morris, Norwich, and Wyoming on uplands and Alluvial land and Mucky peat along drainageways.

This map unit is mostly wooded. A few areas were cleared for crops, but large portions of these areas are now idle. Some of the wooded areas were cleared for villages, recreation areas, and resorts. Except where cleared, the soils are too stony for cultivation and are better suited to woodland, wildlife habitat, and recreation than to other uses. Cleared soils are suited to most crops commonly grown in the county. Protection of woodland from fire and improved woodland management are needed. Cleared areas need to be protected against runoff and erosion. The major limitations in addition to stoniness are the slow permeability, the seasonal high water table, and the moderate depth to bedrock.

2. Wurtsboro-Swartswood-Volusia

Nearly level and gently sloping, deep, well drained to somewhat poorly drained soils underlain by gray to yellowish brown glacial till

This map unit makes up about 11 percent of the county. It is on the undulating broad part of the plateau. The soils are mainly nearly level and gently sloping, but some sloping soils are on knolls and in stream valleys (fig. 2).

Wurtsboro soils are moderately well drained and have a seasonal high water table during wet periods. Swartswood soils are well drained but have a slowly permeable fragipan. Volusia soils are somewhat poorly drained and have a seasonal high water table during wet periods.

Wurtsboro soils make up about 31 percent of the map unit; Swartswood soils, 28 percent; Volusia soils, 20 percent; and minor soils, 21 percent. Among the minor soils are Chippewa, Lordstown, Wyoming, and Mardin soils on uplands and Alluvial land along drainageways.

This map unit is mostly wooded except for small areas that were cleared for villages, recreation areas, and resorts. The soils are too stony for cultivation. This map unit is better suited to woodland, wildlife habitat, and recreation than to other uses. The major limitations in addition to stoniness are the slow permeability and the seasonal high water table. Protection of woodland from fire and improved woodland management are needed. Many areas in this map unit are being rapidly developed for summer homes and related recreation facilities.

3. Chippewa-Norwich-Mucky peat

Nearly level, deep, poorly drained and very poorly drained soils underlain by pinkish gray and gray glacial till and organic material

This map unit makes up about 6 percent of the county. It is on the nearly level part of the plateau. The soils are mainly nearly level. This map unit includes many depressions, lakes, and swamps of varying size.

Chippewa soils are poorly drained and have a high water table during much of the year. Norwich soils are poorly drained and very poorly drained and have a high water table during much of the year. Mucky peat is very poorly drained and has a high water table throughout the year.

Chippewa soils make up about 31 percent of the map unit; Norwich soils, 25 percent; Mucky peat, 18 percent; and minor soils, 26 percent. Among the minor soils are Volusia, Morris, Wyoming, Wellsboro, and Wurtsboro soils on uplands and Alluvial land along drainageways.

This map unit is mostly wooded except for small areas that were cleared and used for recreational developments, including seasonal homes. Many lakes have been enlarged or created for recreation. The soils are too stony for cultivation and are better suited to woodland, wildlife habitat, and recreation than to other uses. The major limitations in addition to stoniness are the slow permeability and the high water table. Much of this map unit is State or federally owned.

4. Clymer-Buchanan

Nearly level and gently sloping, deep, well drained to somewhat poorly drained soils underlain by brownish glacial till and colluvium

This map unit makes up about 5 percent of the county. It is on the broad, gently sloping and nearly level part of the plateau. The soils are mainly nearly level and gently sloping, but some sloping to steep soils are at Pimple Hill.

Clymer soils are well drained. Buchanan soils are moderately well drained and somewhat poorly drained and have a seasonal high water table during wet periods.

Clymer soils make up about 38 percent of the map unit; Buchanan soils, 22 percent; and minor soils 40 percent. Among the minor soils are Alvira, Shelmadine, Norwich, Dekalb, and Chippewa soils on uplands and Mucky peat along drainageways. Some areas of Very stony land and Rock outcrops are on uplands.

This map unit is mostly wooded except for small areas that were cleared and used for truck crops or that reverted to woodland. Some areas are used for recreation and

homesites. The soils are too stony for cultivation and are better suited to wildlife habitat and recreation than to other uses. The major limitations in addition to stoniness are the seasonal high water table in the Buchanan soils. A significant part of this map unit is State and County owned land. The existing woodland is of poor quality.

5. Wellsboro-Morris-Lackawanna

Nearly level and gently sloping, deep, well drained to somewhat poorly drained soils underlain by reddish glacial till

This map unit makes up about 4 percent of the county. It is on the undulating broad part of the plateau. The soils are mainly nearly level and gently sloping, but some sloping soils are on knolls and in concave depressions.

Wellsboro soils are moderately well drained and have a seasonal high water table. Morris soils are somewhat poorly drained and have a seasonal high water table during wet periods. Lackawanna soils are well drained and have a slowly permeable fragipan.

Wellsboro soils make up about 29 percent of the map unit; Morris soils, 24 percent; Lackawanna soils, 18 percent; and minor soils, 29 percent. Among the minor soils are Norwich, Oquaga, and Wyoming soils on uplands and Mucky peat and Alluvial land along drainageways.

This map unit is mostly wooded except for areas that were cleared and used for villages, recreation areas, and resorts. The soils are too stony for cultivation and are better suited to woodland, wildlife habitat, and recreation than to other uses. A significant part of this map unit is State owned or federally owned. The major limitations in addition to stoniness are the seasonal high water table and the slow permeability. Protection of woodland from fire and improved woodland management are needed. Many privately owned areas in this map unit are being developed for summer homes and related recreation facilities.

6. Empeyville-Worth

Nearly level and gently sloping, deep, well drained to somewhat poorly drained soils underlain by brownish glacial till

This map unit makes up about 4 percent of the county. It is on the undulating, broad part of the plateau. The soils are mainly nearly level and gently sloping, but some sloping to moderately steep soils are on knolls and in stream valleys.

Empeyville soils are moderately well drained to somewhat poorly drained and have a seasonal high water table during wet periods. Worth soils are well drained but have a slowly permeable fragipan.

Empeyville soils make up about 42 percent of the map unit; worth soils 22 percent; and minor soils 36 percent. Among the minor soils are Volusia, Wyoming, Lordstown, and Chippewa soils on uplands and Alluvial land and Very stony land and Rock outcrops along drainageways and on uplands.

This map unit is mostly wooded except for areas that were cleared and used for villages, recreation areas, and resorts. The soils are too stony for cultivation and are better suited to woodland, wildlife habitat, and recreation than to other uses. Much of this map unit is State owned or federally owned. The major limitations in addition to stoniness are the seasonal high water table and the slow permeability. Protection of woodland from fire and improved woodland management are needed. Many privately owned areas in this map unit are being developed for summer homes and related recreation facilities.

7. Wyoming-Swartswood-Norwich

Nearly level to moderately steep, deep, somewhat excessively drained, well drained, and poorly drained soils underlain by reddish and brownish glacial outwash and glacial till

This map unit makes up about 3 percent of the county. It is on the undulating broad part of the plateau and has numerous depressions and kames. The soils are mainly level to moderately steep, but steep soils are along gorges.

Wyoming soils are deep and somewhat excessively drained. Swartswood soils are deep and well drained but have a slowly permeable fragipan. Norwich soils are poorly drained and have a high water table during most of the year.

Wyoming soils make up about 21 percent of the map unit; Swartswood soils, 18 percent; Norwich soils, 14 percent; and minor soils, 47 percent. Among the minor soils are Wurtsboro, Volusia, Chippewa, Worth, Empeyville, Braceville, Wellsboro, and Morris soils on uplands. Many of the depressions are filled with Mucky peat.

This map unit is mostly wooded except for small areas that were cleared and used for villages, recreation areas, and resorts. The soils are too stony for cultivation and are better suited to woodland, wildlife habitat, and recreation than to other uses. The major limitations in addition to stoniness are the slow permeability and the seasonal high water table. Protection of woodland from fire and improved woodland management are needed.

Dominantly moderately deep soils formed in glacial till mainly in the Appalachian Plateau Province

The one map unit in this category is mainly on the Pocono Plateau and Low Plateau, mainly in the northern part of the county. It makes up about 11 percent of the county. Most areas remain wooded because of the numerous surface stones, steep slopes, and bedrock exposures. A few areas were cleared and farmed in the past, but now have reverted to woodland. Many areas are being developed for summer homes and recreation. A few areas of State forest are included.

8. Lordstown-Oquaga

Sloping to very steep, moderately deep, well drained soils underlain by yellowish brown and reddish brown glacial till

This map unit makes up about 11 percent of the county. It is on dissected ridges on uplands on the plateau. The soils are mainly sloping to very steep, but some soils on the ridgetops are nearly level to gently sloping (fig. 3).

Lordstown soils are yellowish brown, are moderately deep to bedrock, and are well drained. Oquaga soils are reddish brown, are moderately deep to bedrock, and are well drained.

Lordstown soils make up about 42 percent of the map unit; Oquaga soils, 28 percent; and minor soils, 30 percent. Among the minor soils are Bath, Mardin, and Volusia soils associated with Lordstown soils; Lackawanna, Wellsboro, and Morris soils associated with Oquaga soils; and Pope, Philo, and Holly soils along the streams.

This map unit is mostly wooded. Much of this map unit is State owned. A few areas were cleared and used for farming, but most of the acreage is now idle. Many of the cleared idle areas have reverted to woodland. The wooded soils are too stony for cultivation and are better suited to woodland, wildlife habitat, and recreation than to other uses. The cleared areas are suited to most crops commonly grown in the county. The soils, however, have low to moderate available water capacity and crop yields decrease during dry periods. The major limitations in addition to stoniness are the moderate depth to bedrock and the slope. Protection of woodland from fire and improved woodland management are needed. A few privately owned areas in this map unit are being developed for summer homes and related recreation facilities.

Dominantly deep soils formed in glacial till mainly on the Valley and Ridge Province

The three map units in this group are mainly in the Appalachian Mountain section in the southern part of the county. They make up about 11 percent of the county. Most of the areas in this group are wooded because of the surface stones and the steep slopes. Most cleared areas are used for crops, pasture, and residential use. Many of the cleared, idle areas have reverted to woodland.

9. Mardin-Bath-Volusia

Nearly level to sloping, deep, well drained to somewhat poorly drained soils underlain by brownish to gray glacial till

This map unit makes up about 5 percent of the county. It is on nearly level to moderately steep, broadly dissected uplands. The soils are mainly nearly level to sloping, but some moderately steep soils are on sides of ridges (fig. 4).

Mardin soils are moderately well drained and have a seasonal high water table. Bath soils are well drained but have a slowly permeable fragipan. Volusia soils are somewhat poorly drained and have a seasonal high water table.

Mardin soils make up about 23 percent of the map unit; Bath soils, 15 percent; Volusia soils, 15 percent; and minor soils, 47 percent. Among the minor soils are Lordstown, Chippewa, Swartswood, Wurtsboro, and Wyoming soils on uplands and Alluvial land along drainageways.

This map unit is mostly wooded except for areas that were cleared and used for farming, villages, recreation areas, and resorts. Wooded soils are too stony for cultivation. The major limitations in addition to stoniness are the slow permeability and the seasonal high water table. Cleared areas are suited to most crops commonly grown in the county. The wet areas, however, need artificial drainage. Management practices to reduce runoff and control erosion are essential. Wooded areas are better suited to woodland, wildlife habitat, and recreation than to other uses. Protection of woodland from fire and improved woodland management are needed. Many privately owned areas in this map unit are being developed for summer homes and related recreation facilities.

10. Meckesville-Kedron

Nearly level and gently sloping, deep, well drained and moderately well drained soils underlain by reddish glacial till

This map unit makes up about 4 percent of the county. It is in broad areas of the dissected uplands, mainly in the southwestern part of the county. The soils are mainly nearly level and gently sloping, but some sloping to moderately steep soils are on sides of ridges.

Meckesville soils are well drained but have a slowly permeable fragipan. Kedron soils are moderately well drained and have a seasonal high water table during wet periods.

Meckesville soils make up about 41 percent of the map unit; Kedron soils, 17 percent; and minor soils, 42 percent. Among the minor soils are Leck Kill, Klinesville, and Norwich soils on uplands and Philo and Pope soils along streams.

Most of this map unit has been cleared and is used for general crops. Much is now idle. A few small areas are home sites and recreation. The soils are suited to most crops commonly grown in the county. The wet areas, however, need artificial drainage. Management practices that reduce runoff and control erosion are needed. The major limitations for most uses are the slow permeability, the seasonal high water table, and the hazard of erosion.

11. Leck Kill-Klinesville

Gently sloping to moderately steep, shallow and deep, well drained soils underlain by dark red and red shale bedrock

This map unit makes up about 2 percent of the county. It is on gently sloping to very steep, hilly, dissected uplands. The soils are mainly gently sloping to moderately

steep but some steep and very steep soils are on sides of ridges.

Leck Kill soils are deep and well drained. Klinesville soils are shallow and well drained.

Leck Kill soils make up about 29 percent of the map unit; Klinesville soils, 27 percent; and minor soils, 44 percent. Among the minor soils are Meckesville, Kedron, and Norwich soils on uplands and Pope, Philo, Holly, and Wayland soils along the streams.

Most of this map unit has been cleared and is used for general farm crops. Much is presently idle. A few small areas are being developed for homesites and recreation. The soils are suited to most crops commonly grown in the county. The soils, however, have low to high available water capacity, and crop yields decrease during dry periods. Management practices that conserve moisture, reduce runoff, and control erosion are essential. The major limitations for most uses are the depth to bedrock, the hazard of erosion, and the slope.

Dominantly shallow and moderately deep soils formed in glacial till mainly in the Valley and Ridge Province

The three map units in this group are mainly in the Appalachian Mountain section of the southern part of the county. They make up about 17 percent of the county. Most of the areas in this group are wooded because of the surface stones, steep slopes, shallow depth, and Rock outcrop. Most cleared areas are idle, and some areas are used for crops, pasture, and residential use. Many of the idle areas have reverted to woodland.

12. Dekalb-Hazleton-Laidig

Sloping to moderately steep, moderately deep and deep, well drained soils underlain by brownish glacial till and colluvium

This map unit makes up about 6 percent of the county. It is in narrow to broad areas on tops and sides of ridges and mountains. The soils are mainly sloping to moderately steep, but some soils on the tops of ridges and mountains are nearly level to gently sloping. Some steep to very steep soils are on the sides of ridges and mountains (fig. 5).

Dekalb soils are moderately deep and well drained. Hazleton soils are deep and well drained. Laidig soils are deep and well drained but have a moderately slowly permeable fragipan.

Dekalb soils make up about 40 percent of the map unit; Hazleton soils, 13 percent; Laidig soils, 10 percent; and minor soils, 13 percent. Among the minor soils are Watson, Buchanan, Alvira, and Shelmadine soils and Very stony land and Rock outcrop on uplands and Pope, Philo, and Holly soils along the streams.

This map unit is mostly wooded. The soils are too stony for cultivation and are better suited to woodland, wildlife habitat, and recreation than to other uses. The main limitations in addition to stoniness are the moderate depth to bedrock, the slope, and the moderately slow permeability. Protection of woodland from fire and improved woodland management are needed.

13. Weikert-Hartleton

Gently sloping to sloping, shallow and deep, well drained soils underlain by gray to brown shale bedrock and glacial till

This map unit makes up about 6 percent of the county. It is on gently sloping to rolling dissected uplands. The soils are mainly gently sloping to sloping, but some moderately steep and steep soils are on sides of ridges.

Weikert soils are shallow to bedrock and are well drained. Hartleton soils are deep and well drained.

Weikert soils make up about 30 percent of the map unit; Hartleton soils, 26 percent; and minor soils, 44 percent. Among the minor soils are Allenwood, Watson, Alvira, and Shelmadine soils on uplands and Pope, Philo, and Holly soils along the streams.

Most of this map unit has been cleared and is used for general farm crops. A significant acreage is presently idle. A few small areas are being developed for homesites and recreation. The soils are suited to most crops commonly grown in the county. The soils, however, have very low to moderate available water capacity and crop yields decrease during dry periods. Management practices that conserve moisture, reduce runoff, and control erosion are essential. The major limitations for most uses are the depth to bedrock, the hazard of erosion, and the slope.

14. Benson-Rock outcrop

Moderately steep to very steep, shallow, well drained soils and areas of Rock outcrop underlain by calcareous and noncalcareous shale, slate, sandstone, and quartzite

This map unit makes up about 5 percent of the county. It is on moderately steep to very steep bedrock ridges. The soils are mainly steep and hilly, but some rolling, undulating, and nearly level soils are on ridgetops.

Benson soils are shallow and well drained. Benson soils make up about 38 percent of the map unit, Rock outcrop makes up about 25 percent, and minor soils make up the remaining 37 percent. Among the minor soils are Bath, Mardin, Alden, Wyoming, and Rexford soils on uplands.

This map unit is mostly wooded. Much of the area was cleared in the past, but most of this acreage has reverted to woodland. Some areas are idle, and a few small areas are developed for homesites and recreation. Part of the acreage is in the area of the proposed Tocks Island Dam and the accompanying recreation area. This map unit is poorly suited to most crops commonly grown in the county because of surface stones, rock ledges, and shallow depth to bedrock. Slope is also a major limitation.

Dominantly deep soils formed in glacial outwash and alluvium mainly on terraces and flood plains

The one map unit in this category is mainly on terraces and flood plains adjacent to the major streams in the county, mainly in the southern and south-central part of the county. It makes up about 10 percent of the county. Most areas are cleared and either are idle or are used for crops, pasture, residential use, and sources of sand and gravel. The remaining areas are mostly wooded. The major residential areas in the county are in this unit.

15. Wyoming-Chenango-Pope

Nearly level to sloping, deep, somewhat excessively drained and well drained soils underlain by glacial outwash and alluvium

This map unit makes up about 10 percent of the county. It is on nearly level to very steep terraces and kames and nearly level flood plains and high bottoms. The soils are mainly nearly level to sloping, but some moderately steep to very steep soils are on faces of terraces and on kames (fig. 6).

Wyoming soils are deep and somewhat excessively drained. Chenango soils are deep and well drained to excessively drained. Pope soils are deep and well drained.

Wyoming soils make up about 30 percent of the map unit; Chenango soils, 9 percent, Pope soils, 9 percent; and minor soils, 52 percent. Among the minor soils are Braceville, Rexford, Lawrenceville, Rushtown, and Sheffield soils on terraces and kames and Philo, Holly, and Wayland soils along streams.

Most of this map unit has been cleared and is used for general crops. Much is presently idle or is in established communities. A few small areas are developed for homesites and recreation. The soils are suited to most crops commonly grown in the county. Most of the soils, however, have a very low to moderate available water capacity, and crop yields decrease during dry periods. Management practices that conserve moisture, reduce runoff, and control erosion are essential. The major limitations for most uses are the rapid permeability and flooding.

Broad land use considerations

An important issue in the survey area is deciding what areas are to be used for homesites. Monroe County is a major attraction for tourism and recreation, resulting in the building of seasonal and permanent homes throughout the county. More than 50,000 lots, ranging from 1/2 acre to more than 3 acres in size, have been plotted for homesites, and the number is expected to increase. The general soil map is most helpful for planning broad land use for general areas; but it should not be used for selecting specific sites. The detailed soil maps in this survey can be helpful in planning future land use in specific areas. In general, the soils in the survey area that have a good potential for homesites also have good potential for specialty crops, cultivated crops, and woodland.

As shown in table 3, most soils in the county are either too stony or too wet to be used for cultivated or specialty crops. Cropland has decreased in recent years. However, in some areas the soils are productive and are suited to cultivated and specialty crops. In general, the areas that have fair to good potential for cultivated crops also have fair to good potential for specialty crops. Large areas in the Meckesville-Kedron and Leck Kill-Klinesville map units have good potential for crops because they have a high proportion of productive soils. Large areas in the Clymer-Buchanan, Mardin-Bath-Volusia, Weikert-Hartleton, and Wyoming-Chenango-Pope map units have fair potential for this use. The major limitations for crops in these map units are large surface stones, low available water capacity, and small stones.

About 81 percent of the county is used for woodland. Most soils are well suited to wood production. Nine map units have good potential (table 3), and few limitations for woodland. The remaining map units have fair to poor potential for woodland. The Chippewa-Norwich-Mucky peat, Lordstown-Oquaga, Dekalb-Hazleton-Laidig, Weikert-Hartleton, and Wyoming-Chenango-Pope map units have fair potential. The soils in these map units are capable of fair wood production but are limited by wetness and low available water capacity. The Benson-Rock outcrop map unit has poor potential for wood production. It has too many Rock outcrops, and available water capacity is too low for good wood production.

Only the Leck Kill-Klinesville map unit has good potential for urban use (fig. 7). Although somewhat limited, it has the largest areas with the most favorable soils for urban use. The Clymer-Buchanan, Mardin-Bath-Volusia, Meckesville-Kedron, Weikert-Hartleton, and Wyoming-Chenango-Pope map units have fair potential for urban use. The major limitations in these map units are large surface stones, slowly permeable subsoil, wetness, depth to rock, rapid permeability, and flooding. All sites selected for urban use should be investigated onsite to determine the potential and limitations of the soils.

Ten map units have poor potential for intensive recreation areas. The major limitations of these soils are large surface stones, depth to rock, slope, and wetness. However, two map units have good potential and three have fair potential. The Meckesville-Kedron and Leck Kill-Klinesville map units have good potential and have larger areas of favorable soils. The Clymer-Buchanan, Mardin-Bath-Volusia, and Wyoming-Chenango-Pope map units have fair potential. The major limitations of these soils are large and small stones, wetness, and flooding.

The Clymer-Buchanan, Meckesville-Kedron, Leck Kill-Klinesville, Weikert-Hartleton, and Wyoming-Chenango-Pope map units have good potential for extensive recreation areas. The Lackawanna-Wellsboro-Oquaga, Wurtsboro-Swartswood-Volusia, Wellsboro-Morris-Lackawanna, Empeyville-Worth, Wyoming-Swartswood-Norwich, Mardin-

Bath-Volusia, and Dekalb-Hazleton-Laidig map units have fair potential; the major limitations of these soils are the large surface stones, wetness, and slope. The remaining map units have poor potential because of wetness, slope, large surface stones, and rock outcrops.

Every map unit in Monroe County has some potential for development or improvement of wildlife habitat.

Soil maps for detailed planning

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

Soils that have a profile that is almost alike make up a *soil series*. Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Wellsboro channery loam, 3 to 8 percent slopes, is one of several phases within the Wellsboro series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes or undifferentiated groups.

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Weikert-Hartleton channery silt loams, 3 to 8 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because there is little value in separating them. The pattern and proportion of the soils are not uniform. An area shown on the map has at least one of the dominant (named) soils or may have all of them. Chippewa and Norwich silt loams, 0 to 5 percent slopes, is an undifferentiated group in this survey area.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Alluvial land is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 4, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

Ad—Alden mucky silt loam. This deep, very poorly drained, nearly level soil is in depressions. Slopes are concave to nearly smooth and are about 300 to 900 feet long. Areas are irregular in shape and normally are 5 to 30 acres in size.

Typically, the surface layer is black, mucky silt loam about 9 inches thick. The subsoil is about 26 inches thick. It is dark gray and gray, friable, mottled light silty clay loam. The substratum, to a depth of 60 inches, is dark gray, friable gravelly loam.

Included with this soil in mapping are small areas of stony Alden soils and small areas of Wayland and Norwich soils. Also included are a few areas that have a mucky surface layer 18 inches thick.

Permeability is moderately slow, and available water capacity is high. In unlimed areas, reaction is slightly acid and neutral throughout. A high water table is at or near the surface for most of the year. Surface runoff is slow. Rooting depth is restricted by the high water table.

Most areas of this soil are used for woodland or are idle.

If properly drained, the soil can be used occasionally for row crops. This soil has fair potential for pasture and poor potential for trees. The high water table and moderately slow permeability limit the potential for most nonfarm

uses. This soil has some potential for wildlife habitat and recreation.

If this soil is used for cultivated crops, the hazard of erosion is slight. Excess water causes the soil to warm slowly in the spring. Crops can be damaged by ponded water following intensive rainfall. Excess surface water can be drained by keeping natural drainageways open. Where outlets are available, open drains improve drainage.

If this soil is used for pasture, grazing when the soil is wet and overgrazing are major concerns in pasture management. Grazing when the soil is wet compacts the surface. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the main management needs.

This soil is poorly suited to trees, but a large part of the area is wooded. Potential productivity is poor. Use of equipment is restricted for much of the year by the high water table.

This soil is severely limited for most nonfarm uses by the high water table and moderately slow permeability. Capability subclass IVw.

AnA—Allenwood gravelly silt loam, 0 to 3 percent slopes. This nearly level, deep, well drained soil is on broad ridgetops. Slopes are generally nearly smooth and are about 200 to 650 feet long. Areas are irregular in shape and about 3 to 8 acres in size.

Typically, the surface layer is dark brown, friable gravelly silt loam about 10 inches thick. The subsoil is about 56 inches thick. The upper part of the subsoil is strong brown, friable gravelly light silty clay loam 4 inches thick; the middle part is yellowish red, firm, gravelly silty loam 10 inches thick; and the lower part is red, firm and very firm gravelly silty clay loam 42 inches thick. The substratum, to a depth of 72 inches, is red to yellowish red, firm gravelly clay loam.

Included with this soil in mapping are a few areas of stony and cobbly Allenwood soils and scattered areas of Hartleton and Watson soils.

Permeability is moderate to slow, and available water capacity is moderate to high. Surface runoff is slow. The surface layer is more than 15 percent gravel. In unlimed areas reaction is very strongly acid to extremely acid throughout.

Most areas of this soil are idle, but some small areas are used for hay, crops, or housing developments.

This soil has excellent potential for farming and is well suited to pasture and trees. The potential for homesites is mainly good. This soil is also suited to most other nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is slight. Crops respond well to fertilizer and good management. Growing cover crops, using crop residue, and including hay in the cropping system help to maintain organic-matter content and good tilth. In places the gravelly surface layer interferes with seeding of small grain and mechanical harvesting of some crops such as potatoes.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production.

This soil is suited to trees, but only a very small acreage is wooded. Productivity is good. Management concerns are minor. Machine planting is practical in large areas.

This soil is somewhat limited for nonfarm uses by the gravelly surface layer and moderate to slow permeability. Moderate to slow permeability limits onsite sewage disposal. Capability class I.

AnB—Allenwood gravelly silt loam, 3 to 8 percent slopes. This gently sloping, deep, well drained soil is on broad ridgetops. Slopes are undulating to slightly convex and are about 250 to 750 feet long. Areas are irregular in shape and are mainly 4 to 12 acres in size.

Typically, in a cultivated area, the surface layer is dark brown, friable gravelly silt loam 9 inches thick. The subsoil is about 50 inches thick. The upper part of the subsoil is strong brown, friable gravelly light silty clay loam 4 inches thick; the middle part is yellowish red, firm gravelly silty clay loam 10 inches thick; and the lower part is red, firm and very firm gravelly silty clay loam 36 inches thick. The substratum to a depth of 72 inches is red to yellowish red, firm gravelly clay loam.

Included with this soil in mapping are a few small areas of stony and severely eroded Allenwood soils that have a surface layer of gravelly silty clay loam. Small, scattered areas of Hartleton and Watson soils are also included.

Permeability is moderate to slow, and available water capacity is moderate to high. Surface runoff is slow to medium. The surface layer is more than 15 percent gravel. In unlimed areas reaction is very strongly acid to extremely acid throughout.

Most areas of this soil are idle, but some small areas are used for crops, hay, or housing developments.

This soil has excellent potential for farming and is well suited to pasture and trees. The potential for homesites is mainly good. The soil is suited to most other nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Crops respond well to fertilizer and good management. Stripcropping, minimum tillage, diversions, and sod waterways help to control erosion. Growing cover crops, returning crop residue to the soil, and including hay in the cropping system help to maintain organic-matter content and good tilth. In places the gravelly surface layer interferes with the seeding of small grain and mechanical harvesting of some crops such as potatoes.

If this soil is used for pasture, the chief management needs are proper stocking rates to maintain key plant species and rotation of pastures. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production.

This soil is suited to trees, but only a small acreage is wooded. Productivity is good. Management concerns are minor. Machine planting is practical in large areas.

This soil is somewhat limited for nonfarm uses by the gravelly surface. Moderate to slow permeability limits onsite waste disposal. Capability subclass IIe.

AnC—Allenwood gravelly silt loam, 8 to 20 percent slopes. This sloping to moderately steep, well drained soil is on the upper parts of sides of ridges. Slopes are generally convex and hilly and are about 200 to 500 feet long. Areas are oval to rectangular in shape and about 4 to 12 acres in size.

Typically, the surface layer is dark brown, friable gravelly silt loam about 8 inches thick. The subsoil is about 50 inches thick. The upper part of the subsoil is strong brown friable gravelly light silty clay loam 4 inches thick; the middle part is yellowish red, firm gravelly silty clay loam 10 inches thick; and the lower part is red, firm and very firm gravelly silty clay loam 36 inches thick. The substratum to a depth of 70 inches is red to yellowish red, firm gravelly clay loam.

Included with this soil in mapping are a few areas of stony and cobbly Allenwood soils and a few areas of severely eroded Allenwood soils that have a surface layer of gravelly silty clay loam. A few areas of Hartleton and Watson soils are also included.

Permeability is moderate to slow, and available water capacity is high. Surface runoff is rapid, and the hazard of erosion is severe. The surface layer is more than 15 percent gravel. In unlimed areas reaction is very strongly acid and extremely acid throughout.

Most areas of this soil are idle, but some small areas are used for crops, hay, or housing developments.

This soil has excellent potential for farming and is well suited to pasture and trees. The potential for pasture is good. The potential for homesites is good, but the moderate to slow permeability limits onsite sewage disposal.

If this soil is used for cultivated crops, the hazard of erosion is severe. Contour stripcropping, minimum tillage, diversions, sod waterways, cover crops, and grasses and legumes in the cropping system help to reduce runoff and control erosion. Mixing crop residue and manure into the soil helps to maintain organic-matter content and good tilth. In places the gravelly surface interferes with mechanical seeding and harvesting of some crops.

If this soil is used for pasture, overgrazing is the major concern in pasture management. Rotation of pastures, proper stocking rates, and periodic applications of nutrients are the main management needs.

This soil is suited to trees, but only a small acreage is wooded. Many idle areas are reverting to trees. Removing undesirable species helps to increase production. Placing roads on the contour during harvest helps to reduce erosion. Other management concerns are minor. Machine planting is practical in large areas.

This soil is somewhat limited for most nonfarm uses by slope, the gravelly surface, and moderate to slow permeability. Moderate to slow permeability limits onsite waste disposal. Capability subclass IIIe.

As—Alluvial land. This gently sloping, miscellaneous area is on flood plains and along frequently flooded drainageways on uplands. Drainage is variable. Slopes are mostly concave and vary in length. Many areas have gouges and gullies. Areas are generally long and narrow in shape and are mainly 5 to 25 acres in size. In the mountains, however, some areas are larger than 50 acres. Alluvial land in mountain areas is extremely stony.

Along the major streams this unit varies from eroded soil material with a high proportion of coarse material to recent alluvial deposits of cobbles, gravel, sand, and silt. Along upland drainageways, the material consists of mixed soil material with many large stones and boulders on the surface. Much of the fine soil material has been removed by rapidly moving floodwaters. The constant erosion and shifting of material prevent development of a profile.

Included with Alluvial land in mapping are a few areas of Rubble land and of Norwich, Alden, and Chippewa soils on uplands. A few areas of Wayland, Holly, and Philo soils are along the streams.

This miscellaneous area is mostly in poor quality woodland.

This miscellaneous area is too stony and gravelly and to frequently flooded, to be suited to crops and pasture. It is poorly suited to woodland. Frequent flooding and wetness limit most nonfarm uses. Alluvial land has some potential for wildlife habitat and for open space. Capability subclass VIIIs.

AvB—Alvira gravelly silt loam, 3 to 8 percent slopes. This gently sloping, somewhat poorly drained soil is on ridgetops and in seep positions on lower foot slopes of ridges. Slopes are generally smooth to concave. They are about 300 to 550 feet long. Areas are irregular in shape and about 3 to more than 8 acres in size.

Typically, the surface layer is dark grayish brown gravelly silt loam about 10 inches thick. The subsoil is about 50 inches thick. The upper part of the subsoil is mottled, light yellowish brown gravelly silt loam 7 inches thick, and the lower part is mottled, firm and brittle and very brittle, gravelly silty clay loam, gravelly silt loam, and gravelly loam 43 inches thick.

Included with this soil in mapping are a few areas of Alvira stony silt loam and Alvira silt loam and a few areas of Alvira gravelly silt loam that has slopes of 1 to 3 percent. Also included are scattered areas of Watson, Shelmadine, and Holly soils.

Permeability is slow, and available water capacity is moderate. Surface runoff is medium. The subsoil has a firm fragipan. A high water table is at a depth of 6 to 18 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan and the seasonal high water table. In unlimed areas, reaction is extremely acid and very strongly acid throughout.

Most areas of this soil are presently idle. Other areas are commonly used for pasture and hay. A few areas are used for cultivated crops, recreation, and homesites.

This soil is better suited to grass and pasture, but it can be used for row crops if properly managed. It has good potential for pasture and for trees. The seasonal high water table, the slowly permeable subsoil, and the gravelly surface layer limit the potential for many nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Contour stripcropping, minimum tillage, sod waterways, cover crops, and grasses and legumes in the cropping system help to reduce runoff and control erosion. Diversions and subsurface drains are needed to help to remove excess water and allow for timely tillage. In places, the gravelly surface interferes with seeding and harvesting of some crops.

If this soil is used for pasture, overgrazing and grazing when the soil is wet are major concerns in pasture management. Grazing when the soil is wet compacts the surface layer. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs. Open drains and closed drains can be used to improve the potential of this soil for pasture.

This soil is suited to trees, but only a small acreage is wooded. Many idle areas are reverting to trees. Removing undesirable species helps to increase production. Use of equipment is restricted during wet seasons by the seasonal high water table. Machine planting is practical in large areas.

This soil is severely limited for most nonfarm uses, including onsite waste disposal, because of slow permeability and the seasonal high water table. Slow permeability and the seasonal high water table seriously limit onsite waste disposal. Buildings with basements on this soil need foundation drains to prevent seepage into the basement. Capability subclass IIIw.

AwB—Alvira and Watson very stony loams, 0 to 12 percent slopes. These deep, somewhat poorly drained and moderately drained, nearly level to sloping soils are on foot slopes and lower sides of ridges. Slopes are smooth to concave and are about 350 to 700 feet long. Areas are usually irregular in shape and normally are 4 to 15 acres in size.

This unit is about 55 percent Alvira soil, 35 percent Watson soil, and 10 percent included soils. These soils are mapped together because their surface is stony and because the areas of each soil are small; therefore, it was not practical to map them separately.

Typically, the Alvira soil has a surface layer of dark grayish brown gravelly loam about 6 inches thick. The subsoil is 54 inches thick. The upper part of the subsoil is light yellowish brown, friable gravelly silt loam 11 inches thick; and the lower part is a brown and strong brown, firm and brittle to very brittle fragipan of gravelly silty clay loam and gravelly silt loam 43 inches thick.

Typically, the Watson soil has a surface layer of dark brown loam about 6 inches thick. The subsoil is 54 inches thick. The upper part of the subsoil is strong brown and reddish yellow, gravelly light silty clay loam and gravelly silty clay loam 21 inches thick; and the lower part is a yellowish red, very firm and brittle fragipan of gravelly light silty clay loam and gravelly heavy loam 33 inches thick.

Included with these soils in mapping are a few small areas of stony and extremely stony Alvira and Watson soils and small areas of Shelmadine and Hartleton soils.

Permeability is slow, and available water capacity is moderate. In unlimed areas, reaction is extremely acid and strongly acid. Surface runoff is slow to medium. Rooting depth is restricted by the seasonal high water table and the fragipan in the subsoil.

These soils are used mainly for woodland.

These soils have poor potential for farming and for pasture. They have good potential for woodland. Slow permeability and the seasonal high water table limit most nonfarm uses.

These soils are too stony for cultivated crops. The cost of removing trees and large stones and providing drainage limit the potential for pasture.

A large acreage of this soil is used for woodland. Productivity is good. Use of equipment is restricted during wet seasons by the seasonal high water table. Machine planting in large areas is generally practical.

These soils are limited for nonfarm uses by the seasonal high water table, slow permeability, and the surface stones. Slow permeability and the seasonal high water table seriously limit onsite waste disposal. If this soil is disturbed for construction, erosion control practices are needed. Buildings with subsurface basements on these soils need foundation drains to prevent water seepage into the basements. Capability subclass VIs.

BaB—Bath channery silt loam, 3 to 8 percent slopes. This gently sloping, deep, well drained soil is on ridgetops and lower foot slopes of ridges. Slopes are undulating to concave and are about 300 to 750 feet long. Areas are irregular in shape. They generally range from 4 to 15 acres in size, but some are more than 50 acres in size.

Typically, the surface layer is dark grayish brown channery silt loam about 10 inches thick. The subsoil is about 58 inches thick. The upper part of the subsoil is yellowish brown, friable channery silt loam and channery loam 16 inches thick; the middle part is yellowish brown, firm and brittle channery loam 31 inches thick; and the lower part is brown, firm and brittle very channery loam 11 inches thick. The substratum to a depth of 79 inches is olive sandstone fragments coated with silt.

Included with this soil in mapping are small areas of nearly level, gravelly and stony Bath soils. Also included are a few small areas of Swartswood and Mardin soils. Included in the eastern part of the county is a soil that is similar to this Bath soil, but that is less acid throughout.

Permeability is moderate above the fragipan and slow in the fragipan. Available water capacity is low to moderate. In unlimed areas reaction is very strongly acid to medium acid above the fragipan and strongly acid to slightly acid in the fragipan. Although this soil is well drained, a temporary perched water table is sometimes present in wet seasons. Surface runoff is medium. The rooting depth is restricted by the fragipan in the subsoil.

Most areas of this soil are idle, but some small areas are used for general farm crops or subdivisions.

This soil has good potential for farming and is well suited to pasture and trees. Potential for homesites is good, but potential for onsite waste disposal is poor because of the slow permeability.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Minimum tillage, cover crops, and grasses and legumes in the cropping system help to control erosion. If the topography is suitable, stripcropping can be used. Returning some crop residue to the surface layer helps to maintain organic-matter content and reduce the tendency of this soil to clod and crust.

If this soil is used for pasture, the main management needs are proper stocking rates to maintain key plant species and rotation of pasture. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production.

This soil is suited to trees, but only a small acreage is wooded. Many idle areas are reverting to trees. Productivity is good, but rooting depth may be restricted by the fragipan. Management concerns are minor. Machine planting is practical in large areas.

This soil is somewhat limited for nonfarm uses by slow permeability in the subsoil and channery fragments on the surface. Slow permeability seriously limits onsite waste disposal. During construction on this soil, erosion- and sediment-control practices are needed. Capability subclass IIe.

BaC—Bath channery silt loam, 8 to 15 percent slopes. This sloping, deep, well drained soil is on upper side slopes and upper foot slopes of ridges. Slopes are smooth to rolling and are about 200 to 600 feet long. Areas are irregular in shape. They generally range from 3 to 14 acres in size, but some areas are more than 45 acres in size.

Typically, the surface layer is dark grayish brown channery silt loam about 9 inches thick. The subsoil is about 51 inches thick. The upper part of the subsoil is yellowish brown, friable channery silt loam 15 inches thick, and the lower part is yellowish brown, firm and brittle channery loam 36 inches thick. The substratum, to a depth of 70 inches, in brown, firm very channery loam.

Included with this soil in mapping are small areas of gravelly and stony Bath soils. Also included are a few small areas of Swartswood and Mardin soils. Included in the eastern part of the county is a soil that is similar to this Bath soil but that is less acid throughout.

Permeability is moderate above the fragipan and slow in the fragipan. Available water capacity is low to moderate. In unlimed areas, the soil is very strongly acid to medium acid above the fragipan and strongly acid to slightly acid in the fragipan. Although this soil is well drained, a temporary perched water table is sometimes present during wet seasons. Surface runoff is medium. The rooting depth is restricted by the fragipan in the subsoil.

Most areas of this soil are idle, but some small areas are used for general farm crops, pasture, or subdivisions.

This soil has good potential for farming if it is protected from erosion, and it is well suited to pasture and trees. The potential for homesites is fair, but the potential for onsite waste disposal is poor because of slow permeability and slope.

If cultivated crops are grown, the hazard of erosion is severe. Some of the practices needed to reduce runoff and control erosion are stripcropping on the contour, diversions, minimum tillage, cover crops, and grasses and legumes in the cropping system. Returning some crop residue to the surface layer helps to maintain organic-matter content and reduce the tendency of this soil to clod and crust.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the main management needs. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production.

This soil is suited to trees, but only a small acreage is wooded. Many idle areas are reverting to trees. Productivity is good, but in places rooting depth is restricted by the fragipan. Management concerns are minor. Machine planting is practical in large areas. Roads constructed for harvesting need to be constructed on the contour to reduce the amount of erosion.

This soil has some limitations for nonfarm uses because of slow permeability in the subsoil, slope, and coarse fragments on the surface. Slow permeability and slope limit onsite waste disposal. During construction on this soil, erosion- and sediment-control practices are needed. Capability subclass IIIe.

BaD—Bath channery silt loam, 15 to 25 percent slopes. This moderately steep, deep, well drained soil is on the sides of ridges. Slopes are rolling to hilly and about 250 to 650 feet long. Areas are irregular in shape and generally range from 2 to 12 acres in size, but some areas are larger than 35 acres.

Typically, the surface layer is dark grayish brown channery silt loam about 8 inches thick. The subsoil is about 46 inches thick. The upper part of the subsoil is yellowish brown, friable channery silt loam 14 inches thick, and the lower part is yellowish brown, firm and brittle channery loam 32 inches thick. The substratum, to a depth of 60 inches, is brown, firm very channery loam.

Included with this soil in mapping are small areas of gravelly and steeper Bath soils. Also included are a few small areas of Swartswood and Mardin soils. In the east-

ern part of the county, a soil that is similar to this Bath soil but that is less acid throughout is also included.

Permeability is moderate above the fragipan and slow in the fragipan. Available water capacity is low to moderate. Unless limed, this soil is very strongly acid to medium acid above the fragipan and strongly acid to slightly acid in the fragipan. Although this soil is well drained, a temporary perched water table sometimes is present in wet seasons. Surface runoff is rapid. Rooting depth is restricted by the fragipan in the subsoil.

Most areas of this soil are idle, but some small areas are in hay, pasture, or subdivisions.

Because the hazard of erosion is severe, this soil has fair potential for cultivated crops. This soil is better suited to pasture and trees. The potential for homesites is poor, and the potential for onsite waste disposal is poor because of moderately steep slopes and slow permeability.

If this soil is cultivated, the hazard of erosion is severe. Because of the hazard of erosion, this soil is better suited to long-term hay crops or pasture than to cultivated crops. If plowed for replanting hay or pasture grasses, contour strips, diversion terraces, and sod waterways help to reduce runoff and control erosion.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pasture are the main management needs. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production. Practices that reduce the amount of runoff and control erosion are needed when plowing for replanting.

This soil is suited to trees, but only a small acreage is wooded. Many idle areas are reverting to trees. Productivity is good, but rooting depth may be restricted by the fragipan. Management concerns are generally minor, but in places slope limits the use of some equipment. Machine planting is practical in large areas. Roads for harvesting need to be constructed on the contour to reduce erosion.

This soil is limited for nonfarm uses by moderately steep slopes, slow permeability in the subsoil, and coarse fragments. Slope and slow permeability seriously limit onsite waste disposal. During construction on this soil, erosion- and sediment-control practices are needed. Capability subclass IV.

BbB—Bath very stony silt loam, 0 to 8 percent slopes. This deep, nearly level and gently sloping soil is on ridgetops and the upper parts of sides of ridges. Slopes are undulating to convex and about 350 to 900 feet long. Areas are irregular in shape and generally range from 5 to 40 acres in size.

Typically, the surface layer is very dark grayish brown channery silt loam about 6 inches thick. The subsoil is about 56 inches thick. The upper part of the subsoil is yellowish brown channery silt loam and channery loam 20 inches thick, and the lower part is yellowish brown, firm and brittle channery loam 36 inches thick. The substratum, to a depth of 70 inches, is brown very channery loam.

Included with this soil in mapping are small areas of stony and extremely stony Bath soils. Also included are a few small areas of Swartswood and Mardin soils. Included in the eastern part of the county is a soil that is similar to this Bath soil but that is less acid throughout.

Permeability is moderate above the fragipan and slow in the fragipan. Available water capacity is low to moderate. In unlimed areas, the soil is very strongly acid to medium acid above the fragipan and strongly acid to slightly acid in the fragipan. Although this soil is well drained, a temporary perched water table is sometimes present in wet seasons. Surface runoff is slow. The rooting depth is restricted by the fragipan in the subsoil.

Most areas of this soil are used for woodland, but some small areas are used for homesites and recreation.

This soil has poor potential for farming and pasture, but it is well suited to trees. The potential for homesites is good, but the potential for onsite waste disposal is poor because of the slowly permeable fragipan.

This soil is too stony for cultivated crops. The cost of removing trees and large stones also reduces the potential for pasture.

This soil is suited to trees, and a large acreage is wooded. Productivity is good, but in places rooting depth is restricted by the fragipan. Management concerns are minor. Machine planting is practical in large areas.

This soil is somewhat limited for nonfarm uses by slow permeability in the subsoil and the stony surface. Slow permeability seriously limits onsite waste disposal. During construction on this soil, erosion- and sediment-control practices are needed. Capability subclass VIIs.

BbC—Bath very stony silt loam, 8 to 25 percent slopes. This deep, sloping and moderately steep soil is on the sides of ridges. Slopes are rolling to hilly and are about 300 to 1,000 feet long. Areas are irregular in shape and generally range from 5 to 30 acres in size.

Typically, the surface layer is very dark grayish brown channery silt loam about 6 inches thick. The subsoil is about 54 inches thick. The upper part of the subsoil is yellowish brown channery silt loam and channery loam 20 inches thick, and the lower part is yellowish brown, firm and brittle channery loam 34 inches thick. The substratum, to a depth of 70 inches, is brown, very channery loam.

Included with this soil in mapping are small areas of stony and extremely stony Bath soils. Also included are a few small areas of Swartswood, Lackawanna, and Bath soils. Included in the eastern part of the county is a soil that is similar to this Bath soil but that is less acid.

Permeability is moderate above the fragipan and slow in the fragipan. Available water capacity is low to moderate. In unlimed areas, the soil is very strongly acid to medium acid above the fragipan and strongly acid to slightly acid in the fragipan. Although this soil is well drained, a temporary perched water table is sometimes present during wet

seasons. Surface runoff is medium. Rooting depth is restricted by the fragipan in the subsoil.

Most areas of this soil are used for woodland, but some small areas are used for homesites and recreation.

The soil has poor potential for farming and pasture, but it is well suited to trees. The potential for homesites is good, but potential for onsite waste disposal is poor because of the slowly permeable fragipan in the subsoil.

This soil is too stony for cultivated crops. The cost of removing trees and large stones also reduces the potential of this soil for pasture.

This soil is suited to trees, and a large acreage is wooded. Productivity is good, but rooting depth may be restricted by the fragipan. Roads for harvesting need to be constructed on the contour to reduce erosion. Machine planting is practical in large areas, but in places surface stones interfere with machine operation.

This soil is somewhat limited for nonfarm uses by slow permeability in the subsoil, slopes, and stony surface. Permeability seriously limits onsite waste disposal. During construction on this soil, erosion- and sediment-control practices are needed. Capability subclass VIs.

BeB—Benson-Rock outcrop complex, 0 to 8 percent slopes. This complex of nearly level and gently sloping, shallow, well drained soil and Rock outcrop are on the tops and upper parts of sides of ridges. Slopes are complex and are variable in length. Areas are usually long and narrow in shape and normally are 10 to 45 acres in size.

The complex is about 55 percent Benson soil, 15 percent Rock outcrop, and 30 percent included soils. The soils and Rock outcrop are mapped together because they occur in such intricate patterns that it is not practical to map them separately at the scale of mapping. In about 70 percent of the area, the surface layer of the Benson soils is stony.

Typically, the Benson soils have a surface layer of brown channery silt loam about 8 inches thick. The subsoil is 10 inches thick. The upper part is yellowish brown, friable, shaly silt loam 6 inches thick; and the lower part is yellowish brown, friable, very shaly silt loam 4 inches thick. Moderately calcareous, fine grained sandstone bedrock is at a depth of 18 inches.

Rock outcrop consists of exposures of solid bedrock.

Included with this complex in mapping are a few small areas of Benson very stony silt loam and some areas of moderately deep and deep, well drained soils that do not have a fragipan. Small areas of Bath, Mardin, and Volusia soils and a few small scattered areas of sand and gravel deposits are also included.

Permeability is moderate, and available water capacity is low to very low in the Benson soil. In unlimed areas, reaction is neutral to medium acid. Surface runoff is slow to medium. Rooting depth is restricted by the shallow depth to bedrock.

This complex is used mainly for pasture and woodland.

This complex has poor potential for farming. The shallow depth to bedrock and bedrock outcrops limit most nonfarm uses.

Most areas of this complex are too stony and rocky for cultivated crops. In some small areas where outcrops are not too numerous and where stones have been removed, cultivated crops can be grown. However, production is low. If the soil is used for cultivated crops, the hazard of erosion is moderate. Further erosion results in a shallower rooting depth and lower available water capacity. Minimum tillage, cover crops, and grass and legumes in the cropping system help to reduce runoff and control erosion. If the topography is suitable, stripcropping can be used. Returning crop residue to the surface layer helps to maintain organic-matter content and reduce the tendency of this soil to clod and crust.

Where surface stones have been removed, this complex can be used for rotation pasture. If the soil is used for pasture, the chief management needs are proper stocking rates to maintain key plant species and rotation of pasture. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production.

A large acreage of this complex is used for woodland. Productivity is poor. Rooting depth is restricted by bedrock and rock outcrops. Loss of seedlings is moderate to heavy because of the very low to low available water capacity and the high percentage of coarse fragments in the subsoil. Machine planting in large areas is generally practical, but it is a problem in many smaller areas because of large outcrops of bedrock.

This complex is limited for nonfarm uses by depth to bedrock, rock outcrop, and surface stones. The restricted depth to bedrock and Rock outcrop limit excavation for buildings and seriously limit onsite waste disposal. If this soil is disturbed for construction, erosion-control practices are needed. Capability subclass VIs.

BeC—Benson-Rock outcrop complex, 8 to 25 percent slopes. This complex of well drained, sloping and moderately steep soils and Rock outcrop is on the upper part of sides of ridges. Slopes are complex and are 200 to 1,000 feet long. Areas are usually irregular in shape and generally are 10 to 60 acres in size.

This complex is about 60 percent Benson soil, 20 percent Rock outcrop, and 20 percent included soils. Benson soils and Rock outcrop are mapped together because they occur in such intricate patterns that it is not practical to separate them at the scale of mapping.

Typically, the Benson soils have a surface layer of brown channery silt loam about 8 inches thick. The subsoil is 10 inches thick. The upper part of the subsoil is yellowish brown, friable, shaly silt loam 6 inches thick; and the lower part is yellowish brown, friable, very shaly silt loam 4 inches thick. Moderately calcareous, fine grained sandstone bedrock is at a depth of 18 inches.

Rock outcrop consists of exposures of solid bedrock.

Included with these soils in mapping are a few small areas of Benson channery silt loam and some areas of

moderately deep and deep, well drained soils that do not have a fragipan. Small areas of Bath, Mardin, and Volusia soils and a few small areas of Wyoming and Chenango soils are also included.

Permeability is moderate, and available water capacity is low to very low in the Benson soil. In unlimed areas, reaction in the Benson soil is neutral to medium acid. Surface runoff is medium. Rooting depth is restricted by the shallow depth to bedrock in the Benson soil and the exposed bedrock in the Rock outcrop part.

This complex is used mainly for woodland.

This complex is too rocky and stony for farming. The shallow depth to rock, rock outcrops, and stony surface layer limit most nonfarm uses.

A large acreage of this complex is used for woodland. Productivity is poor. Loss of seedlings is heavy because of the very low to low available water capacity and the shallow depth to rock. Windthrow losses of the larger trees are also a management concern. Machine planting is impossible because of the large surface stones and Rock outcrop.

This complex is limited for nonfarm uses by Rock outcrop, shallow depth to bedrock, and slope. The restricted depth to bedrock is a problem in excavating for buildings and seriously limits onsite waste disposal. If this soil is disturbed for construction, erosion-control practices are needed. Capability subclass VIs.

BeF—Benson-Rock outcrop complex, 25 to 70 percent slopes. This complex of shallow, steep and very steep, well drained soils and Rock outcrop is on steeper sides of ridges. Slopes are complex and are about 350 to 1,200 feet long. Areas are usually long and narrow in shape and normally are 10 to 120 acres in size.

This complex consists of about 60 percent Benson soil, 25 percent Rock outcrop, and 15 percent included soils. Benson soils and Rock outcrop are mapped together because they occur in such intricate patterns that it is not practical to separate them at the scale of mapping. In most of the area, Benson soils have an extremely stony surface layer; however, in about 25 percent of the area, the stones have been removed from the surface.

Typically, the Benson soil has a surface layer of brown channery silt loam about 8 inches thick. The subsoil is 8 inches thick. The upper part is yellowish brown, friable shaly silt loam 4 inches thick; and the lower part is yellowish brown, friable very shaly silt loam 4 inches thick. Moderately calcareous, fine grained sandstone bedrock is at a depth of 16 inches.

Rock outcrop consists of exposures of solid bedrock.

Included in mapping are a few small areas of Benson channery silt loam and some areas of a moderately deep and deep, well drained soil that does not have a fragipan. Small areas of Bath and Wyoming soils are also included.

Permeability is moderate, and available water capacity is low to very low in the Benson soil. In unlimed areas, reaction in the Benson soil is neutral to medium acid. Surface runoff is rapid. Rooting depth is restricted by the shallow depth to bedrock in the Benson soil and the exposed bedrock in the Rock outcrop part.

This complex is used mainly for woodland.

This complex is too stony, rocky, and steep for farming. The shallow depth to rock, rock outcrops, stony surface, and slope limit most nonfarm uses.

A large acreage of this complex is used for woodland. Productivity is poor. Loss of seedlings is heavy because of the very low available water capacity and the shallow depth to rock. Windthrow losses of the larger trees are also a management concern. Machine planting is impossible because of slope, large surface stones, and Rock outcrop.

This complex is limited for nonfarm uses by Rock outcrop, shallow depth to bedrock, and steep slope. The restricted depth to bedrock is a problem in excavating for buildings and seriously limits onsite waste disposal. If the soil is disturbed for construction, erosion-control practices are needed. Capability subclass VIIs.

BrA—Braceville gravelly loam, 0 to 3 percent slopes. This nearly level, deep, moderately well drained soil is on terraces adjacent to major streams and drainageways. Slopes are generally smooth to gently undulating and are about 200 to 450 feet long. Areas are oval in shape and about 2 to 5 acres in size.

Typically the surface layer is dark grayish brown gravelly loam about 10 inches thick. The subsoil is about 26 inches thick. The upper part of the subsoil is brown gravelly loam and gravelly fine sandy loam 11 inches thick; and the lower part is brown, firm and brittle, gravelly fine sandy loam 15 inches thick. The substratum, to a depth of 60 inches, is brown, firm very gravelly sandy loam.

Included with this soil in mapping are a few areas of Braceville cobbly loam and Braceville stony loam and a few areas of Braceville gravelly loam, 3 to 8 percent slopes. Also included are scattered areas of Chenango, Wyoming, and Rexford soils.

Permeability is slow and moderately slow, and available water capacity is moderate. Surface runoff is slow. The subsoil has a frim and brittle fragipan. A high water table is at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan in the subsoil. In unlimed areas, reaction is very strongly acid to medium acid above the fragipan and strongly acid to slightly acid in the fragipan.

Most areas of this soil are presently idle. Most other areas are used for crops, pasture, and woodland. A few areas are used for homesites and recreation.

This soil is better suited to grass and pasture than to most other uses, but it can be used for crops if properly managed. It has good potential for pasture and very good potential for trees. The seasonal high water table, slowly permeable subsoil, and slope limit the potential of this soil for many nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is slight. Minimum tillage, sod waterways, cover crops, and grasses and legumes in the cropping system

help to reduce runoff and add organic matter to the soil. Open drains and cover drains help to remove excess water and allow for timely tillage. In places, the gravelly surface layer interferes with seeding and harvesting of some crops.

If this soil is used for pasture, overgrazing and grazing when the soil is wet are major concerns in pasture management. Grazing when the soil is wet compacts the surface. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs.

This soil is suited to trees, but only a small acreage is wooded. Many idle areas are reverting to trees. Removing undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting is practical in large areas.

This soil is seriously limited for most nonfarm uses, including onsite waste disposal, by slow to moderately slow permeability and the seasonal high water table. The seasonal high water table is a potential hazard for buildings with subsurface basements. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass IIw.

BrB—Braceville gravelly loam, 3 to 8 percent slopes. This gently sloping, moderately well drained soil is on terraces and higher alluvial fans adjacent to major streams and drainageways. Slopes are generally uniform to undulating and are about 250 to 600 feet long. Areas are irregular in shape and about 3 to 11 acres in size.

Typically the surface layer is dark grayish brown gravelly loam about 9 inches thick. The subsoil is about 27 inches thick. The upper part of the subsoil is brown gravelly loam and gravelly fine sandy loam 12 inches thick; and the lower part is brown, firm and brittle gravelly fine sandy loam 15 inches thick. The substratum, to a depth of 60 inches, is brown, firm very gravelly sandy loam.

Included with this soil in mapping are a few areas of Braceville cobbly loam, gravelly silt loam, and stony loam, and a few areas of Braceville gravelly loam, 0 to 3 percent slopes. Also included are scattered areas of Chenango, Wyoming, and Rexford soils.

Permeability is slow and moderately slow, and available water capacity is moderate. Surface runoff is medium. The subsoil has a firm and brittle fragipan. A high water table is at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan in the subsoil. In unlimed areas, reaction is very strongly acid to medium acid above the fragipan and strongly acid to slightly acid in the fragipan and in the C horizon.

Most areas of this soil are presently idle. Most other areas are used for crops, pasture, and woodland. A few areas are used for homesites and recreation.

This soil is better suited to grass and pasture than to most other uses, but it can be used for crops if properly managed. It has good potential for pasture and very good potential for trees. The seasonal high water table, slowly and moderately slowly permeable subsoil, and slope limit the potential of this soil for many nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is moderate. If the topography is suitable, contour stripcropping, minimum tillage, sod waterways, cover crops, and grasses and legumes in the cropping system help to reduce runoff and control erosion. Diversions and covered drains help to remove excess water and allow for timely tillage. In places, the gravelly surface layer interferes with seeding and harvesting of some crops.

If this soil is used for pasture, overgrazing and grazing when the soil is wet are major concerns in pasture management. Grazing when the soil is wet compacts the surface. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs.

This soil is suited to trees, but only a small acreage is wooded. Many idle areas are reverting to trees. Removing undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting is practical in large areas.

This soil is seriously limited for most nonfarm uses, including onsite waste disposal, by slow to moderately slow permeability and the seasonal high water table. The seasonal high water table is a potential hazard for buildings with subsurface basements. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass IIe.

BuB—Buchanan loam, 3 to 8 percent slopes. This gently sloping, moderately well drained and somewhat poorly drained soil is on broad plateaus and ridgetops. Slopes are smooth and slightly concave and are generally about 250 to 700 feet long. Areas are broad and wide in shape and about 3 to 18 acres in size.

Typically the surface layer is very dark grayish brown loam about 10 inches thick. The subsoil is about 45 inches thick. The upper part of the subsoil is yellowish brown, friable gravelly loam 29 inches thick; and the lower part is yellowish brown, firm and brittle gravelly loam 26 inches thick. The substratum, to a depth of 65 inches, is yellowish brown, firm gravelly loam.

Included with this soil in mapping are a few areas of Buchanan silt loam, gravelly loam, and stony loam, and a few areas of Buchanan soils that have slopes of 0 to 3 percent and 8 to 15 percent. Also included are scattered areas of Clymer, Alvira, and Dekalb soils.

Permeability is moderate above the fragipan and slow in the fragipan. Available water capacity is moderate. Surface runoff is medium. The subsoil has a firm and brittle fragipan. A high water table is at a depth of 10 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan in the subsoil. In unlimed

areas, reaction is very strongly acid and extremely acid throughout.

Most areas of this soil are presently idle. Most others are used for crops, truck farming, pasture, and woodland. A few areas are used for homesites and recreation, and a few areas are State owned.

This soil is better suited to grass and pasture than to most other uses, but it can be used for crops if properly managed. It has good potential for pasture and for trees. The seasonal high water table, slowly permeable subsoil, and slope limit the potential of this soil for many nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Contour stripcropping, minimum tillage, sod waterways, cover crops, and grasses and legumes in the cropping system help to reduce runoff and control erosion. Diversion and covered drains help to remove excess water and allow for timely tillage. In undrained areas, spring tillage is delayed by wetness.

If this soil is used for pasture, overgrazing and grazing when the soil is wet are major concerns in pasture management. Grazing when the soil is wet compacts the surface. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs.

This soil is suited to trees, but only a small acreage is wooded. Many idle areas are reverting to trees. Removing undesirable species helps to increase production. Placing roads on the contour during harvesting in the steeper areas helps to reduce erosion. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting is practical in large areas.

This soil is severely limited for most nonfarm uses, including onsite waste disposal, by slow permeability and the seasonal high water table. The seasonal high water table is a potential hazard for buildings with subsurface basements. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass IIe.

BxB—Buchanan extremely stony loam, 0 to 8 percent slopes. This well drained, nearly level and gently sloping soil is on broad plateaus and ridgetops. Slopes are smooth to undulating and slightly concave and are variable in length. Areas are broad and wide in shape and normally are 8 to 25 acres in size.

Typically, the surface layer is very dark grayish brown loam about 6 inches thick. The subsoil is about 49 inches thick. The upper part of the subsoil is yellowish brown gravelly loam 23 inches thick; and the lower part is yellowish brown, firm and brittle, gravelly loam 26 inches thick. The substratum, to a depth of 65 inches, is yellowish brown, firm gravelly loam.

Included with this soil in mapping are small areas of Buchanan very stony loam and a few small areas of Clymer, Alvira, Laidig, and Dekalb soils. A few small areas of Buchanan soils in which the surface layer is more than 15 percent gravel are also included.

Permeability is moderate above the fragipan and slow in the fragipan. Available water capacity is moderate. In unlimed areas, reaction is very strongly acid and extremely acid. A high water table is at a depth of 10 to 18 inches during wet seasons. Surface runoff is slow to medium. Rooting depth is restricted by the fragipan layer in the subsoil.

Most areas of this soil are used for woodland, and small areas are used for recreation and homesites.

This soil has poor potential for farming and is poorly suited to pasture because of the numerous surface stones. It has good potential for trees. The surface stones, seasonal high water table, and slowly permeable subsoil limit the potential of this soil for most nonfarm uses. This soil has some potential for recreation that is not affected by surface stones.

This soil is not suited to cultivated crops or to pasture because of the numerous surface stones and the seasonal high water table. The cost of removing surface stones and trees and reducing the water table limits the potential for crops or pasture.

This soil is suited to trees, and most areas are wooded. Productivity is good. Removing undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Large surface stones interfere with seeding and harvesting.

This soil is seriously limited for most nonfarm uses, including onsite waste disposal, by slow permeability, the stony surface layer, and the seasonal high water table. The seasonal high water table is a potential hazard for buildings with subsurface basements. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass VIIs.

BxC—Buchanan extremely stony loam, 8 to 25 percent slopes. This sloping and moderately steep, extremely stony, moderately well drained to somewhat poorly drained soil is on foot slopes and sides of hills and ridges on uplands, and in sloping areas on broad plateaus. Slopes are generally smooth and concave and are variable in length. Areas are broad and wide in shape and are about 5 to 20 acres in size.

Typically, the surface layer is very dark grayish brown loam about 6 inches thick. The subsoil is about 49 inches thick. The upper part of the subsoil is yellowish brown, friable gravelly loam 23 inches thick; and the lower part is yellowish brown, firm and brittle gravelly loam 26 inches thick. The substratum, to a depth of 65 inches, is yellowish brown, firm gravelly loam.

Included with this soil in mapping are a few areas of Buchanan very stony loam and scattered areas of Clymer, Laidig, Alvira, and Dekalb soils.

Permeability is moderate above the fragipan and slow in the fragipan. The available water capacity is moderate.

Surface runoff is rapid. The subsoil has a slowly permeable fragipan. A high water table is at a depth of 10 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. In unlimed areas, reaction is very strongly acid and extremely acid throughout.

Most areas of this soil are used for woodland. A few areas are used for recreation and homesites.

This soil is too stony for cultivated crops and is poorly suited to grass and pasture. It has good potential for trees. The surface stones, seasonal high water table, slowly permeable subsoil, and the slope limit the potential of this soil for many nonfarm uses. This soil has some potential for wildlife habitat and recreation that are not affected by surface stones and slope.

This soil is not suited to cultivated crops or to pasture because of the numerous surface stones and the seasonal high water table. The cost of removing surface stones and trees and reducing the water table limits the potential for crops or pasture.

This soil is suited to trees, and most areas are wooded. Productivity is good. Removing undesirable species helps to increase production. Placing roads on the contour during harvesting reduces erosion. Use of equipment is restricted during wet seasons because of the seasonal high water table. Large surface stones interfere with seeding and harvesting.

This soil is seriously limited for most nonfarm uses by slope, slow permeability, extreme stoniness, and the seasonal high water table. Slow permeability and the seasonal high water table also seriously limit onsite waste disposal. The seasonal high water table is a potential hazard for buildings with subsurface basements. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basements. Capability subclass VIIs.

ChA—Chenango gravelly loam, 0 to 3 percent slopes. This nearly level, deep, well drained and somewhat excessively drained soil is on outwash plains and terraces and tops of kames and moraines. Slopes are generally complex and about 100 to 350 feet long. Areas are irregular in shape and are about 3 to 9 acres in size.

Typically (fig. 8), the surface layer is dark grayish brown gravelly loam about 8 inches thick. The subsoil is 24 inches thick. The upper part of the subsoil is dark yellowish brown, friable gravelly fine sandy loam 8 inches thick; the middle part is yellowish brown, friable gravelly loam 8 inches thick; and the lower part is yellowish brown, friable gravelly fine sandy loam 8 inches thick. The substratum, to a depth of 60 inches, is brown, loose very gravelly loamy coarse sand.

Included with this soil in mapping are a few areas of cobbly and stony Chenango soils and scattered areas of Wyoming and Braceville soils. Small pockets of wetter soils are also included.

Permeability is moderately rapid in the solum and rapid in the substratum. Available water capacity is low. Surface runoff is slow. The surface layer is more than 15 percent gravel. In unlimed areas reaction is very strongly acid and strongly acid in the solum.

Most of the acreage of this soil is used for crops and pasture, and small areas are used for woodland and housing developments and as sources of sand and gravel. A few large areas are idle.

This soil has fair potential for farming and is fairly well suited to pasture and trees. The potential for homesites is mainly good. This soil is also suited to most other nonfarm uses for which the gravelly surface is not a limitation.

If this soil is used for cultivated crops, the hazard of erosion is slight. Crops respond well to fertilizer and to good management. Growing cover crops, using crop residue, and including hay in the cropping system help to maintain organic-matter content and good tilth. In places, the gravelly surface layer interferes with the seeding of small grain and the mechanical harvesting of some crops such as potatoes. Crop production decreases during unusually dry periods because of the low available water capacity.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production. Water retention practices lengthen the safe grazing periods.

This soil is suited to trees, but only a very small acreage is wooded. Productivity is good. Management concerns are minor. Machine planting is practical in large areas. Removing undesirable species leaves more available water for desirable species.

This soil is somewhat limited for nonfarm uses by the rapidly permeable substratum and the gravelly surface. This soil has good potential for homesites. The rapidly permeable substratum limits onsite waste disposal because ground water contamination is a possible hazard. Capability subclass IIs.

ChB—Chenango gravelly loam, 3 to 8 percent slopes. This gently sloping, deep, well drained and somewhat excessively drained soil is on tops and sides of outwash plains, terraces, kames, eskers, and moraines. Slopes are generally undulating and are 50 to 300 feet long. Areas are irregular in shape and usually are about 4 to 40 acres in size. A few areas are as large as 100 acres or more.

Typically, the surface layer is dark grayish brown gravelly loam about 8 inches thick. The subsoil is 24 inches thick. The upper part of the subsoil is dark yellowish brown, friable gravelly fine sandy loam 8 inches thick; the middle part is yellowish brown, friable gravelly loam 8 inches thick; and the lower part is yellowish brown, friable gravelly fine sandy loam 8 inches thick. The substratum, to a depth of 60 inches, is brown, loose very gravelly loamy coarse sand.

Included with this soil in mapping are a few areas of cobbly and stony Chenango soils and scattered areas of

Wyoming and Braceville soils. Small pockets of wetter soils are also included.

Permeability is moderately rapid in the solum and rapid in the substratum. Available water capacity is low. Surface runoff is medium. The surface layer is more than 15 percent gravel. In unlimed areas, reaction is very strongly acid and strongly acid in the solum.

Most of the acreage of this soil is used for crops and pasture, and small areas are used for woodland and housing developments and as sources of sand and gravel.

This soil has fair potential for farming and is fairly well suited to pasture and trees. The potential for homesites is good, but the rapid permeability in the substratum limits the potential for onsite waste disposal. It is also suited to most other nonfarm uses for which the gravelly surface is not a limitation.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Crops respond well to fertilizer and to good management. Growing cover crops, using crop residue, and including hay in the cropping system help to maintain organic-matter content and good tilth. Minimum tillage, diversions, sod waterways, and stripcropping on suitable slopes help to control erosion. In places, the gravelly surface interferes with the seeding of small grain and the mechanical harvesting of some crops such as potatoes. Crop production decreases during unusually dry periods because of the low available water capacity.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to help maintain fertility are needed for optimum production. Water retention practices lengthen the safe grazing periods.

This soil is suited to trees, but only a very small acreage is wooded. Productivity is good. Management concerns are minor. Machine planting is practical in large areas. Removing undesirable species leaves more available water for desirable species.

This soil is somewhat limited for nonfarm uses by the rapidly permeable substratum and the gravelly surface. Potential is good for homesites, but the rapidly permeable substratum limits onsite waste disposal because ground water contamination is a hazard. Capability subclass IIe.

ChC—Chenango gravelly loam, 8 to 15 percent slopes. This sloping, deep, well drained and somewhat excessively drained soil is on sides of outwash plains, terraces, kames, eskers, and moraines. Slopes are generally complex and rolling and are about 50 to 400 feet long. Areas are irregular in shape and are usually about 3 to 25 acres in size.

Typically the surface layer is dark grayish brown gravelly loam about 8 inches thick. The subsoil is 20 inches thick. The upper part of the subsoil is dark yellowish brown, friable gravelly fine sandy loam 6 inches thick; the middle part is yellowish brown, friable gravelly loam 6 inches thick; and the lower part is yellowish brown, friable gravelly fine sandy loam 8 inches thick. The substratum, to a depth of 60 inches, is brown, loose very gravelly loamy coarse sand.

Included with this soil in mapping are a few areas of cobbly and stony Chenango soils and scattered areas of Wyoming and Braceville soils. Small pockets of wetter soils are also included.

Permeability is moderately rapid in the solum and rapid in the substratum. Available water capacity is low. Surface runoff is medium. The surface layer is more than 15 percent gravel. In unlimed areas, reaction is very strongly acid and strongly acid in the solum.

Most of the acreage of this soil is used for crops or is idle, and small areas are used for woodland and housing developments and as sources of sand and gravel.

This soil has fair potential for farming and is fairly well suited to pasture and trees. The potential for homesites is fair because of slope, but the rapid permeability in the substratum limits onsite waste disposal. Slope and the gravelly surface are the major limitations for many other nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is severe. Crops respond well to fertilizer and to good management. Contour stripcropping, minimum tillage, diversions, sod waterways, cover crops, crop residue, and hay in the cropping system help in controlling erosion and maintaining organic-matter content and good tilth. In places, the gravelly surface interferes with the seeding of small grain and the mechanical harvesting of some crops such as potatoes. Crop production decreases during unusually dry periods because of the low available water capacity.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production. Water retention practices lengthen the safe grazing periods.

This soil is suited to trees, but only a very small acreage is wooded. Productivity is good. Placing roads on the contour during harvesting helps to reduce erosion. Machine planting is practical in large areas. Removing undesirable species leaves more water available for desirable species.

This soil is somewhat limited for nonfarm uses, including onsite waste disposal, by the rapidly permeable substratum, slope, and the gravelly surface. Ground water contamination is a hazard if this soil is used for onsite waste disposal. Slope and the gravelly surface limit many other nonfarm uses. Capability subclass IIIe.

CmA—Chippewa and Norwich silt loams, 0 to 5 percent slopes. These poorly drained and very poorly drained, nearly level and gently sloping soils are in depressions and drainageways on uplands. Slopes are slightly concave and are variable in length. Areas are usually long and narrow in shape and normally are 5 to more than 20 acres in size.

This unit is about 40 percent Chippewa soil, 40 percent Norwich soil, and 20 percent included soils. These soils are mapped together because they are similar in use and management. Individual mapped areas of this unit are generally mostly Chippewa soil or Norwich soil. In places both soils occur in the same area.

Typically, the Chippewa soil has a surface layer of very dark grayish brown silt loam about 7 inches thick. The subsurface layer is olive gray channery silt loam 4 inches thick. The subsoil is 49 inches thick. The upper 8 inches of the subsoil is mottled olive gray and gray, friable channery silt loam; and the lower 41 inches is mottled gray and brown, very firm and brittle gravelly silt loam.

Typically the Norwich soil has a surface layer of very dark brown silt loam about 9 inches thick. The subsurface layer is gray channery silt loam 3 inches thick. The subsoil is 30 inches thick. The upper 4 inches of the subsoil is mottled light gray friable channery loam, and the lower 26 inches is mottled brown and reddish gray, very firm and brittle channery loam and channery fine sandy loam. The substratum to a depth of 60 inches is pinkish gray channery heavy silt loam.

Included with these soils in mapping are a few areas of Mucky peat and better drained soils on knolls and small areas of Wayland and Holly soils.

Permeability is slow and very slow, and available water capacity is low to moderate. In unlimed areas, reaction is very strongly acid to strongly acid in the upper part of the solum and strongly acid to neutral in the lower part and in the substratum. Surface runoff is very slow. A high water table is at the surface for long periods during wet seasons. Rooting depth is restricted by the high water table and the fragipan in the subsoil.

These soils are mainly used for hay, pasture, or woodland or they are idle.

These soils have poor potential for farming unless drained. They have fair potential for pasture and poor potential for woodland. The high water table and slow and very slow permeability limit most nonfarm uses.

If these soils are used for cultivated crops, the hazard of erosion is slight. If drained, the soils can be used occasionally for row crops. Excess water causes the soils to warm slowly in spring and delays tillage. Excess surface water can be removed by keeping natural drainageways open. Subsurface drains and open drains can be used where outlets are available.

If these soils are used for pasture, grazing when the soils are wet and overgrazing are major concerns in pasture management. If the soils are grazed when wet, the surface becomes compacted. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs. Periodic application of nutrients to maintain fertility are needed for optimum production.

A small acreage of this soil is wooded. Productivity is generally poor. Rooting depth is restricted by the high water table and the fragipan in the subsoil. Seedling loss is moderate to heavy. Use of equipment is restricted for most of the year because of the high water table. Machine planting in large areas is generally practical.

These soils are seriously limited for nonfarm uses by the high water table and the slow and very slow permeability. Wildlife habitat and open space are possible nonfarm uses. Capability subclass IVw.

CnB—Chippewa and Norwich extremely stony soils, 0 to 8 percent slopes. The deep, poorly drained, nearly level and gently sloping soils are in depressions and drainageways on uplands. Texture of the surface layer is channery loam, silt loam, and fine sandy loam. Slopes are slightly concave to mucky and are variable in length. Areas are usually long and narrow in shape and normally are 5 to more than 100 acres in size.

This unit is about 40 percent Chippewa soil, 40 percent Norwich soil, and 20 percent included soils. These soils are mapped together because they are similar in use and management. Individual mapped areas are generally mostly Chippewa soil or Norwich soil. In places both soils occur in the same area.

Typically, the Chippewa soil has a surface layer of very dark grayish brown channery silt loam about 7 inches thick. The subsurface layer is olive gray channery silt loam 4 inches thick. The subsoil is 49 inches thick. The upper 8 inches of the subsoil is mottled olive gray and gray, friable channery silt loam; and the lower 41 inches is mottled gray and brown, very firm and brittle gravelly silt loam and gravelly loam.

In a typical pedon of the Norwich soil, the surface layer is very dark brown channery silt loam about 8 inches thick. The subsurface layer is gray channery silt loam. The subsoil is 30 inches thick. The upper 16 inches of the subsoil is mottled, light gray, friable channery loam; and the lower 26 inches is mottled brown and reddish gray, very firm and brittle channery loam and channery fine sandy loam. The substratum to a depth of 60 inches is pinkish gray channery heavy silt loam.

Included with these soils in mapping are a few areas of mucky peat and better drained soils on knolls. Small areas of Wayland and Holly soils are included.

Permeability is slow and very slow, and available water capacity is low to moderate. Surface runoff is slow. The subsoil has a firm fragipan. A high water table is at or near the surface for long periods during wet seasons. Rooting depth is restricted by the high water table and the fragipan. In unlimed areas, reaction is very strongly acid to slightly acid in the upper part of the solum and strongly acid to neutral in the lower part and in the substratum.

Most areas of these soils are used for woodland. A few areas are used for developments.

The soils are too stony for cultivated crops and are poorly suited to grass and pasture. They have poor potential for trees. The surface stones, high water table, and slowly to very slowly permeable subsoil limit potential for most nonfarm uses.

These soils are not suited to cultivated crops or to pasture because of the numerous surface stones and the high water table. The cost of removing surface stones or trees and reducing the water table limits the potential for crops or pasture.

These soils are poorly suited to trees, but most areas are wooded. Productivity is poor for most species. Removing undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the high water table. Large surface stones interfere with seeding and harvesting.

These soils are severely limited for most nonfarm uses, including onsite waste disposal, by slow and very slow permeability, stony surface layers, and high water table. The high water table is a hazard for buildings with subsurface basements. Wildlife habitat and open space are possible nonfarm uses. Capability subclass VIIs.

CpA—Clymer loam, 0 to 3 percent slopes. This nearly level, deep, well drained soil is on broad plateaus. Slopes are generally smooth and are about 200 to 400 feet long. Areas are irregular in shape and are generally 5 to 20 acres in size.

Typically, the surface layer is dark grayish brown friable loam about 9 inches thick. The subsoil is 51 inches thick. The upper part of the subsoil is yellowish brown friable loam 13 inches thick; the middle part is strong brown, friable loam and clay loam 27 inches thick; and the lower part is strong brown, firm heavy clay loam 11 inches thick.

Included with this soil in mapping are a few areas of gravelly and stony Clymer soils and scattered areas of Dekalb and Meckesville soils. In a few areas, a soil that has an indistinct fragipan at a depth of about 30 inches is included.

Permeability is moderate, and available water capacity is moderate to high. Surface runoff is slow. The surface layer is less than 15 percent gravel. In unlimed areas, reaction is strongly acid to extremely acid throughout.

Most of the acreage of this soil is used for truck crops, farm crops, or hay or is idle, and some areas are used for woodland and recreation.

This soil has excellent potential for farming; however, at high elevation, the growing season is short and should be considered when selecting crops. This soil is well suited to pasture and trees. The potential for homesites and for most other nonfarm uses is good.

If this soil is used for cultivated crops, the hazard of erosion is slight. Crops respond well to fertilizer and to good management. Growing cover crops, using crop residue, and including hay in the cropping system help to maintain organic-matter content and good tilth.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production.

This soil is suited to trees, and a considerable acreage is wooded. Productivity is good. Management concerns are minor. Machine planting is practical in large areas.

This soil has few limitations for nonfarm uses. Capability class I.

CpB—Clymer loam, 3 to 8 percent slopes. This gently sloping, deep, well drained soil is on broad plateaus and ridges. Slopes are uniform to undulating and are about 250 to 500 feet long. Areas are irregular in shape and are mainly 5 to more than 20 acres in size.

Typically, the surface layer is dark brown friable loam 9 inches thick. The subsoil is 44 inches thick. The upper part of the subsoil is yellowish brown friable loam 10 inches thick; the middle part is strong brown friable loam and clay loam 25 inches thick; and the lower part is strong brown firm clay loam 9 inches thick. The substratum to a depth of 60 inches is strong brown very channery loam.

Included with this soil in mapping are a few small areas of stony, gravelly, and severely eroded Clymer soils. Small scattered areas of Meckesville, Dekalb, and Buchanan soils are also included. In a few areas, a soil that has an indistinct fragipan at a depth of about 30 inches is included.

Permeability is moderate, and available water capacity is moderate to high. Surface runoff is medium, and the hazard of erosion is moderate. The surface layer is less than 15 percent gravel. In unlimed areas, reaction is strongly acid to extremely acid throughout.

Most areas of this soil are used for truck and farm crops and for hay. The remaining areas are in woodland or are idle.

This soil has excellent potential for farming and is well suited to pasture and trees. The potential for homesites is good, and the limitations for onsite waste disposal are slight. This soil has good potential for most other nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Crops respond well to fertilizer and to good management. Stripcropping, minimum tillage, diversions, and sod waterways help to control erosion. Growing cover crops, using crop residue, and including hay in the cropping system help to maintain organic-matter content and good tilth. At high elevation, the growing season is short; this should be considered when selecting crops.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed for optimum production.

This soil is suited to trees, and a considerable acreage is wooded. Productivity is good. Management concerns are minor. Machine planting is practical in large areas.

This soil has few limitations for most nonfarm uses. However, the hazard of erosion is moderate when the soil

is disturbed. The soil also needs to be protected during construction. Capability subclass IIe.

CpC—Clymer loam, 8 to 15 percent slopes. This sloping, deep, well drained soil is on broad plateaus and on sides of ridges. Slopes are uniform to slightly concave and are about 200 to 450 feet long. Areas are irregular in shape and are mainly 5 to more than 15 acres in size.

Typically, the surface layer is dark brown, friable loam 8 inches thick. The subsoil is 43 inches thick. The upper part of the subsoil is yellowish brown, friable loam 7 inches thick; the middle part is strong brown, friable loam and clay loam 24 inches thick; and the lower part is strong brown, firm clay loam 12 inches thick. The substratum to a depth of 60 inches is strong brown very channery loam.

Included with this soil in mapping are a few small areas of a gravelly loam soil and severely eroded Clymer soils. Small scattered areas of Dekalb and Meckesville soils are also included.

Permeability is moderate, and available water capacity is moderate to high. Surface runoff is medium. The surface layer is less than 15 percent gravel. In unlimed areas, reaction is strongly acid to extremely acid throughout.

Most areas of this soil are used for farm crops, truck crops, and hay. Some areas are idle.

This soil has good potential for farming and is well suited to pasture and trees. The potential for homesites is fair, but the slope limits onsite waste disposal and the design and construction of homes. Slope is the main limitation for most other nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is severe. Crops respond well to fertilizer and to good management. Contour stripcropping, minimum tillage, diversions, and sod waterways help to control erosion. Growing cover crops, using crop residue, and including hay in the cropping system help to maintain the organic-matter content and good tilth. At high elevation, the growing season is short; this should be considered when selecting crops.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production.

This soil is suited to trees, but only a small acreage is wooded. Productivity is good. Management concerns are minor. However, constructing roads on the contour during harvesting reduces erosion. Machine planting is practical in large areas.

This soil is somewhat limited for nonfarm uses by slope. Slope is the main limitation for onsite waste disposal. Capability subclass IIIe.

CxB—Clymer extremely stony loam, 0 to 8 percent slopes. This nearly level to gently sloping, extremely stony, well drained soil is on the tops of broad plateaus and ridges. Slopes are generally smooth to slightly convex and are 200 to 700 feet long. Areas are irregular in shape and are about 5 to 40 acres in size.

Typically, the surface layer is dark brown loam about 6 inches thick. The subsoil is 54 inches thick. The upper part of the subsoil is yellowish brown loam 20 inches thick, and the lower part is strong brown heavy loam and clay loam 34 inches thick.

Included with this soil in mapping are a few areas of very stony and nonstony Clymer soils that have a loam or gravelly loam surface layer. Also included are scattered areas of Dekalb, Laidig, and Meckesville soils.

Permeability is moderate, and available water capacity is moderate to high. Surface runoff is slow. In unlimed areas, reaction is strongly acid to extremely acid throughout.

Most areas of this soil are in woodland. A few areas are used for recreation and housing developments.

This soil is too stony for cultivated crops and pasture. It is better suited to trees for which it has good potential. Numerous surface stones limit the potential for many nonfarm uses.

This soil is suited to trees, and most areas are wooded. Many cleared areas are reverting to trees. Removing undesirable species helps to increase production. Large surface stones interfere with equipment use and machine planting.

This soil is seriously limited for many nonfarm uses by extreme stoniness. The numerous surface stones seriously limit onsite waste disposal and homesites. Recreation for which the surface stones are not a limitation, wildlife habitat, and open space are possible nonfarm uses. Capability subclass VIIs.

CxC—Clymer extremely stony loam, 8 to 25 percent slopes. This sloping and moderately steep, extremely stony, well drained soil is on sides of ridges and broad plateaus. Slopes are generally uniform to convex and are 250 to 800 feet long. Areas are irregular in shape and are about 5 to 20 acres in size.

Typically, the surface layer is dark brown loam about 5 inches thick. The subsoil is 55 inches thick. The upper part of the subsoil is yellowish brown loam 21 inches thick, and the lower part is strong brown heavy loam and clay loam 34 inches thick.

Included with this soil in mapping are a few areas of very stony and nonstony Clymer soils that have a loam or gravelly loam surface layer. Also included are scattered areas of Dekalb, Laidig, and Meckesville soils.

Permeability is moderate, and available water capacity is moderate to high. Surface runoff is medium. In unlimed areas, reaction is strongly acid to extremely acid throughout.

Most areas of this soil are used for woodland. A few areas are used for recreation and housing developments.

This soil is too stony for cultivated crops and pasture. It is better suited to trees, for which it has good potential. Numerous surface stones limit the potential for many nonfarm uses.

This soil is suited to trees, and most areas are wooded. Many idle areas are reverting to trees. Removing undesirable species helps to increase production. Large surface stones interfere with equipment use and machine planting. Constructing roads on the contour during harvesting reduces erosion.

This soil is seriously limited for most nonfarm uses by extreme stoniness and sloping to moderately steep slopes. The numerous surface stones and slope limit homesites and onsite waste disposal. Recreation for which the surface stones and slope are not a limitation, wildlife habitat, and open space are possible nonfarm uses. Capability subclass VIIs.

Cy—Cut and fill land. These miscellaneous areas are throughout the county, mainly in the urbanized areas and in other smaller areas. Slopes range from 0 to 25 percent. Areas are scattered; they vary in size and are irregular in shape.

Cut and fill land consists of land that has been cut and areas of variable fill material. The soils have been disturbed or altered by earth-moving operations to the extent that all profile features are obliterated.

Included with this unit in mapping are scattered spots of undisturbed soils. Some small areas are covered with asphalt and concrete. The included soils generally occupy less than 10 percent of the areas.

Most of the miscellaneous area is used for commercial and housing developments, roads, military reservation, schools, railroads, athletic fields, and other uses.

Because the soil material is so variable, onsite investigation is needed for each specific area to determine management requirements. Generally, the material has too many coarse fragments to support plant growth. However, where Cut and fill land is used for commercial and housing developments, the soil material is generally able to support lawn grasses, ornamental trees, shrubs, and gardens if good quality topsoil is provided. For building sites, the material varies in suitability with the type of fill material and location. Not placed in a capability unit.

DxB—Dekalb extremely stony loam, 0 to 8 percent slopes. This nearly level and gently sloping, moderately deep, well drained soil is on the tops of prominent ridges and broad plateaus. Slopes are smooth and convex and are 300 to 800 feet long. Areas are usually irregular in shape and normally are 10 to 50 acres in size.

Typically, the surface layer is gray channery loam about 2 inches thick. The subsoil is 22 inches thick. The upper part of the subsoil is yellowish brown very channery loam 5 inches thick, and the lower part is yellowish brown very channery sandy loam 17 inches thick. The substratum is yellowish brown very channery sandy loam. Fine grained sandstone bedrock is at a depth of 32 inches.

Included with this soil in mapping are small areas of Dekalb soils where the surface stones have been removed. Also included are a few small areas of Dekalb very stony soils and scattered areas of Lordstown, Weikert, and Hazleton soils.

Permeability is rapid, water and available water capacity is low. In unlimed areas, reaction is strongly acid to extremely acid throughout. Surface runoff is slow to medium.

Most areas of this soil are used for woodland, and small areas are used for homesites and recreation.

This soil has very poor potential for farming because of surface stones. It is better suited to trees. The potential is poor for homesites, and it is poor for onsite waste disposal because of numerous large surface stones and the moderate depth to bedrock.

This soil is too stony for cultivated crops and pasture. It is better suited to woodland and to wildlife habitat.

The soil is fairly well suited to trees, and most of the acreage is wooded. Productivity is fair. Large surface stones interfere with equipment use and machine planting. Loss of seedlings is moderate.

This soil is limited for nonfarm uses by stoniness and moderate depth to bedrock. Stoniness and depth to bedrock seriously limit onsite waste disposal and homesites. During construction on this soil, practices are needed to control erosion and sediment. Capability subclass VIIs.

DxC—Dekalb extremely stony loam, 8 to 25 percent slopes. This sloping and moderately steep, moderately deep, well drained soil is on the upper parts of sides of ridges and in sloping areas on broad plateaus. Slopes are rolling to hilly and are about 350 to 1,000 feet long. Areas are usually irregular in shape and normally are 10 to 60 acres in size.

Typically, the surface layer is gray channery loam about 2 inches thick. The subsoil is about 22 inches thick. The upper part is yellowish brown very channery loam 5 inches thick, and the lower part is yellowish brown very channery sandy loam 17 inches thick. The substratum is yellowish brown very channery sandy loam. Fine grained sandstone bedrock is at a depth of 30 inches.

Included with this soil in mapping are small areas of Dekalb soils where the surface stones have been removed. Also included are a few small areas of Dekalb very stony loam and Hazleton and Clymer soils and a few small areas of a soil in which bedrock is at a depth of less than 20 inches.

Permeability is rapid, and available water capacity is low. In unlimed areas, reaction is strongly acid to extremely acid throughout. Surface runoff is medium to rapid.

Most areas of this soil are used for woodland, and small areas are used for homesites and recreation.

This soil has very poor potential for farming because of slope and surface stones. It is better suited to trees. The potential is poor for homesites, and it is poor for onsite waste disposal because of numerous large surface stones, moderate depth to bedrock, and sloping and moderately steep slopes.

This soil is too stony for cultivated crops and for pasture. It is better suited to woodland and to wildlife habitat.

This soil is fairly well suited to trees, and most of the acreage is wooded. Productivity is fair. Large surface

stones and slope interfere with equipment use and machine planting. Loss of seedlings is moderate.

This soil is limited for nonfarm uses by stoniness, slope, and moderate depth to bedrock. These characteristics seriously limit onsite waste disposal and homesites. During construction on this soil, erosion- and sediment-control practices are needed. Capability subclass VIIs.

DxE—Dekalb extremely stony loam, 25 to 80 percent slopes. This steep and very steep, moderately deep, well drained soil is on the sides of ridges, mountains, and plateaus. Slopes are uniform to complex and are about 350 to 1,100 feet long. Areas are usually irregular in shape and normally are 10 to 75 acres in size.

Typically, the surface layer is gray channery loam about 2 inches thick. The subsoil is about 22 inches thick. The upper part of the subsoil is yellowish brown very channery loam 5 inches thick, and the lower part is yellowish brown very channery sandy loam 17 inches thick. The substratum is yellowish brown very channery sandy loam. Fine grained sandstone bedrock is at a depth of 30 inches.

Included with this soil in mapping are small areas of Dekalb soils where the surface stones have been removed. Also included are a few small areas of Dekalb very stony loam and Hazleton and Clymer soils and a few small areas of a soil in which bedrock is at a depth of less than 20 inches.

Permeability is rapid, and available water capacity is low. In unlimed areas, reaction is strongly acid to extremely acid throughout. Surface runoff is rapid to very rapid.

Most areas of this soil are used for woodland.

This soil has very poor potential for farming because of slope and surface stones. It is better suited to trees. The potential is poor for homesites, and it is poor for onsite waste disposal because of numerous large surface stones, moderate depth to bedrock, and steep and very steep slopes.

This soil is too stony and steep for cultivated crops and for pasture. It is better suited to woodland and to wildlife habitat. The soil is fairly well suited to trees, and most of the acreage is wooded. Productivity is fair. Large surface stones and slope interfere with equipment use and machine planting. Loss of seedlings is moderate.

This soil is limited for nonfarm uses by stoniness, slope, and moderate depth to bedrock. These characteristics seriously limit onsite waste disposal and homesites. During construction on this soil, erosion- and sediment-control practices are needed. Capability subclass VIIs.

ExB—Empeyville extremely stony sandy loam, 0 to 8 percent slopes. This nearly level and gently sloping, deep, moderately well drained to somewhat poorly drained soil is on broad plateaus. Slopes are undulating to slightly concave and are generally 300 to 900 feet long. Areas are irregular in shape and are 10 to more than 80 acres in size.

Typically, the surface layer is pinkish gray gravelly loamy fine sand about 3 inches thick. The subsoil is 57 inches thick. The upper part of the subsoil is reddish brown and strong brown, friable very fine sandy loam and gravelly fine sandy loam 15 inches thick; the middle part is pale brown, friable gravelly sandy loam 4 inches thick; and the lower part is yellowish brown and grayish brown, firm to very firm and brittle gravelly sandy loam, gravelly fine sandy loam, and gravelly loamy fine sand 38 inches thick.

Included with this soil in mapping are small areas of a soil that is similar to Empeyville soils but that is poorly drained. A few scattered areas of Empeyville soils from the surface of which stones have been removed and a few small areas of Wurtsboro and Worth soils are also included.

Permeability is slow, and available water capacity is low to moderate. Surface runoff is slow. The subsoil has a fragipan. A high water table is at a depth of 12 to 36 inches for most of the year. Rooting depth is restricted by the fragipan and the seasonal high water table. In unlimed areas, reaction is very strongly acid and strongly acid.

Most of the acreage of this soil is used for woodland. A few areas are used for developments.

This soil has fair potential for trees. The stony surface, seasonal high water table, and slowly permeable fragipan limit the potential for most nonfarm uses.

This soil is too stony and wet for cultivated crops and pasture. It is better suited to trees.

Most of the acreage is wooded. Removing undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting is limited by the numerous large surface stones.

This soil is severely limited for most nonfarm uses, including onsite waste disposal, by slow permeability, the seasonal high water table, and the stony surface. The seasonal high water table and stoniness are potential hazards for buildings with subsurface basements. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basements. Capability subclass VIIs.

HaB—Hartleton channery silt loam, 2 to 8 percent slopes. This nearly level and gently sloping, deep, well drained soil is on hilltops and ridges. Slopes are undulating and are about 200 to 600 feet long. Areas are broad in shape and are mainly 5 to 15 acres in size.

Typically, the surface layer is very dark grayish brown channery silt loam 2 inches thick. The subsoil is 35 inches thick. The upper part of the subsoil is brownish yellow, friable channery silt loam 6 inches thick; the middle part is yellowish brown, friable channery silt loam and shaly silt loam 15 inches thick; and the lower part is yellowish brown, friable very shaly silt loam and very channery loam 14 inches thick. The substratum is yellowish brown, friable very channery loam. Brown sandstone bedrock is at a depth of 47 inches.

Included with this soil in mapping are a few small areas of Hartleton soils that have a stony, channery loam, or flaggy silt loam surface layer and areas where slopes are

less than 2 percent. Small scattered areas of Allenwood, Weikert, and Watson soils are also included.

Permeability is moderate and available water capacity is moderate. Surface runoff is medium. The surface layer is more than 15 percent channers. In unlimed areas, reaction is strongly acid and very strongly acid throughout.

Most areas of this soil are used for crops. Small areas are used for woodland, and some areas are idle.

This soil has very good potential for farming and is well suited to pasture and trees. The potential for homesites is mainly good. Potential is good for most other nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Crops respond well to fertilizer and to good management. Stripcropping, minimum tillage, diversions, and sod waterways help to control erosion. Growing cover crops, using crop residue, and including hay in the cropping system help to maintain organic-matter content and good tilth. The gravelly surface interferes with seeding of small grain and mechanical harvesting of some crops such as potatoes.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pasture are the chief management needs. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production.

This soil is suited to trees, but only a small acreage is wooded. Productivity is good. Management concerns are minor. Machine planting is practical in large areas.

This soil is somewhat limited for nonfarm uses by the coarse fragments. Bedrock at a depth of 40 to 60 inches limits onsite waste disposal. Capability subclass IIe.

HaC—Hartleton channery silt loam, 8 to 20 percent slopes. This sloping and moderately steep, deep, well drained soil is on the upper parts of sides of ridges and lower parts of foot slopes of ridges. Slopes are generally hilly and are about 200 to 650 feet long. Areas are irregular in shape and are 3 to 12 acres in size.

Typically, the surface layer is dark brown, friable channery loam 8 inches thick. The subsoil is 27 inches thick. The upper part of the subsoil is yellowish brown, friable channery silt loam 12 inches thick; the middle part is yellowish brown, friable very channery silt loam 6 inches thick; and the lower part is yellowish brown very channery loam 9 inches thick. The substratum is yellowish brown, friable very channery loam. Brown sandstone bedrock is at a depth of 45 inches.

Included with this soil in mapping are a few areas of severely eroded and very stony Hartleton soils and areas where the surface layer is flaggy silt loam. Scattered areas of Allenwood, Weikert, and Watson soils are also included.

Permeability is moderate and available water capacity is moderate. Surface runoff is medium to rapid. The surface layer is more than 15 percent channers. In unlimed areas, reaction is strongly acid and very strongly acid throughout.

Most of the acreage of this soil is used for crops and small areas are used for woodland and pasture. A few areas are idle.

This soil has very good potential for farming and is well suited to pasture and trees. The potential for homesites is mainly good. Slope is the main limitation for most other nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is moderate to severe. Crops respond well to fertilizer and to good management. Stripcropping, minimum tillage, sod waterways, and diversions where needed help to reduce runoff and control erosion. Growing cover crops, using crop residue, and including hay in the cropping system help to maintain organic-matter content and good tilth. The channery surface interferes with the seeding of small grain and the mechanical harvesting of some crops such as potatoes.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production.

This soil is suited to trees, but only a very small acreage is wooded. Productivity is good. The main management concern is erosion in disturbed areas. Constructing roads on the contour during harvesting minimizes erosion. Machine planting is practical in large areas.

This soil is somewhat limited for nonfarm uses by coarse fragments, slope, and bedrock at a depth of 20 to 40 inches. Bedrock at a depth of 40 to 60 inches and slope limit onsite waste disposal. Capability subclass IIIe.

HxB—Hazleton extremely stony sandy loam, 0 to 8 percent slopes. This nearly level and gently sloping, extremely stony, well drained soil is on the tops of broad plateaus, ridges, and mountains. Slopes are generally smooth and slightly convex and are about 300 to 700 feet long. Areas are irregular in shape and are about 10 to 50 acres in size.

Typically, the surface layer is brown channery sandy loam about 3 inches thick. The subsoil is 28 inches thick. The upper part of the subsoil is brown and yellowish brown channery sandy loam 15 inches thick, and the lower part is strong brown channery coarse sandy loam 13 inches thick. The substratum, to a depth of 60 inches, is brown very channery very coarse sandy loam.

Included with this soil in mapping are a few areas of Hazleton soils from which the surface stones have been removed. Also included are scattered areas of Dekalb and Buchanan soils.

Permeability is moderately rapid to rapid, and available water capacity is moderate. Surface runoff is slow. In unlimed areas, reaction is strongly acid to extremely acid.

Most areas of this soil are used for woodland. A few areas are used for recreation and developments.

This soil is too stony for cultivated crops and pasture. It is better suited to trees, for which it has good potential. Moderately rapid to rapid permeability, numerous surface

stones, and rock fragments limit the potential for many nonfarm uses.

This soil is suited to trees. Most areas of this soil are wooded, and many cleared areas are reverting to trees. Removing undesirable species helps to increase production. Large surface stones interfere with equipment selection and machine plantings.

This soil is seriously limited for most nonfarm uses by extreme stoniness and moderately rapid to rapid permeability. The numerous surface stones seriously limit onsite waste disposal and homesites. Recreation for which the surface stones are not a limitation, wildlife habitat, and open space are possible nonfarm uses. Capability subclass VIIs.

HxC—Hazleton extremely stony sandy loam, 8 to 25 percent slopes. This sloping and moderately steep, extremely stony, well drained soil is on the upper parts of sides and foot slopes of ridges, plateaus, and mountains. Slopes are generally rolling to hilly and are generally 200 to 800 feet long. Areas are usually long and narrow in shape and are about 15 to 65 acres in size.

Typically, the surface layer is brown channery sandy loam about 3 inches thick. The subsoil is 28 inches thick. The upper part of the subsoil is brown and yellowish brown channery sandy loam 15 inches thick, and the lower part is strong brown channery coarse sandy loam 13 inches thick. The substratum, to a depth of 60 inches, is brown very channery very coarse sandy loam.

Included with this soil in mapping are a few areas of Hazleton soils from which the surface stones have been removed. Also included are scattered areas of Dekalb and Buchanan soils.

Permeability is moderately rapid to rapid, and available water capacity is moderate. Surface runoff is medium to rapid. In unlimed areas, reaction is strongly acid to extremely acid.

Most areas of this soil are used for woodland. A few areas are used for recreation and housing developments.

This soil is too stony for cultivated crops and pasture. It is better suited to trees for which it has good potential. Moderately rapid to rapid permeability, numerous surface stones, and rock fragments limit the potential for many nonfarm uses.

This soil is suited to trees, and most areas are wooded. Many cleared areas are reverting to trees. Removing undesirable species helps to increase production. Large surface stones and slope interfere with equipment use and machine planting.

This soil is seriously limited for most nonfarm uses by extreme stoniness, sloping to moderately steep slopes, and moderately rapid to rapid permeability. The numerous surface stones and slope seriously limit onsite waste disposal and homesites. Recreation for which surface stones and slope are not a limitation, wildlife habitat, and open space are possible nonfarm uses. Capability subclass VIIs.

Hy—Holly silt loam. This deep, poorly drained, nearly level soil is on flood plains adjacent to major streams. Slopes are nearly flat to slightly concave and are about 100 to 250 feet long. Areas are generally long and narrow in shape and normally are 2 to 12 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer is dark grayish brown silt loam 3 inches thick. The subsoil is 30 inches thick. It is light brownish gray, very fine sandy loam and loam. The substratum, to a depth of 60 inches, is gray gravelly loam.

Included with this soil in mapping are small areas where the surface layer is thick deposits of dark grayish brown sediment. Also included are scattered areas of Wayland and Sheffield soils.

Permeability is moderate, and available water capacity is moderate. In unlimed areas, reaction is medium acid to neutral throughout. A high water table is at a depth of 6 inches for most of the year. Surface runoff is slow. Rooting depth is restricted by the high water table.

Most areas of this soil are used for pasture, hay, or woodland.

If properly drained, this soil can be used occasionally for row crops. This soil has good potential for pasture and fair potential for trees. The high water table and flooding limits the potential for many nonfarm uses. This soil has some potential for wildlife habitat and recreation.

If this soil is used for cultivated crops, the hazard of erosion is slight. Excess water causes the soil to warm slowly in spring. Crops can be damaged by floodwaters following intensive rainfalls. Excess surface water can be removed by keeping natural drainageways open. Open drains, where outlets are available, can be used to improve drainage.

If this soil is used for pasture, grazing when the soil is wet and overgrazing are major concerns in pasture management. Grazing when the soil is wet compacts the surface. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs.

This soil is fairly well suited to moisture-tolerant trees. A small acreage is wooded. Potential productivity is fair. Rooting depth is restricted by the high water table. Use of equipment is also restricted most of the year because of the high water table. Machine planting in large areas is practical.

This soil is severely limited for most nonfarm uses by the high water table and flooding. Capability subclass IIIw.

KaB—Kedron silt loam, 2 to 8 percent slopes. This nearly level and gently sloping, moderately well drained soil is on the tops of broad plateaus and ridges. Slopes are generally smooth and slightly concave and are 250 to 550 feet long. Areas are irregular in shape and are about 3 to 15 acres in size.

Typically, the surface layer is brown, friable silt loam about 10 inches thick. The subsoil is about 36 inches thick. The upper part of the subsoil is yellowish red and reddish brown, friable heavy silt loam 14 inches thick; and

the lower part is reddish brown and yellowish red, very firm and brittle heavy silt loam, gravelly loam, and gravelly silt loam 22 inches thick. The substratum, to a depth of 60 inches, is reddish brown gravelly loam.

Included with this soil in mapping are a few areas of somewhat poorly drained soils and a few areas where the surface layer is more than 15 percent gravel or channers. Also included are scattered areas where the slope is less than 2 percent and a few small areas of Meckesville and Leck Kill soils.

Permeability is slow, and available water capacity is moderate. Surface runoff is medium. The subsoil has a slowly permeable fragipan. A high water table is at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan and the seasonal high water table. In unlimed areas, reaction is extremely acid to strongly acid throughout.

Most areas of this soil are used for cultivated crops, pasture, and hay. A few areas are used for woodland and homesites.

This soil has good potential for farming, for pasture, and for woodland. It is better suited to grass and pasture but can be used for row crops if properly managed. The seasonal high water table and slowly permeable subsoil limit the potential for many nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Contour stripcropping, minimum tillage, sod waterways, cover crops, and grasses and legumes in the cropping system help to reduce runoff and control erosion. Diversions and covered drains are needed to help to remove excess water and allow timely tillage.

If this soil is used for pasture, overgrazing and grazing when the soil is wet are major concerns in pasture management. Grazing when the soil is wet compacts the surface layer. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs.

This soil is suited to trees. A small acreage is wooded, and many idle areas are reverting to trees. Removing undesirable species helps to increase production. Constructing roads on the contour during harvesting reduces erosion. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting is practical in large areas.

This soil is seriously limited for most nonfarm uses, including onsite waste disposal, by slow permeability and the seasonal high water table. The seasonal high water table is a potential hazard for buildings with subsurface basements. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass IIw.

KaC—Kedron silt loam, 8 to 15 percent slopes. This sloping, deep, moderately well drained soil is on sides of ridges around natural drainageways. Slopes are generally uniform to concave and about 250 to 450 feet long. Areas are irregular in shape and are about 3 to more than 8 acres in size.

Typically the surface layer is brown, friable silt loam about 10 inches thick. The subsoil is about 36 inches thick. The upper part of the subsoil is yellowish red and reddish brown, friable heavy silt loam 14 inches thick; the middle part is reddish brown, very firm and brittle heavy silt loam 5 inches thick; and the lower part is yellowish red, very firm and brittle gravelly loam and silt loam 17 inches thick. The substratum, to a depth of 60 inches, is reddish brown, firm and brittle gravelly loam.

Included with this soil in mapping are a few areas of a similar soil that is somewhat poorly drained and a few areas of Kedron soils that have a gravelly or channery surface. Also included are scattered areas of Meckesville and Leck Kill soils.

Permeability is slow, and the available water capacity is moderate. Surface runoff is medium. The subsoil has a slowly permeable fragipan. A high water table is at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the very firm fragipan. In unlimed areas, reaction is extremely acid to strongly acid throughout.

Most areas of this soil are used for general farm crops, pasture, and grassland. A few areas are used for woodland, and a few areas are used for homesites.

This soil is better suited to grass and pasture, but it can be used for crops if properly managed. It has good potential for pasture and for trees. The seasonal high water table, slowly permeable subsoil, and slope limit the potential for many nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is severe. Contour stripcropping, minimum tillage, sod waterways, cover crops, and grasses and legumes in the cropping system help to reduce runoff and control erosion. Diversions and covered drains are needed to help to remove excess water and allow timely tillage.

If this soil is used for pasture, overgrazing and grazing when the soil is wet are major concerns in pasture management. Grazing when the soil is wet compacts the surface. Proper stocking rates to maintain key plant species, rotation of pasture, deferment of grazing, and restriction of grazing during wet periods are the chief management needs.

This soil is suited to trees, but only a small acreage is wooded. Many idle areas are reverting to trees. Removing undesirable species helps to increase production. Constructing roads on the contour during harvesting reduces erosion. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting is practical in large areas.

This soil is severely limited for most nonfarm uses, including onsite waste disposal, by slow permeability and the seasonal high water table. The seasonal high water table is a potential hazard for buildings with subsurface basements. Buildings with basements need foundation

drains with proper outlets to prevent seepage of water into the basements. Capability subclass IIIe.

KdB—Kedron very stony loam, 0 to 8 percent slopes. This nearly level and gently sloping, deep, moderately well drained soil is on the tops of ridges and plateaus. Slopes are generally smooth to undulating and are 300 to 700 feet long. Areas are irregular in shape and are about 5 to 20 acres in size.

Typically the surface layer is dark brown silt loam about 6 inches thick. The subsoil is 39 inches thick. The upper part of the subsoil is yellowish red and reddish brown, friable silt loam 18 inches thick; and the lower part is reddish brown, and yellowish red, very firm and brittle gravelly loam 21 inches thick. The substratum, to a depth of 60 inches, is reddish brown, firm and brittle gravelly loam.

Included with this soil in mapping are a few areas of Kedron soils on steeper slopes and areas of stony Kedron soils. Also included are scattered areas of a somewhat poorly drained soil.

Permeability is slow, and the available water capacity is moderate. Surface runoff is slow to medium. The subsoil has a slowly permeable fragipan. Rooting depth is restricted by the fragipan. In unlimed areas, reaction is extremely acid to strongly acid throughout.

Most areas of this soil are used for woodland. A few areas are used for recreation and homesites.

This soil is too stony for cultivated crops and pasture. It is better suited to trees, for which it has good potential. Slow permeability and surface stones limit the potential for many nonfarm uses.

This soil is suited to trees. Most areas are wooded and many idle areas are reverting to trees. Removing undesirable species helps to increase production. Large surface stones interfere with equipment selection and machine planting. Use of equipment is restricted during wet seasons because of the seasonal high water table.

This soil is seriously limited for many nonfarm uses, including onsite waste disposal, by slow permeability, seasonal high water table, and surface stones. The seasonal high water table is a potential hazard for buildings with basements. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basements. Capability subclass VIs.

KvB—Klinesville channery silt loam, 3 to 8 percent slopes. This gently sloping, well drained, shallow soil is on ridgetops. Slopes are smooth and are 200 to 500 feet long. Areas are irregular in shape and normally are 3 to 12 acres in size.

Typically, the surface layer is dark reddish brown channery silt loam about 6 inches thick. The subsoil is reddish brown very channery silt loam about 9 inches thick. The upper 4 inches of the substratum is weak red shale fragments with brown silt coatings, and the lower 29 inches is dusky red fragments with patches of silt and clay. Thin bedded siltstone and shale bedrock is at a depth of 48 inches.

Included with this soil in mapping are small areas of moderately deep soils and severely eroded and very channery Klinesville soils. Small areas of Leck Kill and Weikert soils are also included.

Permeability is moderately rapid and available water capacity is very low. In unlimed areas, reaction is very strongly acid to medium acid throughout. Surface runoff is medium. Rooting depth is restricted by the bedrock.

This soil is used mainly for crops and hay. Some areas are idle, and some are used for woodland.

This soil has poor potential for farming. It has fair potential for pasture and for woodland. Depth to bedrock and coarse fragments limit the potential for many nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Further erosion results in a shallower rooting depth and lower available water capacity for plants. Minimum tillage, diversions, cover crops, and grasses and legumes in the cropping system reduce runoff and control erosion. Stripcropping can be used where the topography is suitable. In places, bedrock hinders the construction of diversions. Returning some crop residue and manure to the surface layer helps to maintain organic-matter content and reduce the tendency of the soil to clod and crust.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production.

Many areas of this soil are wooded. Productivity of trees is fair, and rooting depth is restricted by bedrock. Loss of seedlings is moderate because of the very low available water capacity. Machine planting in large areas is generally practical.

This soil is limited for nonfarm uses by depth to bedrock, coarse fragments, and very low available water capacity. The shallow depth to the underlying rock seriously limits onsite waste disposal. When this soil is disturbed for construction, management practices are needed to control erosion and sediment. Capability subclass IIIe.

KvC—Klinesville channery silt loam, 8 to 15 percent slopes. This sloping, shallow, well drained soil is on the upper parts of sides of ridges. Slopes are rolling and are 200 to 900 feet long. Areas are irregular is shape and normally are about 3 to 10 acres in size.

Typically, the surface layer is dark reddish brown channery silt loam about 6 inches thick. The subsoil is reddish brown very channery silt loam 9 inches thick. The upper 4 inches of the substratum is weak red shale fragments with silt coatings and the lower 29 inches is dusky red fragments with patches of silt and clay. Thin bedded siltstone and shale bedrock is at a depth of 48 inches.

Included with this soil in mapping are small areas of soils in which bedrock is about a depth of 20 inches. Also included are small areas of severely eroded and very channery Klinesville soils and Leck Kill and Weikert soils.

Permeability is moderately rapid, and available water capacity is very low. In unlimed areas, reaction is very strongly acid to medium acid throughout. Surface runoff is moderate to rapid. Rooting depth is restricted by the bedrock.

This soil is used mainly for crops, grassland, and pasture. A few areas are used for woodland or homesites.

This soil has poor potential for farming, fair to good potential for pasture, and fair potential for woodland. Depth to bedrock, slope, and coarse fragments limit the potential for many nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is severe. Further erosion results in a shallower rooting depth and lower available water capacity for plants. Minimum tillage, diversions, cover crops, and grasses and legumes in the cropping system reduce runoff and control erosion. Stripcropping can be used where the topography is suitable. In places, bedrock hinders the construction of diversions. Returning some crop residue and manure to the surface layer helps to maintain organic-matter content and reduce the tendency of the soil to clod and crust.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production.

Many areas of this soil are wooded. Productivity is poor to fair, and rooting depth is restricted by bedrock. Loss of seedlings is a hazard because of the depth to bedrock and very low available water capacity. Machine planting in large areas is generally practical.

This soil is limited for nonfarm uses by slope, depth to bedrock, and coarse fragments. The shallow depth to the underlying rock seriously limits onsite waste disposal. When this soil is disturbed for construction, management practices are needed to control erosion and sediment. Capability subclass IVe.

KvD—Klinesville channery silt loam, 15 to 25 percent slopes. This moderately steep, well drained, shallow soil is on the sides of ridges. Slopes are 250 to 850 feet long. Areas are long and narrow in shape and normally are 4 to 14 acres in size.

Typically, the surface layer is dark reddish brown channery silt loam about 6 inches thick. The subsoil is reddish brown very channery silt loam 9 inches thick. The upper 4 inches of the substratum is weak red shale fragments with silt coatings. The lower 29 inches is dusky red shale fragments with patches of silt and clay. Thin bedded siltstone and shale bedrock is at a depth of 48 inches.

Included with this soil in mapping are small areas of severely eroded Klinesville soils. Also included are a few small areas of Leck Kill and Weikert soils.

Permeability is moderately rapid, and available water capacity is very low. In unlimed areas, reaction is very strongly acid to medium acid throughout. Surface runoff is very rapid. Rooting depth is restricted by the bedrock.

This soil is used mainly for woodland.

This soil has very poor potential for farming. Depth to bedrock, slope, and coarse fragments limit the potential for most nonfarm uses.

This soil is not suited to cultivated crops or pasture, because of very low available water capacity, moderately steep slopes, and very severe hazard of erosion. Further erosion results in a shallower rooting depth and lower available water capacity for plants.

Most of the acreage of this soil is wooded. Productivity for trees is fair to poor, and rooting depth is restricted by shale bedrock. Loss of seedlings is a hazard because of the very low available water capacity. Constructing roads on the contour during harvesting helps to reduce erosion. Machine planting is practical in large areas.

This soil is limited for nonfarm uses by slope, depth to shale bedrock, coarse fragments, and very low available water capacity. The shallow depth to the underlying rock and slope seriously limits onsite waste disposal. When this soil is disturbed for construction, management practices are needed to control erosion and sediment. Capability subclass VIe.

LaB—Lackawanna channery loam, 2 to 8 percent slopes. This nearly level and gently sloping, well drained soil is in broad areas on ridgetops and plateaus. Slopes are undulating and are about 300 to 650 feet long. Areas are irregular in shape and normally are 3 to 20 acres in size.

Typically, the surface layer is dark reddish brown channery silt loam about 9 inches thick. The subsoil is 66 inches thick. The upper part of the subsoil is reddish brown, friable channery loam 24 inches thick; and the lower part is a weak red, very firm and brittle channery loam fragipan 42 inches thick.

Included with this soil in mapping, in the southeastern part of the county, are small areas of a soil that is similar to this Lackawanna soil but that is less acid. Also included are small areas of gravelly, flaggy, and very stony Lackawanna soils and scattered spots of Bath and Wellsboro soils.

Permeability is moderate above the fragipan and slow in the fragipan. Available water capacity is low to moderate. In unlimed areas, reaction is extremely acid and very strongly acid throughout. Although the soil is well drained, a temporary perched water table is present in wet seasons. Surface runoff is medium. Rooting depth is restricted by the fragipan in the subsoil.

Most areas of this soil are developed for homesites and recreation or are left idle. Small areas are used for cultivated crops.

This soil has good potential for farming and is well suited to pasture and trees. The potential is poor for homesites with onsite sewage disposal because of the slow permeability in the fragipan, but potential is good if a public sewage disposal system is available.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Minimum tillage cover crops, and

grasses and legumes in the cropping system reduce runoff and control erosion. Stripcropping can be used where the topography is suitable. Returning some crop residue to the surface layer helps to maintain organic-matter content and reduce the tendency of this soil to clod and crust.

If this soil is used for pasture, proper stocking rates to maintain desirable plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production.

This soil is suited to trees, but only a small acreage is wooded. Productivity is good, but rooting depth is restricted by the fragipan. Management concerns are minor. Machine planting is practical in large areas.

This soil is somewhat limited for nonfarm uses by slow permeability in the subsoil and channery fragments on the surface. Slow permeability seriously limits onsite waste disposal. During construction, erosion- and sediment-control practices are needed. Capability subclass IIe.

LaC—Lackawanna channery loam, 8 to 15 percent slopes. This sloping, well drained soil is in broad areas on ridgetops and plateaus. Slopes are rolling and are 250 to more than 650 feet long. Areas are irregular in shape and generally are 3 to 15 acres in size. Some areas are larger than 40 acres.

Typically, the surface layer is reddish brown channery loam about 8 inches thick. The subsoil is about 62 inches thick. The upper part of the subsoil is reddish brown, friable channery loam 22 inches thick; and the lower part is a weak red, very firm channery loam fragipan 40 inches thick.

Included with this soil in mapping, in the southeastern part of the county, are some areas of soil that is similar to this Lackawanna soil but that is less acid. Also included are small areas of Bath and Wellsboro soils and a few small areas of flaggy and very stony Lackawanna soils.

Permeability is moderate above the fragipan and slow in the fragipan. Available water capacity is low to moderate. In unlimed areas, reaction is extremely acid and very strongly acid throughout. Although the soil is well drained, a temporary perched water table is present in wet seasons. Surface runoff is medium to rapid. Rooting depth is restricted by the fragipan in the subsoil.

Most areas of this soil are used for homesites or are left idle. Small areas are used for general farm crops.

This soil has good potential for farming and is well suited to pasture and trees. The potential is fair for homesites, but it is poor for onsite waste disposal because of the slow permeability and slope.

If this soil is used for cultivated crops, the hazard of erosion is severe. Contour strips, diversions, minimum tillage, cover crops, and grasses and legumes in the cropping system reduce runoff and control erosion. Returning some crop residue to the surface layer helps to maintain organic-matter content and reduce the tendency of this soil to clod and crust.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production.

This soil is suited to trees, but only a small acreage is wooded. Many idle areas are reverting to trees. Productivity is good, but rooting depth is restricted by the fragipan. Management concerns are minor. Machine planting is practical in large areas. Constructing roads on the contour during harvesting reduces erosion.

This soil is somewhat limited for nonfarm uses by slow permeability in the subsoil, slope, and fragments on the surface. Slow permeability and slope limit onsite waste disposal. During construction on this soil, erosion- and sediment-control practices are needed. Capability subclass IIIe.

LaD—Lackawanna channery loam, 15 to 25 percent slopes. This moderately steep, deep, well drained soil is on tops and sides of broad ridges and plateaus. Slopes are rolling and are 200 to 700 feet long. Areas are irregular in shape and normally are 2 to 14 acres in size.

Typically, the surface layer is reddish brown channery loam about 7 inches thick. The subsoil is about 60 inches thick. The upper part of the subsoil is reddish brown, friable channery loam 23 inches thick; and the lower part is a weak red, very firm and brittle channery loam fragipan 37 inches thick.

Included with this soil in mapping are small areas of Bath and Wellsboro soils and a few areas of flaggy and very stony Lackawanna soils. Also included, in the southeastern part of the county, are a few areas of a soil that is similar to this Lackawanna soil but that is less acid.

Permeability is moderate above the fragipan and slow in the fragipan. Available water capacity is low to moderate. In unlimed areas, reaction is extremely acid and very strongly acid throughout. Although the soil is well drained, a temporary perched water table is present in wet seasons. Surface runoff is rapid. Rooting depth is restricted by the fragipan in the subsoil.

Most areas of this soil are used for homesites or are left idle. Small areas are used for crops and pasture.

This soil has fair potential for farming and is well suited to pasture and trees. The potential is poor for homesites, and it is poor for onsite waste disposal because of slow permeability and slope.

If cultivated crops are grown, hazard of erosion is severe. Contour stripcropping, minimum tillage, cover crops, and grasses and legumes in the cropping system reduce runoff and control erosion. Returning some crop residue to the surface layer helps to maintain organic matter content and reduce the tendency of this soil to clod and crust.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nu-

trients maintain fertility and are needed to obtain optimum production.

This soil is suited to trees, but only a small acreage is wooded. Productivity is good, but rooting depth is restricted by the fragipan. Management concerns are related to slope. Machine planting is practical in large areas. Constructing roads on the contour during harvesting reduces erosion.

This soil is somewhat limited for nonfarm uses by slow permeability in the subsoil, slope and rock fragments on the surface. Slow permeability and slope seriously limit onsite waste disposal. During construction on this soil, erosion- and sediment-control practices are needed. Capability subclass IVe.

LbB—Lackawanna extremely stony loam, 0 to 8 percent slopes. This nearly level and gently sloping, extremely stony, well drained soil is on the tops of broad ridges and plateaus. Slopes are generally uniform to undulating and are 300 to 900 feet long. Areas are irregular in shape and are about 5 to 45 acres in size.

Typically, the surface layer is pinkish gray channery loam 1 inch thick. The subsoil is about 74 inches thick. The upper part of the subsoil is strong brown and brown, friable channery loam about 11 inches thick; the middle part is reddish brown, friable channery loam about 21 inches thick; and the lower part is a weak red, very firm and brittle channery loam fragipan about 42 inches thick.

Included with this soil in mapping in the southeastern part of the county, are a few areas of a soil that is similar to this Lackawanna soil but that is slightly higher in reaction. Also included are small areas of Bath and Wellsboro soils and scattered areas of channery and very stony Lackawanna soils.

Permeability is slow, and available water capacity is low to moderate. Surface runoff is slow. The subsoil has a very firm fragipan. Rooting depth is restricted by the fragipan. In unlimed areas, reaction is extremely acid and very strongly acid throughout.

Most areas of this soil are used for woodland. A few areas are used for homesites and recreation.

This soil is too stony for cultivated crops and pasture. It is better suited to trees, for which it has good potential. Slow permeability, surface stones, and coarse fragments limit the potential for many nonfarm uses.

This soil is suited for trees. Most areas are wooded, and many idle areas are reverting to trees. Removing undesirable species helps to increase production. Large surface stones interfere with equipment use and machine planting.

This soil is seriously limited for many nonfarm uses by slow permeability and numerous surface stones. Slow permeability in the fragipan and the numerous surface stones seriously limit onsite waste disposal. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass VIIs.

LbC—Lackawanna extremely stony loam, 8 to 25 percent slopes. This sloping and moderately steep, extremely stony, well drained soil is on the sides of broad ridges and plateaus. Slopes are generally rolling to hilly and are 350 to 1,100 feet long. Areas are irregular in shape and are about 6 to 60 acres in size.

Typically, the surface layer is pinkish gray channery loam 1 inch thick. The subsoil is 69 inches thick. The upper part of the subsoil is strong brown and brown, friable channery loam 11 inches thick; the middle part is reddish brown, friable channery loam 21 inches thick; and the lower part is a weak red, very firm and brittle channery loam fragipan 37 inches thick.

Included with this soil in mapping, in the southeastern part of the county are a few areas of a soil that is similar to this Lackawanna soil but that is slightly higher in reaction. Also included are small areas of Bath and Wellsboro soils and scattered areas of channery and very stony Lackawanna soils.

Permeability is slow and available water capacity is low to moderate. Surface runoff is slow. The subsoil has a very firm fragipan. Rooting depth is restricted by the fragipan. In unlimed areas, reaction is extremely acid and very strongly acid throughout.

Most areas of this soil are used for woodland. A few areas are used for homesites and recreation.

This soil is too stony for cultivated crops and pasture. It is better suited to trees, for which it has good potential. Moderately slow permeability, sloping to moderately steep slopes, surface stones, and coarse fragments limit the potential for many nonfarm uses.

This soil is suited to trees. Most areas are wooded and many idle areas are reverting to trees. Removing undesirable species helps to increase production. Large surface stones interfere with equipment use and machine planting.

This soil is seriously limited for some nonfarm uses, by sloping to moderately steep slopes, permeability and numerous surface stones. Slow permeability in the fragipan, slope, and numerous surface stones seriously limit onsite waste disposal. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass VIIs.

LBE—Lackawanna and Bath extremely stony soils, steep. These steep and very steep, deep, well drained soils are on steeper sides of ridges, plateaus, and mountains. Slopes are variable and range from 25 to 70 percent. They are about 400 to more than 1,200 feet long. Areas are usually irregular in shape and normally are 5 to 65 acres in size.

This unit is about 45 percent Lackawanna soil, 25 percent Bath soil, and 30 percent included soils. These soils are mapped together because they both are steep to very steep and have an extremely stony surface; these characteristics affect most of the expected uses. Individual mapped areas of this unit are generally mostly Lackawanna soil or Bath soil. In places both soils occur in the same area.

Typically, the Lackawanna soil has a surface layer of pinkish gray channery loam about 1 inch thick. The sub-

soil is 64 inches thick. The upper part of the subsoil is strong brown and brown, friable channery loam 11 inches thick; the middle part is reddish brown, friable channery loam 21 inches thick; and the lower part is a weak red, very firm and brittle channery loam fragipan 32 inches thick.

Typically, the Bath soil, has a surface layer of dark grayish brown channery silt loam 3 inches thick. The subsoil is 52 inches thick. The upper part of the subsoil is yellowish brown, friable channery silt loam and channery loam 23 inches thick; and the lower part is yellowish brown, firm and brittle channery loam 29 inches thick. The substratum, to a depth of 65 inches, is brown very channery loam.

Included with these soils in mapping are a few areas from which the surface stones have been removed. Also included are areas of Swartswood, Oquaga, and Lordstown soils. This unit has a higher proportion of included soils than most map units in Monroe County.

Permeability is slow, and available water capacity is low to moderate. In unlimed areas of the Lackawanna soils, reaction is extremely acid and very strongly acid throughout; and in the Bath soils, reaction is very strongly acid to medium acid above the fragipan and strongly acid to slightly acid in the fragipan. Surface runoff is very rapid. Rooting depth is restricted by the fragipan.

These soils are used mainly for woodland.

These soils are too stony and steep to be used for cultivated crops and pasture. They are better suited to woodland. These soils have very poor potential for farming, poor potential for pasture, and good potential for woodland. The extremely stony surface, steep and very steep slopes, and slow permeability limit most nonfarm uses.

A large acreage of this soil is used for woodland. Productivity potential for woodland is good. Surface stones and slope limit use of equipment and interfere with mechanical planting. Constructing roads on the contour during harvesting reduces erosion.

These soils are limited for nonfarm uses, including excavations for buildings, by the numerous surface stones, slow permeability, and steep and very steep slopes. These characteristics seriously limit onsite waste disposal. If this soil is disturbed for construction, erosion-control practices are needed. Capability subclass VIIs.

LgB—Laidig extremely stony loam, 0 to 8 percent slopes. This nearly level and gently sloping, extremely stony, well drained soil is on the upper parts of sides and foot slopes of ridges and in lower areas on plateaus. Slopes are generally uniform to slightly undulating and are variable in length. Areas are broad and wide in shape and are about 5 to 25 acres in size.

Typically, the surface layer is dark yellowish brown gravelly loam 6 inches thick. The subsoil is 54 inches thick. The upper part of the subsoil is strong brown and yellowish brown gravelly loam 25 inches thick, and the lower part is a strong brown, firm and very firm and brittle gravelly fine sandy loam and gravelly loam fragipan 29 inches thick.

Included with this soil in mapping are a few areas of Laidig soils from which the surface stones have been removed and a few areas of Laidig very stony soils. Also included are scattered areas of Clymer and Buchanan soils.

Permeability is moderately slow, and available water capacity is moderate. Surface runoff is slow. The subsoil has a firm to very firm fragipan. A perched water table is above the fragipan for short periods. Rooting depth is restricted by the fragipan. In unlimed areas, reaction is strongly acid to extremely acid throughout.

Most areas of this soil are used for woodland. A few areas are used for homesites and recreation.

This soil is too stony for cultivated crops and pasture. It is better suited to trees, for which it has good potential. Moderately slow permeability, surface stones, and rock fragments limit the potential for many nonfarm uses.

This soil is suited to trees. Most areas are wooded and many idle areas are reverting to trees. Removing undesirable species helps to increase production. Large surface stones interfere with equipment use and machine planting.

This soil is seriously limited for most nonfarm uses by moderately slow permeability and numerous surface stones. Moderately slow permeability in the fragipan and the high content of surface stones seriously limit onsite waste disposal. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass VIIs.

LgC—Laidig extremely stony loam, 8 to 25 percent slopes. This sloping and moderately steep, extremely stony, well drained soil is on foot slopes and sides of ridges and in lower areas on plateaus. Slopes are generally rolling to hilly and are variable in length. Areas are broad and long in shape and are about 7 to 30 acres in size.

Typically, the surface layer is dark yellowish brown gravelly loam 6 inches thick. The subsoil is 54 inches thick. The upper part of the subsoil is strong brown and yellowish brown gravelly loam 25 inches thick, and the lower part is a strong brown, firm and very firm and brittle gravelly fine sandy loam and gravelly loam fragipan 29 inches thick.

Included with this soil in mapping are a few areas of Laidig soils from which the surface stones have been removed and a few areas of very stony Laidig soils. Also included are scattered areas of Clymer and Buchanan soils.

Permeability is moderately slow, and available water capacity is moderate. Surface runoff is slow. The subsoil has a firm to very firm fragipan. A perched water table is above the fragipan for short periods. Rooting depth is restricted by the fragipan. In unlimed areas, reaction is strongly acid to extremely acid throughout.

Most areas of this soil are used for woodland. A few areas are used for homesites and recreation.

This soil is too stony for cultivated crops and pasture. It is better suited to trees for which it has good potential. Moderately slow permeability, surface stones, and rock fragments limit the potential for many nonfarm uses.

This soil is suited to trees. Most areas are wooded, and many idle areas are reverting to trees. Removing undesirable species helps to increase production. Large surface stones interfere with equipment use and machine planting. Constructing roads on the contour during harvesting reduces erosion.

This soil is seriously limited for most nonfarm uses by sloping to moderately steep slopes, moderately slow permeability, and numerous surface stones. Moderately slow permeability in the fragipan, slope, and numerous surface stones seriously limit onsite waste disposal. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass VIIs.

Lh—Lawrenceville silt loam. This nearly level, deep, moderately well drained soil is on stream terraces in broad valleys. Slopes are generally smooth to slightly undulating and are generally 350 to 700 feet long. Areas are rectangular to crescent in shape and are about 3 to 15 acres in size.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsoil is about 50 inches thick. The upper part of the subsoil is yellowish brown, friable silty clay loam 15 inches thick; the middle part is yellowish brown, firm and brittle silty clay loam 12 inches thick; and the lower part is yellowish brown, firm and brittle very gravelly silt loam 23 inches thick.

Included with this soil in mapping are a few areas of gently sloping and gravelly Lawrenceville soils and a few areas of Sheffield, Braceville, and Rexford soils.

Permeability is moderately slow, and available water capacity is moderate. Surface runoff is slow. The subsoil has a firm to very firm fragipan. A high water table is at a depth of 18 to 36 inches of the surface for long periods during wet seasons. Rooting depth is restricted by the fragipan. In unlimed areas, reaction is strongly acid and very strongly acid throughout.

Most areas of this soil are used for cultivated crops or hay and are idle. A few areas are used for homesites, woodland, and recreation.

This soil is better suited to grass and pasture, but it can be used for crops if properly managed. It has good potential for pasture and for trees. The seasonal high water table and moderately slowly permeable subsoil limit the potential for many nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is slight. Minimum tillage, sod waterways, cover crops, and grasses and legumes in the cropping system help to reduce runoff and add organic matter to the soil. Open drains and covered drains help remove excess water and allow timely tillage.

If this soil is used for pasture, overgrazing and grazing when this soil is wet are major concerns in pasture management. Grazing when the soil is wet compacts the surface. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs.

This soil is suited to trees, but only a small acreage is wooded. Many idle areas are reverting to trees. Removing undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting is practical in large areas.

This soil is seriously limited for most nonfarm uses, including onsite waste disposal, by moderate permeability and seasonal high water table. The seasonal high water table is a potential hazard for buildings with subsurface basements. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basements. Capability subclass IIs.

LkB—Leck Kill channery silt loam, 2 to 8 percent slopes. This nearly level and gently sloping, deep, well drained soil is on tops of hills and ridges. Slopes are generally uniform and are about 250 to 700 feet long. Areas are irregular in shape and are about 2 to 11 acres in size.

Typically, the surface layer is reddish brown channery silt loam about 10 inches thick. The subsoil is 30 inches thick. The upper part of the subsoil is reddish brown channery silt loam 18 inches thick, and the lower part is red shaly silt loam 12 inches thick. The substratum, to a depth of 60 inches, is red very shaly silt loam in the upper 10 inches and red very channery silt loam in the lower 10 inches.

Included with this soil in mapping are a few areas of severely eroded and stony Leck Kill soils and scattered areas of Klinesville, Meckesville, and Kedron soils.

Permeability is moderate to moderately rapid and available water capacity is high. Surface runoff is slow to medium. The surface layer is more than 15 percent channers. In unlimed areas, reaction is medium acid to very strongly acid throughout.

Most of the acreage of this soil is idle or is used for crops. Small areas are used for homesites and recreation.

This soil has excellent potential for farming and is suited to pasture and trees. The potential for homesites is mainly good. Potential for most other nonfarm uses is good.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Crops respond well to fertilizer and to good management. Stripcropping, minimum tillage, diversions, and sod waterways help to control erosion. Growing cover crops, using crop residue, and including hay in the cropping system maintain organic-matter content and good tilth. The channery surface interferes with the seeding of small grain and the mechanical harvesting of some crops such as potatoes.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nu-

trients to maintain fertility are needed to obtain optimum production.

This soil is suited to trees, but only a very small acreage is wooded. Productivity is good. Management concerns are minor. Machine planting is practical in large areas.

This soil is somewhat limited for nonfarm uses by coarse fragments and bedrock at a depth of 40 to 72 inches. Bedrock at a depth of 40 to 72 inches limits onsite waste disposal. Capability subclass IIe.

LkC—Leck Kill channery silt loam, 8 to 15 percent slopes. This sloping, deep, well drained soil is on sides of hills and ridges. Slopes are generally rolling and are 200 to 850 feet long. Areas are irregular in shape and are 3 to 14 acres in size.

Typically, the surface layer is reddish brown channery silt loam about 7 inches thick. The subsoil is 33 inches thick. The upper part is reddish brown channery silt loam 21 inches thick, and the lower part is red channery silt loam 12 inches thick. The substratum, to a depth of 60 inches, is red very channery silt loam.

Included with this soil in mapping are a few areas of severely eroded and stony Leck Kill soils and scattered areas of Klinesville, Meckesville, and Kedron soils.

Permeability is moderate to moderately rapid, and available water capacity is high. Surface runoff is medium. The surface layer is more than 15 percent channers. In unlimed areas, reaction is medium acid to very strongly acid throughout.

Most of the acreage of this soil is idle or is used for crops. Small areas are used for homesites and recreation.

This soil has very good potential for farming and is suited to pasture and trees. The potential for homesites mainly is fair.

If this soil is used for cultivated crops, the hazard of erosion is severe. Crops respond well to fertilizer and to good management. Stripcropping, minimum tillage, sod waterways, and diversions control erosion. Growing cover crops, using crop residue, and including hay in the cropping system maintain organic-matter content and good tilth. The channery surface interferes with the seeding of small grain and the mechanical harvesting of some crops such as potatoes.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production.

This soil is suited to trees, but only a very small acreage is wooded. Productivity is good. The main management concern is erosion in disturbed areas. Constructing roads on the contour during harvesting minimizes erosion. Machine planting is practical in large areas.

This soil is somewhat limited for nonfarm uses by slope, coarse fragments, and bedrock at a depth of 40 to 72 inches. Depth to bedrock and slope limit onsite waste disposal. Slope and coarse fragments are major limitations for most other nonfarm uses. Capability subclass IIIe.

LkD—Leck Kill channery silt loam, 15 to 25 percent slopes. This moderately steep, deep, well drained soil is on steeper sides of hills and ridges. Slopes are hilly and are about 200 to 650 feet long. Areas are irregular in shape and are mainly 2 to 10 acres in size.

Typically, the surface layer is reddish brown channery silt loam 7 inches thick. The subsoil is 33 inches thick. The upper part of the subsoil is reddish brown channery silt loam 21 inches thick, and the lower part is red shaly silt loam 12 inches thick. The substratum, to a depth of 60 inches, is red very shaly silt loam in the upper 10 inches and red very channery silt loam in the lower 10 inches.

Included with this soil in mapping are a few small areas of severely eroded and stony Leck Kill soils. Small scattered areas of Klinesville, Meckesville, and Hartleton soils are also included.

Permeability is moderate to moderately rapid, and available water capacity is high. Surface runoff is rapid. The surface layer is more than 15 percent channers. In unlimed areas, reaction is medium acid to very strongly acid throughout.

Most areas of this soil are idle, are used for crops, or have reverted to trees. Small areas are used for homesites and recreation.

This soil has good potential for farming and is suited to pasture and trees. The potential is poor for homesites, and it is poor for onsite waste disposal because of the moderately steep slopes. Slope and coarse fragments are the main limitation for most other nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is severe. Crops respond well to fertilizer and to good management. Contour stripcropping, minimum tillage, diversions, cover crops, and sod waterways help to control erosion. Growing cover crops, returning crop residue to the surface layer, and including hay in the cropping system maintain organic-matter content and good tilth. The channery surface interferes with the seeding of small grain and the mechanical harvesting of some crops such as potatoes.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pasture are the chief management needs. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production. Erosion-control measures are needed during reseeding.

This soil is suited to trees, but only a small acreage is wooded. Productivity is good. Management concerns are related to slope and erosion. Machine planting is practical in large areas. Constructing roads on the contour during harvesting reduces erosion.

This soil is somewhat limited for nonfarm uses by moderately steep slope, coarse fragments, and bedrock at a depth of 40 to 72 inches. The moderately steep slopes seriously limit onsite waste disposal and homesites. Capability subclass IVe.

LsB—Lordstown channery silt loam, 3 to 8 percent slopes. This gently sloping, moderately deep, well drained soil is on the tops of mountains and ridges. Slopes are smooth to convex and are about 250 to 550 feet long. Areas are long and narrow in shape and normally are about 3 to 17 acres in size.

Typically (fig. 9), the surface layer is dark brown channery silt loam about 9 inches thick. The subsoil is 17 inches thick. The upper part of the subsoil is yellowish brown channery silt loam and channery loam 11 inches thick, and the lower part is yellowish brown and brown very channery loam 6 inches thick. The substratum is dark brown very channery silt loam. Partially fractured siltstone bedrock is at a depth of 32 inches.

Included in mapping are small areas of rocky and very stony Lordstown soils and a soil that is similar to this Lordstown soil but in which bedrock is above a depth of 20 inches. Also included are small areas of Swartswood, Bath, and Oquaga soils.

Permeability is moderate, and available water capacity is low to moderate. In unlimed areas, reaction is strongly acid and very stony acid throughout. Surface runoff is slow to medium. Rooting depth is restricted by bedrock at a depth of 20 to 40 inches.

This soil is used mainly for grass or is idle.

Potential is fair for farming, fair for pasture, and good for woodland. Depth to bedrock and high content of coarse fragments limit potential for many nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Further erosion results in a shallower rooting depth and lower available water capacity for plants. Minimum tillage, diversions, cover crops, and grasses and legumes in the cropping system reduce runoff and control erosion. Stripcropping can be used where the topography is suitable. In places, bedrock hinders the construction of diversions. Incorporating some crop residue and manure into the surface layer helps to maintain organic-matter content and reduce the tendency of the soil to clod and crust.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production.

Some of the acreage of this soil is wooded because many idle areas are reverting to trees. Productivity is good, but rooting depth is restricted by the siltstone bedrock. Loss of seedlings is a problem because of low to moderate available water capacity. Machine planting in large areas is generally practical.

This soil is limited for nonfarm uses by depth to hard siltstone rock and high content of coarse fragments. The moderate depth to the underlying rock seriously limits onsite waste disposal. When this soil is disturbed for construction, erosion- and sediment-control practices are needed. Capability subclass IIe.

LsC—Lordstown channery silt loam, 8 to 15 percent slopes. This sloping, well drained soil is on the sides of ridges and mountains. Slopes are rolling to hilly and are about 300 to 900 feet long. Areas are generally long and narrow and normally are 4 to more than 12 acres in size.

Typically, the surface layer is brown channery silt loam about 8 inches thick. The subsoil is 16 inches thick. The upper part of the subsoil is yellowish brown, friable channery silt loam and loam 10 inches thick; and the lower part is yellowish brown, friable very channery loam 6 inches thick. The substratum is dark brown very channery silt loam. Very dark gray siltstone bedrock is at a depth of 30 inches.

Included with this soil in mapping are small areas of severely eroded and rocky Lordstown soils and scattered areas of Swartswood, Bath, and Oquaga soils. Also included are small areas of a soil that is similar to this Lordstown soil but in which bedrock is at a depth of less than 20 inches.

Permeability is moderate, and available water capacity is low to moderate. In unlimed areas, reaction is strongly acid and very strongly acid throughout. Surface runoff is medium. Rooting depth is restricted by the moderate depth to bedrock.

This soil is used mainly for permanent grass or is idle.

Potential is fair for farming, fair for pasture, and good for woodland. Depth to bedrock, channery surface, and slope limit potential for many nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Further erosion results in a shallower rooting depth and lower available water capacity for plants. Minimum tillage, diversions, cover crops, and grasses and legumes in the cropping system reduce runoff and control erosion. Stripcropping can be used where the topography is suitable. In places, bedrock hinders the construction of diversions. Incorporating some crop residue and manure into the surface layer helps to maintain organic-matter content and reduce the tendency of the soil to clod and crust.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production.

A moderate acreage of this soil is wooded because many idle areas are reverting to trees. Productivity is good, but rooting depth is restricted by the siltstone bedrock. Loss of seedlings is moderate because of the low to moderate available water capacity. Machine planting in large areas is generally practical.

This soil is limited for nonfarm uses by slope, depth to siltstone rock and channery surface. The moderate depth to the underlying rock seriously limits onsite waste disposal. When this soil is disturbed for construction, erosion- and sediment-control practices are needed. Capability subclass IIIe.

LsD—Lordstown channery silt loam, 15 to 25 percent slopes. This moderately steep, moderately deep, well drained soil is on the sides of ridges and mountains. Slopes are uniform to hilly and are about 200 to 850 feet long. Areas are generally rectangular to crescent in shape and normally are 3 to more than 14 acres in size.

Typically, the surface layer is dark brown channery silt loam about 8 inches thick. The subsoil is 16 inches thick. The upper part of the subsoil is yellowish brown, friable channery silt loam and loam 10 inches thick; the lower part is yellowish brown, friable very channery loam 6 inches thick. The substratum is dark brown very channery silt loam. Partially fractured siltstone bedrock is at a depth of 30 inches.

Included with this soil in mapping are small areas of severely eroded and rocky Lordstown soil and scattered areas of Swartswood, Bath, and Oquaga soils. Also included are small areas of a soil in which bedrock is at a depth of less than 20 inches.

Permeability is moderate, and available water capacity is low to moderate. In unlimed areas, reaction is strongly acid and very strongly acid throughout. Surface runoff is rapid. Rooting depth is restricted by the moderate depth to bedrock.

This soil is used mainly for hay or is idle.

Potential is fair for farming, for pasture, and good for woodland. Depth to bedrock, slope, and coarse fragments limit potential for most nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is severe. Further erosion results in a shallower rooting depth and lower available water capacity for plants. Contour stripcropping, minimum tillage, diversions, cover crops, and grasses and legumes in the cropping system reduce runoff and control erosion. In places, bedrock hinders the construction of diversions. Incorporating some crop residue and manure into the surface layer helps to maintain organic-matter content and reduce the tendency of this soil to clod and crust.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed for optimum production.

A moderate acreage of this soil is wooded because many idle areas are reverting to trees. Productivity is good, but rooting depth is restricted by the siltstone bedrock. Loss of seedlings is a problem because of the low to moderate available water capacity. Machine planting in large areas is generally practical.

This soil is limited for nonfarm uses by slope, depth to siltstone rock, and the channery surface. The moderate depth to underlying rock and slope also seriously limit onsite waste disposal. When this soil is disturbed for construction, erosion- and sediment-control practices are needed. Capability subclass IVe.

LxB—Lordstown extremely stony silt loam, 0 to 8 percent slopes. This nearly level and gently sloping, extremely stony, moderately deep, well drained soil is on the tops of ridges and mountains and on broad plateaus. Slopes are generally smooth to convex and are variable in length. Areas are irregular in shape and are about 5 to 60 acres in size.

Typically, the surface layer is brown channery silt loam about 7 inches thick. The subsoil is 19 inches thick. The upper part of the subsoil is yellowish brown, friable channery silt loam and loam 13 inches thick; the lower part is yellowish brown very channery loam 6 inches thick. The substratum is dark brown very channery silt loam. Partially fractured siltstone bedrock is at a depth of 32 inches.

Included with this soil in mapping are a few areas of nonstony and very stony Lordstown soils. Also included are scattered areas of Swartswood, Oquaga, Bath, and Mardin soils.

Permeability is moderate, and available water capacity is low to moderate. Surface runoff is slow. In unlimed areas, reaction is strongly acid and very strongly acid throughout.

Most areas of this soil are used for woodland. A few areas are used for homesites and recreation.

This soil is too stony for cultivated crops and pasture. It is better suited to trees, for which it has good potential. Moderate depth to bedrock, surface stones, and coarse fragments, limit the potential for most nonfarm uses.

This soil is suited to trees, and most areas are wooded. Many idle areas are reverting to trees. Loss of seedlings is moderate because of low to moderate available water capacity. Removing undesirable species helps to increase production. Large surface stones interfere with equipment use and machine planting.

This soil is seriously limited for most nonfarm uses by moderate depth and numerous surface stones. The moderate depth to bedrock and the high content of surface stones seriously limit onsite waste disposal. Deep excavations for buildings or other uses are restricted by depth to bedrock and surface stones. Capability subclass VIIs.

LxC—Lordstown extremely stony silt loam, 8 to 25 percent slopes. This sloping to moderately steep, extremely stony, well drained soil is on sides of ridges and mountains and in sloping areas on broad plateaus. Slopes are generally rolling to hilly and are variable in length. Areas are irregular in shape and are about 5 to 65 acres in size.

Typically, the surface layer is brown channery silt loam about 6 inches thick. The subsoil is 18 inches thick. The upper part of the subsoil is yellowish brown, friable channery silt loam and loam 12 inches thick; and the lower part is yellowish brown very channery loam 6 inches thick. The substratum is dark brown very channery silt loam. Partially fractured siltstone bedrock is at a depth of 30 inches.

Included with this soil in mapping are a few areas of nonstony and very stony Lordstown soils. Also included are scattered areas of Swartswood, Oquaga, Bath, and Mardin soils.

Permeability is moderate, and available water capacity is low to moderate. Surface runoff is medium. In unlimed areas, reaction is strongly acid and very strongly acid throughout.

Most areas of this soil are used for woodland. A few areas are used for homesites and recreation.

This soil is too stony for cultivated crops and pasture. It is better suited to trees; for which it has good potential. Moderate depth to bedrock, surface stones, slope, and coarse fragments limit the potential for most nonfarm uses.

This soil is suited to trees, and most areas are wooded. Many idle areas are reverting to trees. Loss of seedlings is a problem because of the low to moderate available water capacity. Removing undesirable species helps to increase production. Large surface stones interfere with equipment use and machine planting.

This soil is seriously limited for some nonfarm uses, including onsite waste disposal, by moderate depth, sloping to moderately steep slopes, and surface stones. Deep excavations for buildings and other uses are restricted by depth to bedrock and surface stones. Capability subclass VIIs.

LyE—Lordstown and Oquaga extremely stony soils, 25 to 70 percent slopes. These steep and very steep, moderately deep, well drained soils are on steeper sides of ridges, mountains, and plateaus. Slopes are variable in shape and length. Areas are usually long and wide in shape and normally are 8 to more than 100 acres in size.

This unit is about 40 percent Lordstown soil, 35 percent Oquaga soil, and 25 percent included soils. These soils are mapped together because they are steep and very steep and they have an extremely stony surface layer; these factors affect most expected uses.

Typically, the Lordstown soil has a surface layer of brown channery silt loam about 3 inches thick. The subsoil is about 19 inches thick. The upper part of the subsoil is yellowish brown, friable channery silt loam about 13 inches thick; and the lower part is yellowish brown very channery loam about 6 inches thick. The substratum is dark brown very channery silt loam. Partially fractured siltstone bedrock is at a depth of 28 inches.

Typically, the Oquaga soil has a surface layer of dark reddish brown channery loam about 3 inches thick. The subsoil is reddish brown, strong brown, and dark brown channery loam 15 inches thick. The substratum is reddish brown very channery loam. Partly weathered sandstone bedrock is at a depth of 26 inches.

Included with these soils in mapping are a few small areas where bedrock and ledges make up as much as 40 percent of the unit and some areas of a soil that is similar to the major soils but that is less than 20 inches deep. Small areas of Lackawanna, Swartswood, and Bath soils are also included.

Permeability is moderate, and available water capacity is very low to moderate. In unlimed areas, reaction is extremely acid to strongly acid. Surface runoff is very rapid. Rooting depth is restricted by bedrock.

These soils are used mainly for woodland.

These soils are too stony and steep to be used for cultivated crops and for pasture. They are better suited to woodland. Because of surface stones and slopes, these soils have very poor potential for farming. Potential is very poor for pasture and fair for woodland. The moderate depth to bedrock, surface stones, and steep and very steep slopes limit potential for most nonfarm uses.

A large acreage of this soil is used for woodland. Potential productivity for woodland is fair, but rooting depth is restricted by the bedrock. Surface stones and slope limit the use of equipment and interfere with mechanical planting. Constructing roads on the contour during harvesting minimizes erosion.

These soils are limited for nonfarm uses by moderate depth to bedrock, steep and very steep slopes, and numerous surface stones. The restricted depth to bedrock and numerous surface stones limit excavation for buildings and seriously limit onsite waste disposal. If this soil is disturbed for construction, erosion-control practices are needed. Capability subclass VIIs.

MaB—Mardin channery silt loam, 2 to 8 percent slopes. This nearly level and gently sloping, moderately well drained soil is on crests and upper parts of sides of hills and ridges on uplands. Slopes are generally uniform to slightly concave and are about 250 to 650 feet long. Areas are irregular in shape and are about 4 to more than 12 acres in size.

Typically, the surface layer is dark brown, friable channery silt loam about 9 inches thick. The subsoil is about 61 inches thick. The upper part of the subsoil is yellowish brown, friable channery silt loam and gravelly loam 15 inches thick; and the lower part is yellowish brown, firm and very firm and brittle gravelly loam and gravelly silt loam 46 inches thick. The substratum, to a depth of 110 inches, is yellowish brown, very firm very gravelly loam.

Included with this soil in mapping are a few areas of stony and gravelly Mardin soils and a few areas of Bath, Wurtsboro, and Wellsboro soils. Also included, in the southeastern part of the county, is a soil that is similar to this Mardin soil but that is higher in reaction.

Permeability is slow, and available water capacity is low to moderate. Surface runoff is slow. The subsoil has a firm, slowly permeable fragipan. A water table is at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan in the subsoil. In unlimed areas, reaction is very strongly acid to medium acid above the fragipan and very strongly acid to slightly acid in the fragipan.

Most areas of this soil are used for grassland or are idle, and a few areas are reverting to trees. A few areas are used for cultivated crops and homesites.

This soil is better suited to grass and pasture, but it can be used for crops if properly managed. It has good potential for pasture and for trees. The seasonal high water

table and slowly permeable subsoil limit the potential for many nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Contour stripcropping, minimum tillage, sod waterways, cover crops, and grasses and legumes in the cropping system help to reduce runoff and control erosion. Diversions and covered drains help to remove excess water and allow timely tillage. The channery surface interferes with the seeding and harvesting of some crops.

If this soil is used for pasture, overgrazing and grazing when this soil is wet are major concerns in pasture management. Grazing when the soil is wet compacts the surface. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs.

This soil is suited to trees, but only a small acreage is wooded. Many idle areas are reverting to trees. Removing undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting is practical in large areas.

This soil is severely limited for most nonfarm uses, including onsite waste disposal, by slow permeability and seasonal high water table. The seasonal high water table is a hazard for buildings with subsurface basements. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass IIw.

MaC—Mardin channery silt loam, 8 to 15 percent slopes. This sloping, deep, moderately well drained soil is on sides of hills and ridges on uplands. Slopes are generally uniform to undulating and are about 300 to 700 feet long. Areas are irregular in shape and are about 3 to more than 10 acres in size.

Typically, the surface layer is dark brown, friable channery silt loam about 8 inches thick. The subsoil is about 51 inches thick. The upper part of the subsoil is yellowish brown, friable channery silt loam and gravelly loam 12 inches thick; and the lower part is yellowish brown, firm and very firm and brittle gravelly loam and gravelly silt loam 39 inches thick. The substratum, to a depth of 100 inches, is yellowish brown, very firm very gravelly loam.

Included with this soil in mapping, in the southeastern part of the county, are a few areas of a soil that is similar to this Mardin soil but that is higher in reaction and a few areas of gravelly and stony Mardin soils. Also included are scattered areas of Wurtsboro and Volusia soils and a soil that is similar to this Mardin soil but that is finer textured above the fragipan.

Permeability is slow, and available water capacity is low to moderate. Surface runoff is medium. The subsoil has a firm to very firm fragipan. A high water table is at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan in the subsoil. In unlimed areas, reaction is very strongly acid to medium acid above the fragipan and very strongly acid to slightly acid in the fragipan.

Most areas of this soil are idle, and small areas are in pasture or cultivated crops.

A few small areas are used for homesites, woodland, or recreation.

This soil is better suited to grass and pasture, but it can be used for crops if properly managed. It has good potential for pasture and for trees. The seasonal high water table, slowly permeable subsoil, and slope limit the potential for many nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is severe. Contour stripcropping, minimum tillage, sod waterways, cover crops, and grasses and legumes in the cropping system help to reduce runoff and control erosion. Diversions and covered drains help to remove excess water and allow timely tillage. The channery surface interferes with the seeding and harvesting of some crops.

If this soil is used for pasture, overgrazing and grazing when the soil is wet are major concerns in pasture management. Grazing when the soil is wet compacts the surface layer. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs.

This soil is suited to trees, but only a small acreage is wooded. Many idle areas are reverting to trees. Removing undesirable species helps to increase production. Constructing roads on the contour during harvesting reduces erosion. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting is practical in large areas.

This soil is severely limited for most nonfarm uses, including onsite waste disposal, by slow permeability and the seasonal high water table. The seasonal high water table is a hazard for buildings with subsurface basements. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass IIIe.

MbB—Mardin very stony silt loam, 0 to 8 percent slopes. This nearly level and gently sloping, very stony, moderately well drained soil is on tops of ridges, plateaus, and hills. Slopes are generally slightly concave to undulating and are 250 to 900 feet long. Areas are irregular in shape and are about 5 to 25 acres in size.

Typically, the surface layer is dark brown, friable channery silt loam about 6 inches thick. The subsoil is about 60 inches thick. The upper part of the subsoil is yellowish brown, friable channery silt loam and gravelly loam 16 inches thick; and the lower part is yellowish brown, firm and very firm and brittle gravelly silt loam 44 inches thick. The substratum, to a depth of 75 inches, is yellowish brown, very firm very gravelly loam.

Included with this soil in mapping, in the southeastern part of the county, are a few areas of a soil that is similar to this Mardin soil but that is higher in reaction. Also

included are scattered areas of extremely stony Mardin soils, areas of Wurtsboro and Volusia soils, and a few small areas of a soil that is similar to this Mardin soil but that is finer textured above the fragipan.

Permeability is slow, and available water capacity is low to moderate. Surface runoff is slow. The subsoil has a firm to very firm fragipan. A seasonal high water table is at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. In unlimed areas, reaction is very strongly acid to medium acid above the fragipan and very strongly acid to slightly acid in the fragipan.

Most areas of this soil are used for woodland. A few areas are used for homesites and recreation.

This soil is too stony for cultivated crops and pasture. It is better suited to trees, for which it has good potential. The seasonal high water table, slow permeability, surface stones, and coarse fragments limit the potential for many nonfarm uses.

This soil is suited to trees. Most areas are wooded, and many idle areas are reverting to trees. Removing undesirable species helps to increase production. Use of machinery is restricted during wet seasons because of the seasonal high water table. Large surface stones interfere with equipment use and machine planting.

This soil is seriously limited for some nonfarm uses by the seasonal high water table, slow permeability, and many surface stones. Slow permeability and the seasonal high water table seriously limit onsite waste disposal. The seasonal high water table is a hazard for buildings with subsurface basements. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass VIs.

MbC—Mardin very stony silt loam, 8 to 25 percent slopes. This sloping and moderately steep, very stony, moderately well drained soil is on the sides and tops of ridges and on plateaus. Slopes are generally rolling to hilly and are 350 to 850 feet long. Areas are irregular in shape and are about 5 to 20 acres in size.

Typically, the surface layer is dark brown, friable channery silt loam about 6 inches thick. The subsoil is about 56 inches thick. The upper part of the subsoil is yellowish brown, friable channery silt loam and gravelly loam 14 inches thick; and the lower part is yellowish brown, firm and very firm and brittle gravelly silt loam 42 inches thick. The substratum, to a depth of 75 inches, is yellowish brown, very firm very gravelly loam.

Included with this soil in mapping, in the southeastern part of the county, are a few areas of a soil that is similar to this Mardin soil but that is higher in reaction. Also included are areas of extremely stony Mardin soils, areas of Wurtsboro and Volusia soils, and a few small areas of a soil that is similar to this Mardin soil but that is finer textured above the fragipan.

Permeability is slow, and available water capacity is low to moderate. Surface runoff is medium. The subsoil has a firm to very firm fragipan. A seasonal high water table is at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan. In unlimed areas, reaction is very strongly acid to medium acid above the fragipan and very strongly acid to slightly acid in the fragipan.

Most areas of this soil are used for woodland. A few areas are used for homesites and recreation.

This soil is too stony for cultivated crops and pasture. It is better suited to trees, for which it has good potential. The seasonal high water table, slow permeability, surface stones, and coarse fragments limit the potential for many nonfarm uses.

This soil is suited to trees. Most areas are wooded, and many idle areas are reverting to trees. Removing undesirable species helps to increase production. Use of machinery is restricted during wet seasons because of the seasonal high water table. Large surface stones and slope interfere with equipment use and machine planting.

This soil is seriously limited for some nonfarm uses, including onsite waste disposal, by the seasonal high water table and sloping to moderately steep slopes. The seasonal high water table is a hazard for buildings with subsurface basements. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Surface stones limit many nonfarm uses. Capability subclass VIs.

MeA—Meckesville gravelly loam, 0 to 3 percent slopes. This nearly level, deep, well drained soil is on tops of ridges, broad plateaus, and mountains. Slopes are generally smooth and are about 300 to 700 feet long. Areas are irregular in shape and are mainly 3 to 12 acres in size.

Typically, the surface layer is dark brown, friable gravelly loam 9 inches thick. The subsoil is 51 inches thick. The upper part of the surface layer is reddish brown, friable gravelly loam 17 inches thick; the middle part is weak red, friable channery loam 6 inches thick; and the lower part is weak red, very firm and brittle channery loam 38 inches thick.

Included with this soil in mapping are a few small areas of moderately eroded and cobbly Meckesville soils. Small scattered areas of Clymer, Kedron, and Allenwood soils are also included.

Permeability is moderately slow and available water capacity is moderate. Surface runoff is slow. The surface layer is more than 15 percent gravel. In unlimed areas, reaction is strongly acid and very strongly acid throughout. The subsoil has a very firm fragipan, which restricts rooting depth.

Most areas of this soil are used for crops. Small areas are used for woodland, hay, pasture, or housing developments.

This soil has good potential for farming and is well suited to pasture and trees. The potential for homesites is mainly good. This soil is suited to most other nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is slight. Crops respond well to fertilizer and to good management. Growing cover crops, using crop residue, and including hay in the cropping system help to maintain organic-matter content and good tilth. The gravelly surface interferes with the seeding of small grain and the mechanical harvesting of some crops such as potatoes.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pasture are the chief management needs. Periodic applications of nutrients to maintain fertility are needed for optimum production.

This soil is suited to trees, but only a small acreage is wooded. Productivity is good. Management concerns are minor. Machine planting is practical in large areas.

This soil is somewhat limited for nonfarm uses by moderately slow permeability and gravelly surface. Moderately slow permeability in the subsoil limits onsite waste disposal. Capability class I.

MeB—Meckesville gravelly loam, 3 to 8 percent slopes. This gently sloping, deep, well drained soil is on the upper parts of sides of ridges, plateaus, and mountains. Slopes are undulating and are 350 to 650 feet long. Areas are irregular in shape and are mainly about 3 to 15 acres in size.

Typically, the surface layer is dark brown, friable gravelly loam 9 inches thick. The subsoil is 51 inches thick. The upper part of the subsoil is reddish brown, friable gravelly loam 17 inches thick; the middle part is weak red, friable channery loam 6 inches thick; and the lower part is weak red, very firm and brittle channery loam 28 inches thick.

Included with this soil in mapping are a few small areas of severely eroded Meckesville soils. Small scattered areas of Leck Kill, Clymer, Kedron, and Allenwood soils are also included.

Permeability is moderately slow, and available water capacity is moderate. Surface runoff is slow to medium. The surface layer is more than 15 percent gravel. In unlimed areas, reaction is strongly acid and very strongly acid throughout. The subsoil has a very firm fragipan which restricts rooting depth.

Most areas of this soil are used for crops. Small areas are used for woodland, hay, pasture, or housing developments.

This soil has good potential for farming and is well suited to pasture and trees. The potential for homesites is good, but the moderately slow permeability of the subsoil limits onsite waste disposal. Potential is good for most other nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Crops respond well to fertilizer and to good management. Stripcropping, minimum tillage, diversions, and sod waterways help to control erosion. Growing cover crops, using crop residue, and including hay in the cropping system maintain organic-matter content and good tilth. The gravelly surface interferes with the seeding of small grain and the mechanical harvesting of some crops such as potatoes.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pasture are the chief management needs. Periodic applications of nutrients to maintain fertility are needed for optimum production.

This soil is suited to trees, but only a small acreage is wooded. Productivity is good. Management concerns are minor. Machine planting is practical in large areas.

This soil is somewhat limited for nonfarm uses by moderately slow permeability and gravelly surface. Moderately slow permeability in the subsoil limits onsite waste disposal. Capability subclass IIe.

MeC—Meckesville gravelly loam, 8 to 15 percent slopes. This sloping, deep, well drained soil is on sides of ridges and mountains and in sloping areas of broad plateaus. Slopes are rolling and are 300 to 750 feet long. Areas are irregular in shape and are mainly about 3 to 10 acres in size.

Typically, the surface layer is dark brown, friable gravelly loam 9 inches thick. The subsoil is 51 inches thick. The upper part of the subsoil is reddish brown, friable gravelly loam 17 inches thick; the next part is weak red, friable channery loam 6 inches thick; and the lower part is weak red, very firm and brittle channery loam 28 inches thick.

Included with this soil in mapping are a few small areas of steeper and severely eroded Meckesville soils. Small scattered areas of Leck Kill, Clymer, Kedron, and Allenwood soils are also included.

Permeability is moderately slow and available water capacity is moderate. Surface runoff is medium. The surface layer is more than 15 percent gravel. In unlimed areas, reaction is strongly acid and very strongly acid throughout. The subsoil has a very firm fragipan, which restricts rooting depth.

Most areas of this soil are used for crops. Small areas are used for woodland, hay, pasture, or housing developments.

This soil has good potential for farming and is well suited to pasture and trees. The potential for homesites is fair, but the moderately slow permeability of the subsoil limits onsite waste disposal. Slope and the gravelly surface are the main limitations for most other nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Crops respond well to fertilizer and to good management. Contour stripcropping, minimum tillage, diversions, and sod waterways help to control erosion. Growing cover crops, using crop residue, and including hay in the cropping system maintain organic-matter content and good tilth. The gravelly surface interferes with the seeding of small grain and the mechanical harvesting of some crops such as potatoes.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pasture are the chief management needs. Periodic applications of nutri-

ents to maintain fertility are needed for optimum production.

This soil is suited to trees, but only a small acreage is wooded. Productivity is good. Management concerns are related to slope. Machine planting is practical in larger areas. Constructing roads on the contour during harvesting reduces erosion.

This soil is somewhat limited for nonfarm uses by slope, moderately slow permeability, and gravelly surface. The moderately slow permeability limits onsite waste disposal. Capability subclass IIIe.

MfB—Meckesville very stony loam, 0 to 8 percent slopes. This nearly level and gently sloping, very stony, well drained soil is on tops of ridges, plateaus, and mountains. Slopes are generally smooth to undulating and are 350 to 800 feet long. Areas are irregular in shape and are about 8 to 25 acres in size.

Typically, the surface layer is dark brown, friable gravelly loam about 6 inches thick. The subsoil is 64 inches thick. The upper part of the subsoil is reddish brown, friable gravelly loam 20 inches thick; the middle part is weak red, friable channery loam 6 inches thick; and the lower part is weak red, very firm and brittle channery loam 38 inches thick.

Included with this soil in mapping are a few areas of nonstony and moderately eroded Meckesville soils. Also included are scattered areas of Leck Kill, Clymer, Kedron, and Allenwood soils.

Permeability is moderately slow, and available water capacity is moderate. Surface runoff is slow. The subsoil has a very firm fragipan which restricts rooting depth. In unlimed areas, reaction is strongly acid and very strongly acid throughout.

Most areas of this soil are used for woodland. A few areas are used for homesites.

This soil is too stony for cultivated crops and pasture. It is better suited to trees, for which it has good potential. Moderately slow permeability, surface stones, and coarse fragments limit the potential for many nonfarm uses.

This soil is suited to trees and most areas are wooded. Many idle areas are reverting to trees. Removing undesirable species helps to increase production. Large surface stones interfere with equipment use and machine planting.

This soil is seriously limited for some nonfarm uses by moderately slow permeability and surface stones. Moderately slow permeability in the fragipan seriously limits onsite waste disposal. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass VIs.

MfC—Meckesville very stony loam, 8 to 25 percent slopes. This sloping and moderately steep, very stony, well drained soil is on sides of ridges, plateaus, and mountains. Slopes are generally rolling to hilly and are 350 to 900 feet long. Areas are irregular in shape and are about 6 to 20 acres in size.

Typically, the surface layer is dark brown, friable gravelly loam about 5 inches thick. The subsoil is 55 inches thick. The upper part of the surface layer is reddish brown, friable gravelly loam 21 inches thick; the middle part is weak red, friable channery loam 6 inches thick; and the lower part is weak red, very firm and brittle channery loam 28 inches thick.

Included with this soil in mapping are a few areas of flaggy and channery Meckesville soils. Also included are scattered areas of Clymer, Leck Kill, Kedron, and Allenwood soils.

Permeability is moderately slow, and available water capacity is moderate. Surface runoff is medium. The subsoil has a very firm fragipan which restricts rooting depth. In unlimed areas, reaction is strongly acid and very strongly acid throughout.

Most areas of this soil are used for woodland. A few areas are used for homesites.

This soil is too stony for cultivated crops and pasture. It is better suited to trees, for which it has a good potential. Moderately slow permeability, surface stones, slope, and coarse fragments limit the potential for many nonfarm uses.

This soil is suited to trees, and most areas are wooded. Many idle areas are reverting to trees. Removing undesirable species helps to increase production. Large surface stones interfere with equipment use and machine planting. Constructing roads on the contour during harvesting reduces erosion.

This soil is seriously limited for some nonfarm uses by moderately slow permeability, sloping to moderately steep slopes, and surface stones. Moderately slow permeability in the fragipan and slope seriously limit onsite waste disposal. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass VIs.

MgB—Morris channery silt loam, 2 to 10 percent slopes. This deep, somewhat poorly drained, nearly level to sloping soil is in depressions in the glaciated uplands. Slopes are undulating and are 300 to 550 feet long. Areas are crescent to oval in shape and normally are 3 to 22 acres in size.

Typically, the surface layer is dark reddish brown channery silt loam about 7 inches thick. The subsoil is 53 inches thick. The upper part of the subsoil is reddish brown and pinkish gray, friable channery silt loam and gravelly loam 8 inches thick; the middle part is weak red, very firm and brittle gravelly loam 8 inches thick; and the lower part is reddish brown, very firm and firm and brittle gravelly loam 37 inches thick.

Included with this soil in mapping, in the southeastern part of the county, are some areas of a soil that is similar to this Morris soil but that is higher in reaction. Small areas of gravelly and very stony Morris soils and scattered areas of Wellsboro, Norwich, and Volusia soils are also included.

Permeability is very slow, and available water capacity is moderate. In unlimed areas, reaction is medium acid and strongly acid above a depth of 4 feet. A seasonal

high water table is at a depth of 6 to 18 inches for most of the year. Surface runoff is slow to medium. Rooting depth is resticted by the high water table and by the fragipan in the subsoil.

Most areas of this soil are used for grass or are idle. A few areas are used for homesites.

If properly drained, this soil can be used for row crops. This soil has good potential for permanent pasture and for trees. The seasonal high water table and very slow permeability limit the potential for many nonfarm uses. This soil has some potential for wildlife habitat and recreation.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Excess water causes the soil to warm slowly in spring. Crops can be damaged by ponded water following intensive rainfalls. Excess surface water can be removed by keeping natural drainageways open. Open drains, and subsurface drains where outlets are available, improve drainage. Stripcropping, cover crops, diversions, and sod waterways control erosion.

This soil has good potential for permanent pasture. Grazing when this soil is wet and overgrazing are major concerns in pasture management. Grazing when the soil is wet compacts the surface layer. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs.

This soil has good potential for trees, and part of the area is wooded. Potential productivity is good. Use of equipment is restricted for most of the year because of the seasonal high water table. Machine planting large areas is practical.

This soil is seriously limited for most nonfarm uses by the seasonal high water table and very slow permeability. The water table is a hazard for buildings with subsurface basements. Capability subclass IIIw.

MoB—Morris extremely stony silt loam, 0 to 8 percent slopes. This nearly level and gently sloping, somewhat poorly drained soil is on broad plateaus and ridges adjacent to drainageways and in depressions. Slopes are undulating and are variable in length. Areas are irregular in shape and normally are 5 to more than 100 acres in size.

Typically, the surface layer is dark reddish brown channery silt loam about 4 inches thick. The subsoil is 56 inches thick. The upper part of the subsoil is reddish brown channery silt loam 6 inches thick. The next part is pinkish gray, friable gravelly loam 5 inches thick; the next part is weak red, firm and brittle gravelly loam 8 inches thick; and the lower part is reddish brown, very firm and firm and brittle gravelly loam 37 inches thick.

Included with this soil in mapping are some areas of Morris soils that have a very stony and channery silt loam surface layer. A few small areas of Norwich and Wellsboro soils are also included.

Permeability is very slow, and available water capacity is moderate. Reaction is medium acid and strongly acid above a depth of 4 feet. This soil has numerous large stones on the surface. A high water table is at a depth of 6 to 18 inches during wet seasons. Surface runoff is slow. Rooting depth is restricted by the fragipan in the subsoil and by the seasonal high water table.

This soil is mostly used for woodland.

This soil is too stony and too wet for crops or pasture. It is better suited to trees. Potential is poor for homesites because of the seasonal high water table and poor for most other nonfarm uses because of very slow permeability, seasonal high water table, and extremely stony surface. The seasonal high water table and very slow permeability also limit onsite waste disposal.

This soil is not used for cultivated crops or for pasture because of the seasonal high water table and surface stones. The cost of removing surface stones and woods and reducing the water table limits the potential for cultivated crops or pasture.

This soil is suited to trees and most of the acreage is wooded. Productivity is good. Removing undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Large surface stones interfere with harvesting and seeding.

This soil is seriously limited for most nonfarm uses by the seasonal high water table, very slow permeability, and extremely stony surface. Capability subclass VIIs.

MoC—Morris extremely stony silt loam, 8 to 20 percent slopes. This sloping and moderately steep, deep, somewhat poorly drained soil is on sides of ridges and plateaus adjacent to drainageways and in depressions. Slopes are rolling to hilly and are variable in length. Areas are irregular in shape and are 5 to more than 20 acres in size.

Typically, the surface layer is dark reddish brown channery silt loam about 4 inches thick. The subsoil is 56 inches thick. The upper part of the subsoil is reddish brown channery silt loam 10 inches thick; the middle part is pinkish gray, friable gravelly loam 5 inches thick; and the lower part is weak red, very firm and brittle gravelly loam 41 inches thick.

Included with this soil in mapping are small areas of Morris soils that have a very stony and channery silt loam surface layer. A few scattered areas of Norwich and Wellsboro soils are also included.

Permeability is very slow, and available water capacity is moderate. Surface runoff is medium. The subsoil has a fragipan. A high water table is at a depth of 6 to 18 inches for most of the year during wet seasons. Rooting depth is restricted by the fragipan and the seasonal high water table. In unlimed areas, reaction is medium acid and above a depth of 4 feet.

Most of the acreage of this soil is used for woodland. A few areas are used for developments.

This soil is too stony for cultivated crops and pasture and is better suited to trees, for which it has good potential. The stony surface, seasonal high water table, and

very slowly permeable fragipan limit the potential for most nonfarm uses.

Most of the acreage of this soil is wooded. Removing undesirable species helps to increase wood production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting is restricted by the numerous surface stones.

This soil is seriously limited for most nonfarm uses by very slow permeability, the seasonal high water table, and the extremely stony surface. Very slow permeability and the seasonal high water table seriously limit onsite waste disposal. The seasonal high water table and stoniness are hazards for buildings with subsurface basements. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass VIIs.

Mp—Mucky peat, deep. These nearly level, deep, very poorly drained organic soils are in depressions on broad plateaus, mountains, and ridges and in broad valleys adjacent to major drainageways. Slopes are flat to slightly concave and hummocky and are variable in length. Areas are irregular in shape and are 10 to more than 50 acres in size.

Mucky peat, deep, consists of 3 feet or more of organic muck and peat over mineral soil material.

Included with these soils in mapping are small areas of mucky peat, shallow, and a few areas that have numerous stones on and in the soil. A few scattered areas of Norwich, Alden, Chippewa, Wayland, and Holly soils are also included.

Permeability is moderately rapid, and available water capacity is high. Surface runoff is very slow. A water table is at the surface for most of the year. Surface water ponding and flooding are common. Rooting depth is restricted by the high water table.

Most of the acreage of these soils are in brush and poor quality woodland. A few small areas have been drained and are used for mining peat.

These soils have a poor potential for trees. The high water table, organic material, and flooding limit the potential for most nonfarm uses.

Mucky peat, deep, is too wet for cultivated crops unless it is drained. If drained, these soils have potential for crops and vegetables. Potential for pasture and trees is very poor.

These soils are too wet for most nonfarm uses. Flooding, the high water table, and high content of organic material seriously limit building locations and onsite waste disposal. Wildlife habitat and open space are possible uses. Capability subclass VIIw.

Ms—Mucky peat, shallow. These nearly level, deep, very poorly drained organic soils are in depressions on broad plateaus, mountains, and ridges and in broad valleys adjacent to major drainageways. Slopes are flat to slightly concave and hummocky and are variable in length. Areas are irregular in shape and are 5 to more than 40 acres in size.

Mucky peat, shallow, consists of 18 to 36 inches of organic muck and peat over mineral soil material.

Included with these soils in mapping are small areas of mucky peat, deep, and a few areas that have numerous stones on and in the soil. A few scattered areas of Norwich, Alden, Chippewa, Wayland, and Holly soils are also included.

Permeability is moderately rapid, and available water capacity is high. Surface runoff is very slow. A water table is at the surface for most of the year. Surface water ponding and flooding are common. Rooting depth is restricted by the high water table.

Most areas of these soils are in brush and poor quality woodland.

Potential is poor for trees. The high water table, organic material, and flooding limit the potential for most nonfarm uses.

Mucky peat, shallow, is too wet for cultivated crops, unless it is drained. If drained these soils have potential for crops and vegetables. Potential for pasture and trees is very poor.

These soils are too wet for most nonfarm uses. Flooding, the high water table, and high content of organic material seriously limit building locations and onsite waste disposal. Wildlife habitat and open space are possible uses. Capability subclass VIIw.

OkB—Oquaga-Lackawanna channery loams, 3 to 8 percent slopes. These moderately deep and deep, well drained, gently sloping soils are on tops of mountains, ridges, and plateaus. Slopes are nearly smooth and are 250 to 450 feet long. Areas are usually irregular in shape and normally are 3 to 17 acres in size.

This complex is about 50 percent Oquaga soil, 35 percent Lackawanna soil, and 15 percent included soils. These soils are mapped together because they occur in such intricate patterns that it is not practical to separate them at the scale of mapping.

Typically, the Oquaga soil has a surface layer of dark brown channery loam about 9 inches thick. The subsoil is 23 inches thick. The upper part of the subsoil is reddish brown, friable channery loam 9 inches thick; and the lower part is dark brown and reddish brown, friable channery loam 14 inches thick. The substratum is reddish brown, friable very channery loam. Partly weathered sandstone bedrock is at a depth of 38 inches.

Typically, the Lackawanna soil has a surface layer of reddish brown channery loam about 9 inches thick. The subsoil is 51 inches thick. The upper part of the subsoil is reddish brown, friable channery loam 24 inches thick; and the lower part is a weak red, very firm and brittle channery loam fragipan 27 inches thick.

Included with these soils in mapping are a few small areas of a soil that is similar to these soils but that is less than 20 inches deep over bedrock and areas of less sloping Oquaga and Lackawanna soils. Small areas of Wellsboro and Lordstown soils are also included.

Permeability is slow to moderate, and available water capacity is very low to moderate. In unlimed areas, reaction is extremely acid to strongly acid throughout. Surface runoff is slow to medium. Rooting depth is restricted by the moderate depth to bedrock and by the fragipan.

These soils are used mainly for crops or pasture or are idle. A few areas are used for homesites.

These soils have fair to good potential for farming. Potential is good for pasture and woodland. The slow permeability, moderate depth to bedrock, and channery surface limit the potential for most nonfarm uses.

If these soils are used for cultivated crops, the hazard of erosion is moderate. Further erosion results in a shallower rooting depth and lower available water capacity for plants. Minimum tillage, cover crops, and grass and legumes in the cropping systems reduce runoff and control erosion. Stripcropping can be used where the topography is suitable. Returning some crop residue to the surface layer helps to maintain organic-matter content and reduce the tendency of the soils to clod and crust.

If these soils are used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed for optimum production.

A small acreage of these soils used for woodland, and many idle areas are reverting to trees. Productivity is good. Management concerns are minor. Machine planting in large areas is generally practical.

These soils are limited for nonfarm uses by moderate depth to bedrock, slow permeability and channery surface. The restricted depth to bedrock limits excavations for buildings. Depth to bedrock and slow permeability seriously limit onsite waste disposal. If this soil is disturbed for construction, erosion-control practices are needed. Capability subclass IIe.

OkC—Oquaga-Lackawanna channery loams, 8 to 15 percent slopes. These moderately deep and deep, well drained, sloping soils are on sides of mountains and ridges and in sloping areas on broad plateaus. Slopes are rolling and are 250 to 600 feet long. Areas are usually irregular in shape and normally are 4 to 12 acres in size.

This complex is about 55 percent Oquaga soil, 30 percent Lackawanna soil, and 15 percent included soils. These soils are mapped together because they occur in such intricate patterns that it is not practical to separate them at the scale of mapping.

Typically, the Oquaga soil has a surface layer of dark brown channery loam about 9 inches thick. The subsoil is 29 inches thick. The upper part of the subsoil is reddish brown, friable channery loam 9 inches thick; and the lower part is dark brown and reddish brown, friable channery loam 12 inches thick. The substratum is reddish brown, friable very channery loam. Partly weathered sandstone bedrock is at a depth of 36 inches.

Typically, the Lackawanna soil has a surface layer of reddish brown channery loam about 9 inches thick. The subsoil is 51 inches thick. The upper part of the subsoil is reddish brown, friable channery loam 24 inches thick; and the lower part is a weak red, very firm and brittle channery loam fragipan 27 inches thick.

Included with these soils in mapping are a few small areas of a soil that is similar to these soils but that is less than 20 inches deep over bedrock and areas of less sloping Oquaga and Lackawanna soils. Small areas of Wellsboro and Lordstown soils are also included.

Permeability is slow to moderate, and available water capacity is very low to moderate. In unlimed areas, reaction is extremely acid to strongly acid throughout. Surface runoff is medium. Rooting depth is restricted by the moderate depth to bedrock and by the fragipan.

These soil are used mainly for crops or pasture or are idle. A few are used for homesites.

These soils have fair to good potential for farming. Potential is good for pasture and for woodland. The slow permeability, moderate depth to bedrock, and channery surface limit the potential for most nonfarm uses.

If these soils are used for cultivated crops, the hazard of erosion is moderate. Further erosion results in a shallower rooting depth and lower available water capacity for plants. Minimum tillage, cover crops, and grass and legumes in the cropping system reduce runoff and control erosion. Contour stripcropping is needed where the topography is suitable. Returning some crop residue to the surface layer helps to maintain organic-matter content and reduce the tendency of the soils to clod and crust.

If these soils are used for pasture, proper stocking rates to maintain key plant species and rotation of pasture are the chief management needs. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production.

A small acreage of these soils is used for woodland, and many idle areas are reverting to trees. Productivity is good. Constructing roads on the contour during harvesting reduces erosion. Machine planting in large areas is generally practical.

These soils are limited for nonfarm uses by moderate depth to bedrock, slow permeability, channery surface, and slope. The restricted depth to bedrock limits excavations for buildings. Depth to bedrock and slow permeability seriously limit onsite waste disposal. If this soil is disturbed for construction, erosion-control practices are needed. Capability subclass IIIe.

OkD—Oquaga-Lackawanna channery loams, 15 to 25 percent slopes. These moderately deep and deep, well drained, moderately steep soils are on sides of mountains, ridges, and plateaus. Slopes are generally hilly and are about 300 to more than 1,000 feet long. Areas are usually rectangular to crescent in shape and are from 3 to 12 acres in size.

This complex is about 60 percent Oquaga soil, 25 percent Lackawanna soil, and 15 percent included soils. These soils are mapped together because they occur in

such intricate patterns that it is not practical to separate them at the scale of mapping.

Typically, the Oquaga soil has a surface layer of dark brown channery loam about 9 inches thick. The subsoil is 21 inches thick. The upper part of the subsoil is reddish brown, friable channery loam 11 inches thick; and the lower part is dark brown and reddish brown, friable channery loam 10 inches thick. The substratum is reddish brown, friable very channery loam. Partly weathered sandstone bedrock is at a depth of 34 inches.

Typically, the Lackawanna soil has a surface layer of reddish brown channery loam about 9 inches thick. The subsoil is 51 inches thick. The upper part of the subsoil is reddish brown, friable channery loam 24 inches thick; and the lower part is a weak red, very firm and brittle channery loam fragipan 27 inches thick.

Included with these soils in mapping are a few small areas of a similar soil that is less than 20 inches deep over bedrock and areas of Oquaga and Lackawanna soils that have slightly steeper slopes. Small areas of Lordstown and Bath soils are also included.

Permeability is slow to moderate, and available water capacity is very low to moderate. In unlimed areas, reaction is extremely acid to strongly acid throughout. Surface runoff is rapid. Rooting depth is restricted by the moderate depth to bedrock and by the fragipan.

These soils are used mainly for hay or are idle.

These soils have fair potential for farming. Potential is fair for pasture and good for woodland. Depth to bedrock, slope, coarse fragments, and slow permeability limit the potential for most nonfarm uses.

If these soils are used for cultivated crops, the hazard of erosion is severe. Further erosion results in a shallower rooting depth and lower available water capacity for plants. Contour stripcropping, minimum tillage, diversions, cover crops, grasses and legumes in the cropping system reduce runoff and control erosion. In places, bedrock can hinder the construction of diversions. Incorporating some crop residue and manure into the surface layer helps to maintain organic-matter content and reduce the tendency of the soils to clod and crust.

If these soils are used for pasture, proper stocking rates to maintain key plant species and rotation of pasture are the chief management needs. Periodic applications of nutrients to maintain fertility are needed for optimum production.

A moderate acreage of these soils is wooded because many idle areas are reverting to trees. Productivity is good. Loss of seedlings is moderate because of very low to moderate available water capacity. Machine planting in large areas is generally practical.

These soils are limited for nonfarm uses by slope, depth to bedrock, channery surface, and slow permeability. The moderate depth to bedrock, slope, and slow permeability seriously limit onsite waste disposal. When disturbed for construction, erosion- and sediment-control practices are needed. Capability subclass IVe.

OxB—Oquaga-Lackawanna extremely stony loams, 0 to 8 percent slopes. These moderately deep and deep, extremely stony, nearly level and gently sloping soils are on the tops of ridges, mountains, and broad plateaus. Slopes are smooth to convex and are variable in length. Areas are usually irregular in shape and normally are 10 to more than 40 acres in size.

This complex is about 50 percent Oquaga soil, 35 percent Lackawanna soil, and 15 percent included soils. These soils are mapped together because they occur in such intricate patterns that it is not practical to separate them at the scale of mapping.

Typically, the Oquaga soil has a surface layer of dark reddish brown channery sandy loam about 2 inches thick. The subsoil is 18 inches thick. The upper part of the subsoil is dark reddish brown, friable channery loam 4 inches thick; and the lower part is strong brown and reddish brown, friable channery loam 14 inches thick. The substratum is reddish brown, friable channery loam. Partly weathered sandstone bedrock is at a depth of 28 inches.

Typically, the Lackawanna soil has a surface layer of dark reddish brown channery loam about 4 inches thick. The subsurface layer is reddish brown channery loam 4 inches thick. The subsoil is 52 inches thick. The upper part of the subsoil is reddish brown, very friable channery loam 24 inches thick; and part is a weak red, very firm and brittle channery loam fragipan 28 inches thick.

Included with these soils in mapping are a few small areas of nonstony and very stony Oquaga and Lackawanna soils and small areas of Wellsboro and Lordstown soils. Small areas of rock outcrop of a soil that is similar to these soils but that is less than 20 inches deep over bedrock are also included.

Permeability is slow to moderate and available water capacity is low to moderate. In unlimed areas, reaction is strongly acid to extremely acid throughout. Surface runoff is slow. Rooting depth is restricted by the depth to bedrock and by the fragipan.

These soils are used mainly for woodland.

These soils have poor potential for farming. They have good potential for woodland. Slow permeability, moderate depth to bedrock, and stoniness limit the potential for most nonfarm uses.

These soils are not used for cultivated crops or pasture because of the stony surface.

A large acreage of these soils is wooded. Productivity is good. Surface stones limit equipment use and interfere with machine planting.

These soils are limited for nonfarm uses by depth to bedrock, stoniness, and slow permeability. These characteristics seriously limit building locations and onsite waste disposal. Capability subclass VIIs.

OxC—Oquaga-Lackawanna extremely stony loams, 8 to 25 percent slopes. These moderately deep and deep, extremely stony, sloping and moderately steep soils are on sides of mountains and ridges and in sloping areas on broad plateaus. Slopes are rolling to hilly and are

variable in length. Areas are usually irregular in shape and normally are 10 to more than 75 acres in size.

This complex is about 60 percent Oquaga soil, 30 percent Lackawanna soil, and 10 percent included soils. These soils are mapped together because they occur in such intricate patterns that it is not practical to separate them at the scale of mapping.

Typically, the Oquaga soil has a surface layer of dark reddish brown channery sandy loam 1 inch thick. The subsoil is 17 inches thick. The upper part of the subsoil is dark reddish brown, friable channery loam 2 inches thick; and the lower part is reddish brown, strong brown, and dark brown, friable channery loam 15 inches thick. The substratum is reddish brown, friable very channery loam. Partly weathered sandstone bedrock is at a depth of 26 inches.

Typically, the Lackawanna soil has a surface layer of dark reddish brown channery loam about 4 inches thick. The subsurface layer is reddish brown channery loam 4 inches thick. The subsoil is 52 inches thick. The upper part of the subsoil is reddish brown, friable channery loam 24 inches thick; and the lower part is a weak red, very firm and brittle channery loam fragipan 28 inches thick.

Included with these soils in mapping are a few small areas of nonstony and very stony Oquaga and Lackawanna soils and small areas of Wellsboro and Lordstown soils. A soil that is similar to these soils but that is less than 20 inches deep over bedrock and a few areas of rock outcrop are also included.

Permeability is slow to moderate, and available water capacity is very low to moderate. In unlimed areas, reaction is strongly acid to extremely acid throughout. Surface runoff is medium. Rooting depth is restricted by the depth to bedrock and by the fragipan.

These soils are used mainly for woodland.

These soils have poor potential for farming. They have poor to good potential for woodland. Slope, surface stones, slow permeability, and depth to bedrock limit the potential for most nonfarm uses.

These soils are not used for cultivated crops and pasture because of the extremely stony surface.

A large acreage of these soils is used for woodland. Productivity for woodland is good. Surface stones limit equipment use and interfere with mechanical planting of trees. Constructing roads on the contour during harvesting reduces erosion.

These soils are seriously limited for nonfarm uses by stoniness, depth to bedrock, slope, and slow permeability. Moderate depth to bedrock, slow permeability, and the numerous surface stones seriously limit onsite waste disposal. Depth to bedrock and surface stones limit deep excavations. Capability subclass VIIs.

Ph—Philo silt loam. This nearly level, deep, moderately well drained soil is on flood plains adjacent to the major streams in the survey area. Slopes are usually about 200 to 500 feet long. Areas are generally oval in shape and are about 2 to 9 acres in size.

Typically, the surface layer is brown, friable silt loam about 10 inches thick. The subsoil is about 30 inches thick. The upper part of the subsoil is yellowish brown, friable silt loam 8 inches thick; and the lower part is brown, friable very fine sandy loam and fine sandy loam 22 inches thick. The substratum, to a depth of 60 inches, is brown, firm gravelly fine sandy loam.

Included with this soil in mapping are a few areas of gently sloping and eroded Philo soils and a few areas of Pope, Holly, and Wayland soils. Also included are scattered areas of a soil that is similar to this Philo soil but that has a redder subsoil.

Permeability is moderate, and available water capacity is high. Surface runoff is slow. A high water table is at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the seasonal high water table. In unlimed areas, reaction is very strongly acid to medium acid throughout.

Most areas of this soil are used for crops or pasture or are idle. A few areas are used for recreation and summer homes.

This soil is well suited to crops and pasture. It has good potential for pasture and very good potential for trees. Common flooding and seasonal high water table limit the potential for many nonfarm uses. This soil has good potential for recreation.

If this soil is used for cultivated crops, the hazard of erosion is slight. Using cover crops, returning crop residue, and including grasses and legumes in the cropping system help maintain organic-matter content and good tilth. Diversions and covered drains help to remove excess water and allow timely tillage. Crops are severely damaged during floods.

If this soil is used for pasture, overgrazing and grazing when this soil is wet are major concerns in pasture management. Grazing when the soil is wet compacts the surface layer. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs. During periods of intense rainfall, cattle should be removed from this soil to protect them from flooding.

This soil is suited to trees but only a small acreage is wooded. Many idle areas are reverting to trees. Removing undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting is practical in large areas.

This soil is seriously limited for most nonfarm uses, including onsite waste disposal, by flooding and the seasonal high water table. Flooding is a serious hazard to buildings. Capability subclass IIs.

Po—Pope silt loam. This nearly level, deep, well drained soil is on flood plains. Slopes are about 300 to 900 feet long. Areas are oval to crescent in shape and are 3 to 14 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 10 inches thick. The subsoil is brown and dark yellowish brown, very friable silt loam 20 inches thick. The substratum, to a depth of 60 inches, is brown, very friable loamy very fine sand.

Included with this soil in mapping are a few areas of gravelly and gently sloping Pope soils and scattered areas of Philo and Holly soils. Small areas of a soil that is similar to this Pope soil but that has a reddish subsoil are also included.

Permeability is moderate to moderately rapid, and available water capacity is high. Surface runoff is slow. This soil is commonly flooded. In unlimed areas, reaction is strongly acid and very strongly acid throughout.

Most of the acreage of this soil is used for crops, pasture, and hay or is idle. Small areas are used for recreation and summer homes.

This soil has excellent potential for farming and is well suited to pasture and trees. The potential for homesites is very poor because of flooding, which limits onsite waste disposal. Flooding is the major limitation for most other nonfarm uses. This soil has good potential for recreation.

If this soil is used for cultivated crops, the hazard of erosion is slight. Crops respond well to fertilizer and to good management. Growing cover crops, using crop residue, and including hay in the cropping system maintain the organic-matter content and good tilth. Crops are severely damaged during floods.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed for optimum production. During periods of intense rainfall, cattle should be removed from this soil to protect them from flooding.

This soil is suited to trees, but only a very small acreage is wooded. Productivity is excellent. Management concerns are minor. Machine planting is practical in large areas.

This soil is somewhat limited for nonfarm uses by common flooding. Flooding seriously limits homesites and onsite waste disposal. Capability class I.

Pp—Pope silt loam, high bottom. This nearly level, deep, well drained soil is on high bottoms and low terraces adjacent to the major streams in the county. Slopes are generally smooth and are about 300 to 600 feet long. Areas are rectangular to oval in shape and are 4 to 22 acres in size.

Typically, the surface layer is very dark grayish brown, friable silt loam about 10 inches thick. The subsoil is brown and dark yellowish brown, very friable silt loam 20 inches thick. The substratum, to a depth of 60 inches, is brown, very friable loamy very fine sand.

Included with this soil in mapping are a few areas of gravelly and gently sloping Pope soils and scattered areas of Philo, Holly, Chenango, and Wyoming soils. Small areas of a soil that is similar to this Pope soil but that has a reddish subsoil are also included.

Permeability is moderate to moderately rapid, and available water capacity is high. Surface runoff is slow. This soil is rarely flooded. In unlimed areas, reaction is strongly acid and very strongly acid throughout.

Most of the acreage of this soil is used for crops, pasture, and hay or is idle. A small area is used for homesites, summer homes, and recreation.

This soil has excellent potential for farming and is well suited to pasture and trees. The potential for homesites is very poor because of flooding, which limits onsite waste disposal. Potential is good for most other nonfarm uses for which rare flooding is not a limitation. This soil has good potential for recreation.

If this soil is used for cultivated crops, the hazard of erosion is slight. Crops respond well to fertilizer and to good management. Growing cover crops, using crop residue, and including hay in the cropping system maintain organic-matter content and good tilth. If this soil is flooded during the growing season, crops are severely damaged.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed for optimum production. During intense rainfall, cattle should be removed from this soil to protect them from flooding.

This soil is suited to trees, but only a very small acreage is wooded. Productivity is excellent. Management concerns are minor. Machine planting is practical in large areas.

This soil is somewhat limited for nonfarm uses by flooding. Flooding is a serious hazard for buildings and limits onsite waste disposal. Capability class I.

ReA—Rexford gravelly silt loam, 0 to 3 percent slopes. This deep, somewhat poorly drained to poorly drained, nearly level soil is on terraces and moraines. Slopes are slightly convex to smooth and are 250 to 500 feet long. Areas are oval to circular in shape and normally are 2 to 8 acres in size.

Typically, the surface is dark grayish brown gravelly silt loam about 10 inches thick. The subsoil is 26 inches thick. The upper part of the subsoil is mottled brown, friable gravelly loam 6 inches thick; the middle part is mottled brown and pale brown, very firm and brittle gravelly fine sandy loam 13 inches thick; and the lower part is mottled gray, firm and brittle gravelly sandy loam 7 inches thick. The substratum, to a depth of 60 inches, is mottled gray, very firm very gravelly coarse sandy loam.

Included with this soil in mapping are small areas of cobbly and stony Rexford soils and scattered areas of Braceville and Sheffield soils.

Permeability is slow, and available water capacity is moderate. In unlimed areas, reaction is very strongly acid to medium acid above the fragipan and medium acid and slightly acid in the fragipan and the substratum. A seasonal high water table is at a depth of 6 to 18 inches for most of the year. Surface runoff is slow. Rooting depth is re-

stricted by the seasonal high water table and by the fragipan in the subsoil.

Most areas of this soil are used for hay and pasture or are idle.

If properly drained, this soil can be used for row crops. It has good potential for permanent pasture and for trees. The seasonal high water table, gravelly surface, and slow permeability limit the potential for many nonfarm uses. This soil has some potential for wildlife habitat and recreation.

If this soil is used for cultivated crops, the hazard of erosion is slight. Excess water causes the soil to warm slowly in spring. Crops can be damaged by ponded water following intensive rainfalls. Excess surface water can be removed by keeping natural drainageways open. Open drains, and tile drains where outlets are available can be used to improve drainage.

If this soil is used for permanent pasture, grazing when the soil is wet and overgrazing are major concerns in pasture management. Grazing when the soil is wet compacts the surface layer. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs.

Part of the area of this soil is wooded, and many idle areas are reverting to trees. Potential productivity is good. Use of equipment is restricted for part of the year because of the seasonal high water table. Machine planting in large areas is practical.

This soil is seriously limited for most nonfarm uses by the seasonal high water table and slow permeability. Capability subclass IIIw.

ReB—Rexford gravelly silt loam, 3 to 8 percent slopes. This deep, somewhat poorly drained to poorly drained, gently sloping soil is on terraces and moraines. Slopes are concave to undulating and are 200 to 600 feet long. Areas are oval to circular in shape and normally are 2 to 12 acres in size.

Typically, the surface layer is dark grayish brown gravelly silt loam about 10 inches thick. The subsoil is 26 inches thick. The upper part of the subsoil is mottled brown, friable gravelly loam 6 inches thick. The middle part is mottled brown and pale brown, very firm and brittle gravelly firm sandy loam 13 inches thick; and the lower part is mottled gray, fine and brittle gravelly sandy loam 7 inches thick. The substratum, to a depth of 60 inches, is mottled gray, very firm very gravelly coarse sandy loam.

Included with this soil in mapping are small areas of cobbly, stony, and more sloping Rexford soils. Scattered areas of Braceville, Sheffield, Chenango, and Wyoming soils are also included.

Permeability is slow, and available water capacity is moderate. In unlimed areas, reaction is very strongly acid to medium acid above the fragipan and medium acid and slightly acid in the fragipan and the substratum. A seasonal high water table is at a depth of 6 to 18 inches for most of the year. Surface runoff is slow to medium. Rooting depth is restricted by the seasonal high water table and by the fragipan in the subsoil.

Most areas of this soil are used for hay and pasture or are idle.

If properly drained, this soil can be used for row crops. It has good potential for permanent pasture and for trees. The seasonal high water table, gravelly surface, and slow permeability limit the potential for many nonfarm uses. This soil has some potential for wildlife habitat and recreation.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Stripcropping, minimum tillage, sod waterways, and cover crops control erosion. Excess water causes the soil to warm slowly in the spring. Crops can be damaged by ponded water following intensive rainfalls. Excess surface water can be removed by keeping natural drainageways open. Open drains, and tile drains where outlets are available, can be used to improve drainage.

If this soil is used for permanent pasture, grazing when the soil is wet and overgrazing are major concerns in pasture management. Grazing when the soil is wet compacts the surface. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs. Open drains and subsurface drains improve the potential for pasture.

Part of the area of this soil is wooded. Potential productivity is good. Use of equipment is restricted for part of the year because of the seasonal high water table. Machine planting in large areas is practical.

This soil is severely limited for most nonfarm uses by the seasonal high water table and slow permeability. Capability subclass IIIw.

RuC—Rushtown shaly silt loam, 5 to 15 percent slopes. This gently sloping and sloping, deep, excessively drained soil is on low hills, foot slopes, and sides of ridges and on a few alluvial fans. Slopes are generally rolling and are 100 to 450 feet long. Areas are rectangular in shape and are 2 to 14 acres in size.

Typically the surface layer is dark grayish brown shaly silt loam about 9 inches thick. The subsoil is 11 inches thick. The upper part of the subsoil is dark yellowish brown, friable very shaly silt loam 5 inches thick; and the lower part is yellowish brown, loose very shaly silt loam 6 inches thick. The substratum, to a depth of 60 inches, is yellowish brown, loose very shaly silt loam.

Included with this soil in mapping are a few areas of less sloping and very shaly Rushtown soils and scattered areas of Weikert and Hartleton soils.

Permeability is rapid, and available water capacity is very low to low. Surface runoff is medium. The surface layer is more than 40 percent shale. In unlimed areas, reaction is medium acid and strongly acid throughout.

Most of the acreage of this soil is in permanent grass, and small areas are used for crops, pasture, and housing developments.

This soil has fair potential for farming and is fairly well suited to pasture and trees. The potential for homesites is mainly fair. Slope and the high content of coarse fragments are the major limitations for most other nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is severe. Crops respond fairly well to fertilizer and to good mangement. Contour stripcropping, diversions, sod waterways, and cover crops control erosion. Growing cover crops, using crop residue, and including hay in the cropping system maintain the organic-matter content and good tilth. The shaly surface interferes with the seeding of small grain and the mechanical harvesting of some crops such as potatoes. Leaching of plant nutrients and low to very low available water capacity are critical problems in this soil.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed for optimum production.

This soil is suited to trees, but only a very small acreage is wooded. Productivity is fair. Constructing roads on the contour during harvesting reduces erosion. Machine planting is practical in large areas. High seedling mortality seriously limits tree planting.

This soil is somewhat limited for nonfarm uses by slope, high content of coarse fragments, and rapid permeability. Rapid permeability limits onsite waste disposal because of the possibility of ground water contamination. Very low to low available water capacity, slope, and high content of coarse fragments limit other uses. Capability subclass IVe.

RuD—Rushtown shaly silt loam, 15 to 30 percent slopes. This moderately steep and steep, deep, excessively drained soil is on low hills and on foot slopes of ridges. Slopes are hilly and are about 200 to 700 feet long. Areas are rectangular in shape and are mainly 2 to 19 acres in size.

Typically, the surface layer is dark grayish brown shaly silt loam 9 inches thick. The subsoil is 11 inches thick. The upper part of the subsoil is dark yellowish brown, friable very shaly silt loam 5 inches thick; and the lower part is yellowish brown, loose very shaly silt loam 6 inches thick. The substratum, to a depth of 60 inches, is yellowish brown, loose very shaly silt loam.

Included with this soil in mapping are a few small areas of steeper, severely eroded, and very shaly Rushtown soils. Small scattered areas of Weikert and Hartleton soils are also included.

Permeability is rapid, and available water capacity is very low to low. Surface runoff is rapid to very rapid. The surface layer is more than 40 percent shale. In unlimed areas, reaction is medium acid and strongly acid throughout.

Most areas of this soil are in permanent grass. Small areas are used for woodland or pasture or are idle.

This soil has poor potential for cultivated crops and is fairly well suited to pasture and trees. The potential for homesites is very poor. Slope and rapid permeability limit the potential for onsite waste disposal. Moderately steep and steep slopes and high content of shale fragments are the main limitations for most other nonfarm uses.

This soil is too steep and too erodible for cultivated crops. Further erosion reduces the rooting depth and lowers available water capacity.

This soil has fair potential for pasture. If the soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients maintain fertility and are needed for optimum production.

This soil is fairly well suited to trees, but only a small acreage is wooded. Productivity is fair. Slope limits use of equipment and mechanical plantings. Constructing roads on the contour during harvesting reduces erosion. High seedling mortality seriously limits tree planting.

This soil is seriously limited for nonfarm uses by moderately steep and steep slope. Slope and rapid permeability limit onsite waste disposal because of the possibility of ground water contamination. Capability subclass VIe.

Sh—Sheffield silt loam. This deep, poorly drained, nearly level soil is on old stream terraces. Slopes are smooth to slightly concave and are 400 to 1,000 feet long. Areas are irregular in shape and normally are 3 to 20 acres in size.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is 31 inches thick. The upper part of the subsoil is mottled light brownish gray, reddish yellow, and light gray, friable and firm silty clay loam 12 inches thick; and the lower part is mottled, gray and light gray, very firm and brittle silty clay loam 19 inches thick. The substratum, to a depth of 60 inches, is brown, very firm shaly silty clay loam.

Included with this soil in mapping are small areas of eroded Sheffield soils and scattered areas of Rexford and Shelmadine soils.

Permeability is very slow, and available water capacity is moderate. In unlimed areas, reaction is strongly acid to neutral throughout. A high water table is at a depth of less than 6 inches for most of the year. Surface runoff is slow. Rooting depth is restricted by the high water table and by the fragipan in the subsoil.

Most areas of this soil are used for pasture or woodland or are idle.

If properly drained this soil can be used for row crops. It has good potential for permanent pasture and for trees. The high water table and very slow permeability limit the potential for many nonfarm uses. This soil has some potential for wildlife habitat and for recreation.

If this soil is used for cultivated crops, the hazard of erosion is slight. Excess water causes the soil to warm slowly in spring. Crops can be damaged by ponded water following intensive rainfalls. Excess surface water can be removed by keeping natural drainageways open. Open

drains, and tile drains where outlets are available, improve drainage.

If this soil is used for permanent pasture, grazing when this soil is wet and overgrazing are major concerns in pasture management. Grazing when the soil is wet compacts the surface layer. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs. Open and subsurface drains improve the potential for pasture.

This soil has good potential for trees, but only part of the area is wooded. Potential productivity is good. Use of the equipment is restricted for most of the year because of the high water table. Machine planting in large areas is practical.

This soil is seriously limited for most nonfarm uses by the high water table and very slow permeability. Capability subclass IIIw.

SmA—Shelmadine silt loam, 0 to 3 percent slopes. This deep, poorly drained, nearly level soil is on flats and in depressions on uplands. Slopes are nearly smooth and are about 250 to 600 feet long. Areas are oval to crescent in shape and normally are 2 to 6 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 10 inches thick. The subsoil is 38 inches thick. The upper part of the subsoil is mottled light grayish brown, friable shaly heavy silt loam 10 inches thick; and the lower part is mottled light yellowish brown and olive brown, firm and brittle shaly loam 28 inches thick. The substratum, to a depth of 60 inches, is mottled dark brown, friable very channery loam.

Included with this soil in mapping are small areas of shaly, gravelly, and gently sloping Shelmadine soils and scattered areas of Alvira and Buchanan soils.

Permeability is slow, and available water capacity is moderate. In unlimed areas, reaction is strongly acid to extremely acid throughout. A high water table is at a depth of less than 6 inches for most of the year. Surface runoff is slow. Rooting depth is restricted by the high water table and the fragipan in the subsoil.

Most areas of this soil are used for grass or are idle.

If properly drained, this soil can be used occasionally for row crops. Potential is good for pasture and for trees. The high water table and slow permeability limit the potential for many nonfarm uses. This soil has some potential for wildlife habitat and recreation.

If this soil is used for cultivated crops, the hazard of erosion is slight. Excess water causes the soil to warm slowly in spring. Crops can be damaged by ponded water following intensive rainfalls. Excess surface water can be removed by keeping natural drainageways open. Open drains and subsurface drains where outlets are available improve drainage.

If this soil is used for pasture, grazing when the soil is wet and overgrazing are major concerns in pasture management. Grazing when the soil is wet compacts the surface layer. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs.

This soil is suited to moisture-tolerant trees. A small part of the area is wooded. Potential productivity is good. Use of equipment is restricted for most of the year because of the high water table. Machine planting in large areas is practical.

This soil is severely limited for most nonfarm uses by high water table and slow permeability. Capability subclass IVw.

SpB—Shelmadine very stony silt loam, 0 to 8 percent slopes. This nearly level and gently sloping, deep, poorly drained soil is on flats and in depressions on uplands. Slopes are smooth and concave and are about 200 to 800 feet long. Areas are irregular in shape and are 2 to more than 10 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 6 inches thick. The subsoil is 42 inches thick. The upper part of the subsoil is mottled grayish brown, friable shaly silt loam 4 inches thick; the middle part is mottled light brownish gray, friable shaly heavy silt loam 10 inches thick; and the lower part is mottled light yellowish brown and olive brown, firm and brittle shaly loam 28 inches thick. The substratum, to a depth of 60 inches, is mottled dark brown, friable very channery loam.

Included with this soil in mapping are small areas of nonstony, extremely stony, and sloping Shelmadine soils. A few scattered areas of Alvira and Buchanan soils are also included.

Permeability is slow, and available water capacity is moderate. Surface runoff is slow. The subsoil has a fragipan. A high water table is at a depth of less than 6 inches for most of the year. Rooting depth is restricted by the fragipan and the high water table. In unlimed areas, reaction is strongly acid to extremely acid throughout.

Most of the acreage of this soil is used for woodland. Some areas are in poorly managed pasture. A few areas are used for development.

This soil is too stony and wet for cultivated crops and pasture and is better suited to trees. Potential is good for trees. The stony surface, high water table, and slowly permeable fragipan limit the potential for most nonfarm uses.

Most of the acreage of this soil is wooded. Removing undesirable species helps to increase wood production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting is practical in the larger areas.

This soil is seriously limited for most nonfarm uses by slow permeability, high water table, and stony surface. Slow permeability and the high water table seriously limit onsite waste disposal. The high water table is a hazard for buildings with subsurface basements. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass VIIs.

SwB—Swartswood channery sandy loam, 3 to 8 percent slopes. This gently sloping, deep, well drained soil is on tops of plateaus and ridges. Slopes are uniform and are 150 to 550 feet long. Areas are irregular in shape and normally are 3 to 21 acres in size.

Typically, the surface layer is dark brown channery sandy loam 9 inches thick. The subsoil is about 51 inches thick. The upper part of the subsoil is yellowish brown, friable channery loam 6 inches thick; the middle part is brown, friable gravelly sandy loam 19 inches thick; and the lower part is yellowish brown firm and brittle gravelly sandy loam 26 inches thick.

Included with this soil in mapping are small areas of gravelly, very stony, and nearly level Swartswood soils. Also included are a few small areas of Lackawanna and Wurtsboro soils.

Permeability is slow to moderately slow, and available water capacity is moderate. In unlimed areas, reaction is strongly acid to extremely acid. Although soil is well drained, a temporary perched water table is present in wet seasons. Surface runoff is medium. Rooting depth is restricted by the fragipan in the subsoil.

Most areas of this soil are presently idle, and small areas are used for woodland, pasture, and homesites.

Potential is good for farming, and this soil is well suited to pasture and trees. The potential for homesites is mainly good, but it is poor for onsite waste disposal because of the slowly to moderately slowly permeable subsoil.

If cultivated crops are grown, the hazard of erosion is moderate. Minimum tillage, cover crops, and grasses and legumes in the cropping system reduce runoff and control erosion. Stripcropping and diversions can be used where the topography is suitable. Incorporating crop residue and manure into the surface layer helps to maintain organic-matter content and reduce the tendency of this soil to clod and crust.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic application of nutrients to maintain fertility are needed to obtain optimum production.

This soil is suited to trees, but only a very small acreage is wooded. Many idle areas are reverting to trees. Productivity is good. Management concerns are minor. Machine planting is practical in large areas.

This soil is somewhat limited for nonfarm uses by slow to moderately slow permeability in the fragipan and coarse fragments. Slow to moderately slow permeability seriously limits onsite waste disposal. During construction on this soil, erosion- and sediment-control practices are needed. Capability subclass IIe.

SwC—Swartswood channery sandy loam, 8 to 15 percent slopes. This sloping, deep, well drained soil is on upper parts of sides of plateaus and ridges. Slopes are rolling and are 250 to 700 feet long. Areas are irregular in shape and normally are 3 to 17 acres in size.

Typically, the surface layer is dark brown channery sandy loam about 9 inches thick. The subsoil is 51 inches thick. The upper part of the subsoil is yellowish brown, friable channery loam 6 inches thick; the middle part is brown, friable gravelly sandy loam 19 inches thick; and the lower part is yellowish brown, firm and brittle gravelly sandy loam 26 inches thick.

Included with this soil in mapping are small areas of gravelly, very stony, and nearly level Swartswood soils. Also included are a few small areas of Lackawanna and Wurtsboro soils.

Permeability is slow to moderately slow, and available water capacity is moderate. In unlimed areas, reaction is strongly acid to extremely acid. Although the soil is well drained, a temporary perched water table is present during wet seasons. Surface runoff is medium to rapid. Rooting depth is restricted by the fragipan layer in the subsoil.

Most areas of this soil are presently idle. Small areas are used for pasture, woodland, or homesites.

This soil has good potential for farming and is well suited to pasture and trees. The potential for homesites is fair, but for onsite waste disposal it is poor because of the slowly to moderately slowly permeable subsoil.

If this soil is used for cultivated crops, the hazard of erosion is severe. Minimum tillage, cover crops, and grasses and legumes in the cropping system reduce runoff and control erosion. Where the topography is suitable, contour stripcropping and diversions can be used. Returning some crop residue to the surface layer helps to maintain organic-matter content and reduce the tendency of this soil to clod and crust.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pasture are the chief management needs. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production.

This soil is suited to trees, but only a small acreage is wooded. Many idle areas are reverting to trees. Productivity is good. Management concerns are moderate because of slope. Machine planting is practical in large areas. Placing roads on the contour during harvesting reduces erosion.

This soil is somewhat limited for nonfarm uses by the slow to moderately slow permeability in the fragipan and coarse fragments. Slow to moderately slow permeability seriously limits onsite waste disposal. During construction on this soil, erosion- and sediment-control practices are needed. Capability subclass IIIe.

SxB—Swartswood extremely stony sandy loam, 0 to 8 percent slopes. This nearly level and gently sloping, extremely stony, well drained soil is on the tops of plateaus and ridges. Slopes are generally smooth to undulating and are 300 to more than 1,200 feet long. Areas are irregular in shape and are about 5 to more than 50 acres in size.

Typically, the surface layer is very dark gray channery fine sandy loam about 3 inches thick. The subsurface layer is grayish brown channery sandy loam 2 inches thick. The subsoil is about 55 inches thick. The upper part of the subsoil is dark yellowish brown channery sandy loam 10 inches thick; the middle part is dark brown and brown, friable gravelly sandy loam and gravelly loam 18 inches thick; and the lower part is yellowish brown, firm and brittle gravelly sandy loam 27 inches thick.

Included with this soil in mapping are a few areas of nonstony and eroded Swartswood soils. Also included are scattered areas of Lackawanna, Wurtsboro, and Worth soils.

Permeability is slow to moderately slow, and available water capacity is moderate. Surface runoff is slow. The subsoil has a firm and brittle fragipan, which restricts rooting depth. In unlimed areas, reaction is strongly acid to extremely acid throughout.

Most areas of this soil are used for woodland. A few areas are used for homesites and recreation.

This soil is too stony for cultivated crops and pasture. It is better suited to trees, for which it has good potential. Moderately slow to slow permeability, surface stones, and coarse fragments limit the potential for many nonfarm uses.

This soil is suited to trees, and most areas are wooded. Many idle areas are reverting to trees. Removing undesirable species helps to increase production. Large surface stones interfere with equipment use and machine planting.

This soil is seriously limited for some nonfarm uses by moderately slow to slow permeability and numerous surface stones. Moderately slow to slow permeability in the fragipan and high content of surface stones seriously limit onsite waste disposal. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass VIIs.

SxC—Swartswood extremely stony sandy loam, 8 to 25 percent slopes. This sloping and moderately steep, extremely stony, well drained soil is on the upper parts of sides of ridges and plateaus. Slopes are generally rolling to hilly and are 300 to 1,200 feet long. Areas are irregular in shape and are about 8 to more than 60 acres in size.

Typically, the surface layer is very dark gray channery fine sandy loam about 1 inch thick. The subsurface layer is grayish brown channery sandy loam about 1 inch thick. The subsoil is about 58 inches thick. The upper part of the subsoil is dark yellowish brown, friable channery sandy loam 13 inches thick; the middle part is dark brown, brown, and yellowish brown, friable gravelly sandy loam and gravelly loam 19 inches thick; and the lower part is yellowish brown, firm and brittle gravelly sandy loam 26 inches thick.

Included with this soil in mapping are a few areas of nonstony and very stony Swartswood soils. Also included are scattered areas of Lackawanna, Wurtsboro, and Worth soils.

Permeability is slow to moderately slow, and available water capacity is moderate. Surface runoff is slow. The subsoil has a firm and brittle fragipan, which restricts rooting depth. In unlimed areas, reaction is strongly acid to extremely acid throughout.

Most areas of this soil are used for woodland. A few areas are used for homesites and recreation.

This soil is too stony for cultivated crops and pasture. It is better suited to trees, for which it has good potential. Moderately slow to slow permeability, surface stones, and coarse fragments limit the potential for many nonfarm uses.

This soil is suited to trees, and most areas are wooded. Many idle areas are reverting to trees. Removing undesirable species helps to increase production. Large surface stones interfere with equipment use and machine planting.

This soil is seriously limited for some nonfarm uses by moderately slow to slow permeability and numerous surface stones. Moderately slow to slow permeability in the fragipan and high content of surface stones seriously limit onsite waste disposal. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass VIIs.

VaC—Very stony land and Rock outcrops, sloping. This miscellaneous area is on broad plateaus, mountains, ridgetops, and upper narrow valleys between ridges. Slopes are about 2 to 15 percent and are variable in width and length. Areas are elongated in shape on sides of ridges and irregular in shape on ridgetops and normally are 5 to more than 30 acres in size.

This unit consists of a mass of rock fragments with very little soil material between the fragments and of areas where bedrock has been exposed by geologic erosion. The thickness of the mass of rock material is variable and the Rock outcrops are bare.

Included with this unit in mapping are small areas of extremely stony soils. Also included are small areas of Mucky peat.

This miscellaneous area is too stony and rocky for almost all uses. Areas of this unit are mostly in poor quality woodland. A few scattered trees or shrubs grow on this unit, but none of these plants is economically important.

This miscellaneous area is too stony and rocky for cultivated crops, pasture, and woodland. It is also unsuited to most nonfarm uses, but it has some potential for wildlife habitat and open space. Capability subclass VIIIs.

VaE—Very stony land and Rock outcrops, steep. This miscellaneous area is on sides of ridges, mountains, and plateaus. Slopes are about 15 to more than 75 percent and are variable in width and length. Areas are elongated in shape and normally are 8 to more than 40 acres in size.

This unit consists of a mass of rock fragments with very little soil material between the fragments and of areas where bedrock has been exposed by geologic erosion.

The thickness of the mass of rock material is variable and the Rock outcrops are bare.

Included with this unit in mapping are small areas of extremely stony soils.

This miscellaneous area is too steep, stony, and rocky for almost all uses. Areas of this unit are mostly in poor quality woodland. A few scattered trees or shrubs grow on this unit, but none of these plants is economically important.

This miscellaneous area is too stony, rocky, and steep for cultivated crops, pasture, and woodland. It is also unsuited to most nonfarm uses, but it has some potential for wildlife habitat and open space. Capability subclass VIIIs.

VoA—Volusia gravelly silt loam, 0 to 3 percent slopes. This deep, somewhat poorly drained, nearly level soil is on mountains, ridges, and plateaus. Slopes are generally slightly concave and are 100 to 600 feet long. Areas are irregular in shape and normally are 3 to 14 acres in size.

Typically, the surface layer is very dark grayish brown gravelly silt loam about 9 inches thick. The subsoil is 51 inches thick. The upper part of the subsoil is mottled, yellowish brown and light yellowish brown, friable gravelly silt loam 7 inches thick; and the lower part is mottled, light olive gray and olive gray, firm and very firm and brittle gravelly loam 44 inches thick.

Included with this soil in mapping are small areas of channery and very stony Volusia soils and scattered areas of Chippewa, Wurtsboro, Mardin, and Norwich soils.

Permeability is very slow, and available water capacity is low in unlimed areas. Reaction is medium acid to very strongly acid in the upper part of the solum and strongly acid and medium acid in the lower part. A seasonal high water table is at a depth of 6 to 18 inches for most of the year. Surface runoff is slow. Rooting depth is restricted by the seasonal high water table and the fragipan in the subsoil.

Most areas of this soil are used for woodland, and some areas are used for homesites and recreation.

If properly drained, this soil can be used for row crops. Potential for pasture and for trees is good. The seasonal high water table and very slow permeability limit the potential for many nonfarm uses. This soil has some potential for wildlife habitat and recreation.

If this soil is used for cultivated crops, the hazard of erosion is slight. Excess water causes the soil to warm slowly in spring. Crops can be damaged by ponded water following intensive rainfalls. Excess surface water can be removed by keeping natural drainageways open. Open drains, and subsurface drains where outlets are available, improve drainage.

If this soil is used for permanent pasture, grazing when the soil is wet and overgrazing are major concerns in pasture management. Grazing when the soil is wet compacts the surface layer. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs.

A small part of the area of this soil is wooded. Many idle areas are reverting to trees. Potential productivity is good. Use of equipment is restricted for part of the year because of the seasonal high water table. Machine planting in large areas is practical.

This soil is seriously limited for most nonfarm uses by the seasonal high water table and very slow permeability. Capability subclass IIIw.

VoB—Volusia gravelly silt loam, 3 to 8 percent slopes. This deep, somewhat poorly drained, gently sloping soil is on mountains, ridges, and plateaus. Slopes are generally undulating to concave and are 150 to 650 feet long. Areas are irregular in shape and normally are 3 to 9 acres in size.

Typically, the surface layer is very dark grayish brown gravelly silt loam about 9 inches thick. The subsoil is 51 inches thick. The upper part of the subsoil is mottled, yellowish brown and light yellowish brown, friable gravelly silt loam 7 inches thick; and the lower part is mottled, light olive gray and olive gray, firm and very firm and brittle gravelly loam 44 inches thick.

Included with this soil in mapping are small areas of channery and very stony Volusia soils and scattered areas of Chippewa, Wurtsboro, Mardin, and Norwich soils.

Permeability is very slow, and available water capacity is low. In unlimed areas, reaction is medium acid to very strongly acid in the upper part of the solum and strongly acid and medium acid in the lower part. A seasonal high water table is at a depth of 6 to 18 inches for most of the year. Surface runoff is slow to medium. Rooting depth is restricted by the seasonal high water table and by the fragipan in the subsoil.

Most areas of this soil are used for woodland, and some areas are used for homesites and recreation.

If properly drained this soil can be used for row crops. Potential for permanent pasture and for trees is good. The seasonal high water table and very slow permeability limit the potential for many nonfarm uses. This soil has some potential for wildlife habitat and recreation.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Excess water causes the soil to warm slowly in spring. Crops can be damaged by ponded water following intensive rainfalls. Excessive surface water can be removed by keeping natural drainageways open. Open drains, and subsurface drains where outlets are available, improve drainage. Stripcropping, cover crops, diversions, and sod waterways control erosion.

If this soil is used for permanent pasture, grazing when the soil is wet and overgrazing are major concerns in pasture management. Grazing when the soil is wet compacts the surface layer. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs.

This soil has good potential for trees, and part of the area is wooded. Potential productivity is good. Use of equipment is restricted for most of the year because of the seasonal high water table. Machine planting in large areas is practical.

This soil is seriously limited for most nonfarm uses by the seasonal high water table and very slow permeability. The water table limits buildings with subsurface basements. Capability subclass IIIw.

VxB—Volusia extremely stony silt loam, 0 to 8 percent slopes. This nearly level to gently sloping, somewhat poorly drained soil is on plateaus and broad ridges adjacent to drainageways and in depressions. Slopes are undulating to concave and are variable in length. Areas are irregular in shape and normally are 3 to more than 15 acres in size.

Typically, the surface layer is light brownish gray gravelly silt loam about 2 inches thick. The subsoil is 58 inches thick. The upper part of the subsoil is yellowish brown and light yellowish brown, friable and very friable gravelly silt loam 8 inches thick; the middle part is mottled light yellowish brown, firm gravelly loam 6 inches thick; and the lower part is mottled, light olive gray and olive gray, firm and very firm and brittle gravelly loam 44 inches thick.

Included with this soil in mapping are some small areas of Volusia soils that have a very stony and gravelly silt loam surface layer. A few small areas of Wurtsboro, Chippewa, Mardin, and Norwich soils are also included.

Permeability is very slow, and available water capacity is low. Reaction is medium acid to very strongly acid in the upper part of the solum and strongly acid and medium acid in the lower part. This soil has numerous large stones on the surface. A seasonal high water table is at a depth of 6 to 18 inches during wet seasons. Surface runoff is slow. Rooting depth is restricted by the fragipan in the subsoil.

This soil is mostly used for woodland.

This soil is too stony and too wet for crops or pasture, but is suited to moisture-tolerant trees. This soil has poor potential for homesites because of the seasonal high water table. Potential for most other nonfarm uses is poor because of the water table, stony surface, and slow permeability.

This soil is not used for cultivated crops or for pasture because of the seasonal high water table and numerous large surface stones. The cost of removing surface stones and trees and reducing the water table limits the potential for cultivated crops or pasture.

This soil is suited to trees, and most of the acreage is wooded. Productivity is good. Removing undesirable species helps to increase production. Use of equipment is restricted part of the year because of the seasonal high water table. Also, large surface stones interfere with harvesting and seeding.

This soil is seriously limited for most nonfarm uses by the high water table, slow permeability, and extremely stony surface. The seasonal high water table and slow permeability limit onsite waste disposal. Capability subclass VIIs.

WaB—Watson silt loam, 2 to 8 percent slopes. This nearly level and gently sloping, deep, moderately well drained soil is on broad plateaus, ridgetops, and foot slopes. Slopes are generally slightly concave and are usually about 200 to 600 feet long. The areas are crescent to oval in shape and about 2 to 12 acres in size.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsoil is about 50 inches thick. The upper part of the subsoil is strong brown and reddish yellow, friable and firm gravelly silty clay loam 17 inches thick; and the lower part is yellowish red, very firm and brittle gravelly clay loam and gravelly loam 33 inches thick. Bedrock is at a depth of 60 inches.

Included with this soil in mapping are a few areas of stony, very stony, and channery Watson soils and a few areas of Allenwood, Hartleton, and Alvira soils.

Permeability is slow, and available water capacity is moderate. Surface runoff is slow to medium. The subsoil has a very firm fragipan. A high water table is at a depth of 18 to 36 inches for long periods during wet seasons. Rooting depth is restricted by the fragipan in the subsoil. In unlimed areas, reaction is extremely acid to strongly acid throughout.

Most areas of this soil are used for crops and hay. A few areas are used for pasture, woodland, recreation, or homesites.

This soil is better suited to grass and pasture, but it can be used for crops if properly managed. Potential is good for pasture and for trees. The seasonal high water table and slowly permeable subsoil limit the potential for many nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Stripcropping, minimum tillage, sod waterways, cover crops, and grasses and legumes in the cropping system help reduce runoff and control erosion. Diversions and covered drains help to remove excess water and allow timely tillage.

If this soil is used for pasture, overgrazing and grazing when the soil is wet are major concerns in pasture management. Grazing when the soil is wet compacts the surface layer. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs.

This soil is suited to trees, but only a small acreage is wooded. Many idle areas are reverting to trees. Removing undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting is practical in larger areas.

This soil is seriously limited for many nonfarm uses including onsite waste disposal, by slow permeability and the seasonal high water table. The seasonal high water table is a hazard for buildings with subsurface basements. Buildings with basements need foundation drains with

proper outlets to prevent seepage of water into the basement. Capability subclass IIe.

Wb—Wayland silty clay loam. This deep, very poorly drained, nearly level soil is on flood plains. Slopes are smooth to slightly hummocky and are 100 to 500 feet long. Areas are usually long and narrow in shape and normally are 2 to 10 acres in size.

Typically, the surface layer is very dark gray silty clay loam about 9 inches thick. The subsurface layer is mottled dark gray, friable silty clay loam 8 inches thick. The subsoil is mottled gray, friable silty clay loam 13 inches thick. The substratum, to a depth of 60 inches, is mottled gray, friable silty clay loam in the upper 11 inches and mottled dark gray, friable gravelly loam in the lower 19 inches.

Included with this soil in mapping are small areas of Wayland soils that have a silt loam surface layer. Also included are scattered areas of Very stony land, Holly and Norwich soils, and Mucky peat.

Permeability is slow, and available water capacity is high. In unlimed areas, reaction is medium acid in the upper part of the solum and slightly acid to slightly alkaline in the lower part and in the substratum. A high water table is at the surface for most of the year. Surface runoff is very slow. Rooting depth is restricted by the high water table. This soil is frequently flooded.

Most areas of this soil are idle or are used for woodland.

If properly drained, this soil can be used occasionally for row crops. Potential is fair for pasture and for trees. The high water table, slow permeability, and flooding limit the potential for many nonfarm uses. This soil has some potential for wildlife habitat and recreation.

If this soil is used for cultivated crops, the hazard of erosion is slight. Excess water causes the soil to warm slowly in spring. Crops can be damaged by flood waters following intensive rainfalls. Excess surface water can be removed by keeping natural drainageways open. Open drains where outlets are available can be used to improve drainage.

If this soil is used for pasture, grazing when this soil is wet and overgrazing are major concerns in pasture management. Grazing when the soil is wet compacts the surface layer. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs.

This soil is fairly well suited to moisture-tolerant trees. Some of the area is wooded. Potential productivity is fair. Use of equipment is restricted for most of the year because of the high water table. Machine planting in large areas is practical.

This soil is severely limited for most nonfarm uses by the high water table, slow permeability, and flooding. Capability subclass IVw.

WeB3—Welkert channery silt loam, 3 to 8 percent slopes, eroded. This gently sloping, well-drained, shallow soil is on the tops and sides of dissected ridges. Slopes are about 200 to 700 feet long. The areas are irregular in shape and normally are 3 to 12 acres in size.

Typically, the surface layer is very dark grayish brown channery silt loam about 6 inches thick. The subsoil is yellowish brown, friable very shaly silt loam 10 inches thick. The substratum is 24 inches thick. The upper 3 inches of the substratum is yellowish brown silt on and between shale fragments, and the lower 21 inches is dark gray fractured shale fragments with silt coatings. Dark gray fractured shale bedrock is at a depth of 40 inches.

Included with this soil in mapping are small areas where bedrock is at a depth of less than 20 inches. Also included are some areas of severely eroded and gullied soils and areas of Hartleton, Klinesville, Leck Kill, and Watson soils.

Permeability is moderately rapid, and available water capacity is very low. In unlimed areas, reaction is medium acid to very strongly acid throughout. Surface runoff is slow. Rooting depth is restricted by bedrock.

This soil is used mainly for crops and hay. Some areas are idle, and some are wooded.

This soil has poor potential for farming. Potential is fair for pasture and for woodland. Depth to bedrock and coarse fragments limit many nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Further erosion results in a shallower rooting depth and lower available water capacity for plants. Minimum tillage, diversions, cover crops, and grasses and legumes in the cropping system help to reduce runoff and control erosion. Stripcropping can be used where the topography is suitable. In places bedrock hinders the construction of diversions. Incorporating some crop residue and manure into the surface layer helps to maintain organic-matter content and reduce the tendency of this soil to clod and crust.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pasture are the chief management needs. Periodic applications of nutrients to maintain fertility are needed for optimum production.

Many areas of this soil are wooded. Productivity for trees is fair. Loss of seedlings is a problem because of very low available water capacity. Machine planting in large areas is generally practical.

This soil is limited for nonfarm uses by depth to bedrock, coarse fragments, and very low available water capacity. The shallow depth to the underlying rock seriously limits onsite waste disposal. When this soil is disturbed for construction, erosion- and sediment-control practices are needed. Capability subclass IIIe.

WeC3—Welkert channery silt loam, 8 to 15 percent slopes, eroded. This sloping, well drained, shallow soil is on the upper parts of sides of dissected ridges. Slopes are rolling and are about 300 to 900 feet long. Areas are long and narrow in shape and normally are 4 to 16 acres in size.

Typically, the surface layer is very dark grayish brown channery silt loam about 6 inches thick. The subsoil is yellowish brown, friable very shaly silt loam 10 inches thick. The substratum is 24 inches thick. The upper 3 inches of the substratum is yellowish brown silt on and between shale fragments, and the lower 21 inches is dark gray fractured shale fragments with silt coatings. Dark gray fractured shale bedrock is at a depth of 40 inches.

Included with this soil in mapping are small areas where bedrock is at a depth of less than 20 inches. Also included are some areas where shallow and moderately deep gullies have developed, a few areas of very channery Weikert soils, and areas of Hartleton, Klinesville, Leck Kill, and Watson soils.

Permeability is moderately rapid, and available water capacity is very low. In unlimed areas, reaction is medium acid to very strongly acid throughout. Surface runoff is medium. Rooting depth is restricted by the depth to bedrock.

This soil is used mainly for crops, grassland, and pasture.

This soil has poor potential for farming. It has fair potential for pasture and woodland. Depth to bedrock, slope, and coarse fragments limit the potential for many nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is severe. Further erosion results in shallower rooting depth and lower available water capacity for plants. Minimum tillage, diversions, cover crops, and grasses and legumes in the cropping system reduce runoff and control erosion. Stripcropping can be used where the topography is suitable. In places bedrock hinders the construction of diversions. Incorporating some crop residue and manure into the surface layer helps to maintain organic-matter content and reduce the tendency of the soil to clod and crust.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed for optimum production.

Many areas of this soil are wooded. Productivity is poor to fair. Loss of seedlings is a problem because of depth to bedrock and very low available water capacity. Machine planting in large areas is generally practical.

This soil is limited for nonfarm uses by slope, depth to shale bedrock, coarse fragments, and very low available water capacity. The shallow depth to the underlying rock seriously limits onsite waste disposal. When this soil is disturbed for construction, erosion- and sediment-control practices are needed. Capability subclass IVe.

WeD3—Weikert channery silt loam, 15 to 25 percent slopes, eroded. This moderately steep, well drained, shallow soil is on the sides of dissected ridges. Slopes are about 200 to 800 feet long. The areas are long and narrow in shape and normally are 3 to 18 acres in size.

Typically (fig. 10), the surface layer is very dark grayish brown channery silt loam about 6 inches thick. The subsoil is yellowish brown, friable very shaly silt loam 10 inches thick. The substratum is 24 inches thick. The upper 3 inches of the substratum is yellowish brown silt loam on and between shale fragments, and the lower 21 inches is dark gray fractured shale fragments with silt coatings. Dark gray fractured shale bedrock is at a depth of 40 inches.

Included with this soil in mapping are small areas where bedrock is at a depth of less than 20 inches. Also included are some areas where shallow and moderately deep gullies have developed, a few areas of very channery Weikert soils, and a few areas of Hartleton, Klinesville, Leck Kill, and Watson soils.

Permeability is moderately rapid, and available water capacity is very low. In unlimed areas, reaction is medium acid to very strongly acid throughout. Surface runoff is rapid. Rooting depth is restricted by the depth to bedrock.

This soil is used mainly for hay or is idle.

This soil has very poor potential for farming. Depth to bedrock, slope, and coarse fragments limit the potential for some nonfarm uses.

This soil is not suited to cultivated crops or pasture because of moderately steep slopes and the very severe hazard of erosion. Further erosion results in a shallower rooting depth and lower available water capacity for plants.

Many areas of this soil are wooded. Productivity for trees is fair to poor. Loss of seedlings is a problem because of very low available water capacity. Slope limits the use of machinery. Machine planting is not practical.

This soil is limited for nonfarm uses by slope, depth to shale bedrock, coarse fragments, and very low available water capacity. The shallow depth to the underlying rock and slope seriously limit onsite waste disposal. When this soil is disturbed for construction, erosion- and sediment-control practices are needed. Capability subclass VIe.

WhB—Weikert-Hartleton channery silt loams, 3 to 8 percent slopes. These deep, well drained, gently sloping soils are on ridgetops. Slopes are 100 to 600 feet long. The areas are usually irregular in shape and normally are 4 to 10 acres in size.

This complex is about 50 percent Weikert soil, 40 percent Hartleton soil, and 10 percent included soils. These soils are mapped together because they occur in such intricate patterns that it is not practical to separate them at the scale of mapping.

Typically, the Weikert soil has a surface layer of dark brown channery silt loam about 8 inches thick. The subsoil is 8 inches thick. The upper part of the subsoil is yellowish brown, friable channery silt loam 5 inches thick; and the lower part is yellowish brown, friable very channery silt loam 3 inches thick. The substratum is yellowish brown silt coatings on channers. Dark gray shale bedrock is at a depth of 40 inches.

Typically, the Hartleton soil has a surface layer of dark grayish brown channery silt loam about 8 inches thick. The subsoil is 27 inches thick. The upper part of the subsoil is yellowish brown, friable channery silt loam 12 inches thick; and the lower part is very channery silt loam 15 inches thick. The substratum is yellowish brown, friable very channery loam. Fractured, fine grained sandstone bedrock is at a depth of 45 inches.

Included with these soils in mapping are a few small areas of Weikert and Hartleton soils that have a shaly surface layer. Small areas of Klinesville, Leck Kill, and Watson soils and few areas of nearly level Weikert and Hartleton soils are also included.

Permeability is moderate to moderately rapid, and available water capacity is very low to moderate. In unlimed areas, reaction is medium acid to very strongly acid. Surface runoff is slow. Rooting depth is restricted by the depths to shale and sandstone bedrock.

These soils are used mainly for general farm crops, hay, pasture, and trees.

These soils have fair potential for farming, for pasture, and for woodland. Depth to bedrock and coarse fragments limit the potential for most nonfarm uses.

If these soils are used for cultivated crops, the hazard of erosion is moderate. Further erosion results in shallower rooting depth and lower available water capacity for plants. Minimum tillage, cover crops, and grass and legumes in the cropping systems reduce runoff and control erosion. Stripcropping can be used where the topography is suitable. Returning some crop residue to the surface layer helps to maintain organic-matter content and reduce the tendency of this soil to clod and crust.

If these soils are used for pasture, proper stocking rates to maintain key plant species and rotation of pasture are the chief management needs. Periodic applications of nutrients to maintain fertility are needed to obtain optimum production.

Some of the acreage is used for woodland. Productivity is fair to poor. Loss of seedlings is a moderate to serious problem because of the very low to moderate available water capacity and the high content of shale fragments in the subsoil. Machine planting in large areas is generally practical.

These soils are limited for nonfarm uses by depth to bedrock and coarse fragments. The restricted depth to bedrock is a problem in excavating for buildings and seriously limits onsite sewage disposal. If these soils are disturbed for construction, erosion-control practices are needed. Capability subclass IIIe.

WhC—Weikert-Hartleton channery silt loams, 8 to 15 percent slopes. These deep, well drained, sloping soils are on upper parts of sides of ridges. Slopes are rolling to dissected and are 150 to 850 feet long. Areas are usually long and narrow in shape and normally are 4 to 12 acres in size.

This complex is about 55 percent Weikert soil, 35 percent Hartleton soil, and 10 percent included soils. These soils are mapped together because they occur in such intricate patterns that it is not practical to separate them at the scale of mapping.

Typically, the Weikert soil has a surface layer of dark brown channery silt loam about 8 inches thick. The subsoil is 7 inches thick. The upper part of the subsoil is yellowish brown, friable channery silt loam 5 inches thick; and the lower part is yellowish brown, friable very channery silt loam 2 inches thick. The substratum is yellowish brown silt coatings on channers. Dark gray shale bedrock is at a depth of 40 inches.

Typically, the Hartleton soil has a surface layer of dark grayish brown channery silt loam about 8 inches thick. The subsoil is 25 inches thick. The upper part of the subsoil is yellowish brown, friable channery silt loam 11 inches thick; and the lower part is very channery silt loam 14 inches thick. The substratum is yellowish brown, friable very channery loam. Fractured, fine grained sandstone bedrock is at a depth of 43 inches.

Included with these soils in mapping are a few small areas of very channery, severely eroded, and shaly Weikert and Hartleton soils. Small areas of Klinesville and Leck Kill soils are also included.

Permeability is moderate to moderately rapid, and available water capacity is very low to moderate. In unlimed areas, reaction is medium acid to very strongly acid. Surface runoff is moderate to rapid. Rooting depth is restricted by the shale and sandstone bedrock.

These soils are used mainly for crops, hay, pasture, and trees.

These soils have fair potential for farming, for pasture, and for woodland. Potential for pasture is good to fair. Depth to bedrock, slope, and coarse fragments limit the potential for most nonfarm uses.

If these soils are used for cultivated crops, the hazard of erosion is moderate to severe. Further erosion results in a shallower rooting depth and lower available water capacity for plants. Minimum tillage, cover crops, and grass and legumes in the cropping system reduce runoff and control erosion. Stripcropping can be used where the topography is suitable. Returning some crop residue to the surface layer helps to maintain organic-matter content and reduce the tendency of this soil to clod and crust.

If these soils are used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed for optimum production.

Some of the acreage of these soils is used for woodland. Productivity is fair to poor. Loss of seedlings is a moderate to serious problem because of the very low to moderate available water capacity and the high content of shale fragments in the subsoil. Machine planting in large areas is generally practical.

These soils are limited for nonfarm uses by slope, depth to bedrock, and coarse fragments. The restricted depth to bedrock limits excavations for buildings and seriously

limits onsite waste disposal. If these soils are disturbed for construction, erosion-control practices are needed. Capability subclass IVe.

WhD—Weikert-Hartleton channery silt loams, 15 to 25 percent slopes. These deep, well drained, moderately steep soils are on sides of ridges. Slopes are hilly to dissected and are 150 to 950 feet long. Areas are usually long and narrow in shape and normally are 3 to about 15 acres in size.

This complex is about 60 percent Weikert soil, 30 percent Hartleton soil, and 10 percent included soils. These soils are mapped together because they occur in such intricate patterns that it is not practical to separate them at the scale of mapping.

Typically, the Weikert soil has a surface layer of dark brown channery silt loam about 7 inches thick. The subsoil is 7 inches thick. The upper part of the subsoil is yellowish brown, friable channery silt loam 4 inches thick; and the lower part is yellowish brown, friable very channery silt loam 3 inches thick. The substratum is yellowish brown silt coatings on channers. Dark gray shale bedrock is at a depth of 40 inches.

Typically, the Hartleton soil has a surface layer of dark grayish brown channery silt loam about 7 inches thick. The subsoil is 24 inches thick. The upper part of the subsoil is yellowish brown, friable channery silt loam 10 inches thick; and the lower part is very channery silt loam 14 inches thick. The substratum is yellowish brown, friable very channery silt loam. Fractured, fine grained sandstone bedrock is at a depth of 42 inches.

Included with these soils in mapping are a few small areas of very channery, very stony, and severely eroded Weikert and Hartleton soils. Small areas of Klinesville and Leck Kill soils are also included.

Permeability is moderate to moderately rapid, and available water capacity is very low to moderate. In unlimed areas, reaction is medium acid to very strongly acid. Surface runoff is rapid. Rooting depth is restricted by the shale and sandstone bedrock.

These soils are used mainly for hay, pasture, and trees. Some areas are idle.

These soils have poor potential for cultivated crops. They have fair potential for pasture and for woodland. The moderately steep slopes, depth to bedrock, and coarse fragments limit the potential for most nonfarm uses.

These soils are not suited to cultivated crops because of the erosion hazard.

If these soils are used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed for optimum production.

A small acreage of these soils is used for woodland. Productivity is good to fair. Loss of seedlings is a moderate to serious problem because of the very low to moderate available water capacity and the high content of shale fragments in the subsoil. Machine planting in large areas is generally practical.

These soils are limited for nonfarm uses by the moderately steep slope, depth to rock, and coarse fragments. The restricted depth to bedrock limits excavation for buildings and seriously limits onsite waste disposal. If these soils are disturbed for construction, erosion-control practices are needed. Capability subclass VIe.

WKE—Weikert and Klinesville soils, steep. These shallow, well drained, steep and very steep soils are on the sides of dissected ridges. Surface texture ranges from channery silt loam to very channery loam. Slopes range from 25 to 80 percent and are about 300 to 1,200 feet long. Areas are usually long and narrow in shape and normally are 5 to 60 acres in size.

This unit is about 50 percent Weikert soil, 30 percent Klinesville soil, and 20 percent included soils. These soils are mapped together because the slopes limit use and management.

Typically, the Weikert soil has a surface layer of dark brown, friable channery silt loam about 6 inches thick. The subsoil is 8 inches thick. The upper part of the subsoil is yellowish brown, friable, channery silt loam 4 inches thick; and the lower part is yellowish brown, friable, very channery silt loam 4 inches thick. The substratum is yellowish brown silt coatings on channers. Dark gray shale bedrock is at a depth of 40 inches.

Typically, the Klinesville soil has a surface layer of dark reddish brown channery silt loam about 6 inches thick. The subsoil is reddish brown, friable very channery silt loam 9 inches thick. The upper 4 inches of the substratum is weak red shale with silt coatings, and the lower 29 inches is dusky red shale fragments with patches of silt and clay. Thin bedded siltstone and shale bedrock is at a depth of 48 inches.

Included with these soils in mapping are small areas of Hartleton, Leck Kill, and Meckesville soils. Areas of severely eroded and very shallow soils and a few areas of soils that have a stony surface layer are also included. This map unit has a higher proportion of included soils than most other units in the county.

Permeability is moderately rapid, and available water capacity is very low. In unlimed areas, reaction is medium acid to very strongly acid. Surface runoff is rapid. Rooting depth is restricted by bedrock.

These soils are used mainly for woodland.

These soils have very poor potential for farming. They have poor potential for permanent pasture and for woodland. Depth to bedrock, slope, low available water capacity, and coarse fragments limit the potential for most nonfarm uses.

These soils are not suited to cultivated crops and pasture because of slope and the very severe hazard of erosion. Further erosion results in shallower rooting depth and lower available water capacity for plants.

Very much of the acreage is used for woodland. Productivity is poor to fair for trees. Loss of seedlings is a

moderate to serious problem because of the very low available water capacity and the high content of shale fragments in the subsoil. Slopes also limit the use of machinery. Constructing roads on the contour during harvesting helps to prevent erosion.

These soils are limited for nonfarm uses because of depth to bedrock, slope, very low available water capacity, and coarse fragments. The restricted depth to bedrock and slope limit excavations for buildings and seriously limit onsite waste disposal. If these soils are disturbed for construction, erosion-control practices are needed. Capability subclass VIIe.

WmB—Wellsboro channery loam, 3 to 8 percent slopes. This gently sloping, moderately well drained soil is on broad plateaus and ridgetops. Slopes are smooth and slightly concave and are about 150 to 600 feet long. Areas are irregular in shape and 3 to more than 20 acres in size.

Typically, the surface layer is dark brown channery loam about 10 inches thick. The subsoil is about 50 inches thick. The upper part of the subsoil is brown and reddish brown, friable gravelly loam 13 inches thick, and the lower part is reddish brown and weak red, very firm and brittle channery loam 37 inches thick. Bedrock is at a depth of 60 inches.

Included with this soil in mapping are small areas of Wellsboro soils that have a gravelly, flaggy, or channery silt loam surface layer. A few scattered areas of Morris, Mardin, and Lackawanna soils are also included.

Permeability is slow, and available water capacity is moderate. Surface runoff is slow. The subsoil has a firm and brittle fragipan. A water table is at a depth of 18 to 30 inches for long periods during wet seasons. Rooting depth is restricted by the firm fragipan in the subsoil. In unlimed areas, reaction is very strongly acid to medium acid throughout.

Most of the acreage of this soil is idle, in permanent grass, or developed. A few small areas are in general crops.

This soil has fair potential for farming. It is better suited to grass, grain, and pasture. It has good potential for pasture and for trees. The seasonal high water table and slowly permeable subsoil limit the potential for many nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Minimum tillage, cover crops, and grasses and legumes in the cropping system help to reduce runoff and control erosion. Diversions and covered drains help to remove excess water and allow timely tillage. In places the channery surface layer interferes with the seeding and harvesting of some crops.

If this soil is used for pasture, overgrazing and grazing when the soil is wet are major concerns in pasture management. Grazing when the soil is wet compacts the surface layer. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs.

This soil is suited to trees. A small acreage is wooded, and many idle areas are reverting to trees. Removing undesirable species helps to increase production. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting is practical in larger areas.

This soil is seriously limited for most nonfarm uses including onsite waste disposal, by slow permeability and the seasonal high water table. The seasonal high water table is a potential hazard for buildings with subsurface basements. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass IIe.

WmC—Wellsboro channery loam, 8 to 15 percent slopes. This sloping, moderately well drained soil is on broad plateaus and on foot slopes and upper parts of sides of ridges. Slopes are generally smooth and slightly concave and are about 250 to 750 feet long. Areas are irregular in shape and about 4 to more than 10 acres in size.

Typically, the surface layer is dark brown channery loam about 8 inches thick. The subsoil is about 52 inches thick. The upper part of the subsoil is friable, brown and reddish brown gravelly loam 12 inches thick; and the lower part is very firm and brittle, reddish brown and weak red channery loam 40 inches thick.

Included with this soil in mapping are a few areas of gravelly and very stony Wellsboro soils, and a few areas of steeper Wellsboro soils. Also included are scattered areas of Lackawanna, Morris, and Wurtsboro soils.

Permeability is slow, and available water capacity is moderate. Surface runoff is medium. The subsoil has a firm and brittle fragipan. A high water table is at a depth of 18 to 30 inches for long periods during wet seasons. Rooting depth is restricted by the firm fragipan in the subsoil. In unlimed areas, reaction is very strongly acid to medium acid throughout.

Most areas of this soil are idle, in permanent grass, or developed for houses. A few areas are used for crops, hay, and pasture; however, many idle areas are reverting to trees.

This soil is better suited to grass and pasture, but it can be used for crops if properly managed. It has good potential for pasture and for trees. The seasonal high water table, slowly permeable subsoil, and slope limit the potential for many nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is severe. Contour stripcropping, minimum tillage, sod waterways, cover crops, and grasses and legumes in the cropping system help to reduce runoff and control erosion. Diversions and covered drains help to remove excess water and allow timely tillage. In places the channery surface layer interferes with the seeding and harvesting of some crops.

If this soil is used for pasture, overgrazing and grazing when the soil is wet are major concerns in pasture management. Grazing when the soil is wet compacts the surface layer. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs.

This soil is suited to trees, but only a small acreage is wooded. Many idle areas, however, are reverting to trees. Removing undesirable species helps to increase production. Constructing roads on the contour during harvesting reduces erosion. Use of equipment is restricted during wet seasons because of the seasonal high water table. Machine planting is practical in large areas.

This soil is seriously limited for most nonfarm uses, including onsite waste disposal, by slow permeability and the seasonal high water table. The seasonal high water table is a potential hazard for buildings with subsurface basements. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass IIIe.

WpB—Wellsboro extremely stony loam, 0 to 8 percent slopes. This nearly level and gently sloping, extremely stony, moderately well drained soil is on broad plateaus and ridgetops. Slopes are generally smooth and slightly concave and are variable in length. Areas are irregular in shape and are about 4 to more than 50 acres in size.

Typically, the surface layer is dark brown channery loam about 6 inches thick. The subsoil is 54 inches thick. The upper part of the subsoil is brown and reddish brown, friable gravelly loam 18 inches thick; and the lower part is mottled reddish brown and weak red, very firm and brittle channery loam 36 inches thick.

Included with this soil in mapping are a few areas of nonstony, very stony, and flaggy Wellsboro soils. Also included are scattered areas of Lackawanna, Morris, and Wurtsboro soils.

Permeability is slow, and available water capacity is moderate. Surface runoff is slow. A high water table is at a depth of 18 to 30 inches during wet seasons. The subsoil has a firm and brittle fragipan, which restricts rooting depth. In unlimed areas, reaction is very strongly acid to medium acid throughout.

Most areas of this soil are used for woodland. A few areas are used for homesites and recreation.

This soil is too stony for cultivated crops and pasture. It is better suited to trees, for which it has good potential. Slow permeability, seasonal high water table, surface stones and coarse fragments limit the potential for many nonfarm uses.

This soil is suited to trees, and most areas are wooded. Many areas are reverting to trees. Removing undesirable species helps to increase production. Large surface stones interfere with equipment use and machine planting.

This soil is seriously limited for many nonfarm uses by slow permeability, the seasonal high water table, and surface stones. Slow permeability in the fragipan, the seasonal high water table, and the high content of the surface stones seriously limit onsite waste disposal. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass VIIs.

WpC—Wellsboro extremely stony loam, 8 to 25 percent slopes. This sloping and moderately steep, extremely stony, moderately well drained soil is on broad plateaus and ridgetops and on foot slopes. Slopes are generally rolling to hilly and are 300 to 1,000 feet long. Areas are irregular in shape and are about 5 to 25 acres in size.

Typically, the surface layer is dark brown channery loam about 6 inches thick. The subsoil is 54 inches thick. The upper part of the subsoil is brown and reddish brown, friable gravelly loam 18 inches thick; and the lower part is mottled, reddish brown and weak red, very firm and brittle channery loam 36 inches thick.

Included with this soil in mapping are a few areas of nonstony, very stony, and flaggy Wellsboro soils. Also included are scattered areas of Lackawanna, Morris, and Wurtsboro soils.

Permeability is slow, and available water capacity is moderate. Surface runoff is slow. A high water table is at a depth of 18 to 30 inches during wet seasons. The subsoil has a firm and brittle fragipan, which restricts rooting depth. In unlimed areas, reaction is very strongly acid to medium acid throughout.

Most areas of this soil are used for woodland. A few areas are for homesites and recreation.

This soil is too stony for cultivated crops and pasture. It is better suited to trees, for which it has good potential. Sloping to moderately steep slopes, slow permeability, seasonal high water table, surface stones, and coarse fragments limit the potential for many nonfarm uses.

This soil is suited to trees, and most areas are wooded. Many of the idle areas are reverting to trees. Removing undesirable species helps to increase production. Large surface stones interfere with equipment use and machine planting.

This soil is seriously limited for many nonfarm uses by sloping to moderately steep slopes, slow permeability, the seasonal high water table, and surface stones. Slope, slow permeability in the fragipan, and the high content of surface stones seriously limit onsite waste disposal. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass VIIs.

WrB—Worth extremely stony sandy loam, 0 to 8 percent slopes. This nearly level and gently sloping, extremely stony, well drained soil is on broad plateaus at higher elevations. Slopes are generally uniform to undulating and are variable in length. Areas are irregular in shape and are about 10 to 25 acres in size.

Typically, the surface layer is pinkish gray gravelly fine sandy loam about 4 inches thick. The subsoil is 56 inches thick. The upper part of the subsoil is dark reddish brown

and brown, very friable gravelly fine sandy loam 14 inches thick; the middle part is yellowish brown and brown, friable gravelly fine sandy loam and gravelly loamy fine sand 12 inches thick; and the lower part is dark brown, firm and brittle gravelly very fine sandy loam 30 inches thick.

Included with this soil in mapping are a few areas of nonstony and very stony Worth soils. Also included are scattered areas of Swartswood, Empeyville, and Wurtsboro soils.

Permeability is slow, and available water capacity is low to moderate. Surface runoff is slow. The subsoil has a firm and brittle fragipan, which restricts rooting depth. In unlimed areas, reaction is strongly acid and very strongly acid throughout.

Most areas of this soil are used for woodland. A few areas are used for homesites and recreation.

This soil is too stony for cultivated crops and pasture. It is better suited to trees, for which it has fair potential. Slow permeability, surface stones, and coarse fragments limit the potential for many nonfarm uses.

This soil is fairly suited to trees, and most areas are wooded. Many idle areas are reverting to trees. Removing undesirable species helps to increase production. Large surface stones interfere with equipment use and machine planting.

This soil is seriously limited for many nonfarm uses by slow permeability and numerous surface stones. Slow permeability in the fragipan and the high content of surface stones seriously limit onsite waste disposal. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass VIIs.

WrC—Worth extremely stony sandy loam, 8 to 25 percent slopes. This sloping and moderately steep, extremely stony, well drained soil is on broad plateaus at higher elevations. Slopes are generally rolling to hilly and are variable in length. Areas are irregular in shape and are about 7 to 25 acres in size.

Typically, the surface layer is pinkish gray gravelly fine sandy loam about 4 inches thick. The subsoil is 56 inches thick. The upper part is dark reddish brown and brown, very friable gravelly fine sandy loam 14 inches thick; the middle part is yellowish brown and brown, friable gravelly fine sandy loam and gravelly loamy fine sand 12 inches thick; and the lower part is dark brown, firm and brittle gravelly very fine sandy loam 30 inches thick.

Included with this soil in mapping are a few areas of nonstony and very stony Worth soils. Also included are scattered areas of Swartswood, Empeyville, and Wurtsboro soils.

Permeability is slow, and available water capacity is low to moderate. Surface runoff is slow. The subsoil has a firm and brittle fragipan, which restricts rooting depth. In unlimed areas, reaction is strongly acid and very strongly acid throughout.

Most areas of this soil are used for woodland. A few areas are used for homesites and recreation.

This soil is too stony for cultivated crops and pasture. It is better suited to trees, for which it has fair potential. Sloping to moderately steep slopes, slow permeability, surface stones, and coarse fragments limit the potential for many nonfarm uses.

This soil is fairly suited to trees. Most areas are wooded, and many idle areas are reverting to trees. Removing undesirable species helps to increase production. Large surface stones interfere with equipment use and machine planting.

This soil is seriously limited for many nonfarm uses by slow permeability and numerous surface stones. Slow permeability in the fragipan and the high content of surface stones seriously limit onsite waste disposal. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass VIIs.

WsB—Wurtsboro channery loam, 2 to 12 percent slopes. This deep, moderately well drained, nearly level to sloping soil is on broad plateaus. Slopes are smooth to rolling and are 200 to 550 feet long. Areas are irregular in shape and normally are 2 to 12 acres in size.

Typically, the surface layer is dark brown channery loam about 9 inches thick. The subsoil is 51 inches thick. The upper part of the subsoil is yellowish brown, friable gravelly fine sandy loam 11 inches thick; the middle part is mottled, yellowish brown, friable gravelly sandy loam 7 inches thick; and the lower part is mottled brown and yellowish brown, firm and very firm and brittle gravelly fine sandy loam and gravelly sandy loam 33 inches thick.

Included with this soil in mapping are small areas of nonstony, very stony, and flaggy Wurtsboro soils. Scattered areas of Volusia, Swartswood, and Chippewa soils are also included.

Permeability is slow, and available water capacity is moderate. In unlimed areas, reaction is extremely acid to strongly acid throughout. A seasonal high water table is at a depth of 18 to 36 inches for most of the year. Surface runoff is slow to medium. Rooting depth is restricted by the seasonal high water table and by the fragipan in the subsoil.

Most areas of this soil are used for permanent grass or are idle.

If properly drained, this soil can be used for row crops. It has good potential for permanent pasture and for trees. The seasonal high water table and slow permeability limit the potential for many nonfarm uses. This soil has some potential for wildlife habitat and recreation.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Stripcropping, minimum tillage, sod waterways, cover crops, and grasses and legumes in the cropping system help to reduce runoff and control erosion. Diversions and covered drains help to remove excess water and allow timely tillage.

If this soil is used for permanent pasture, grazing when this soil is wet and overgrazing are major concerns in pasture management. Grazing when the soil is wet com-

pacts the surface layer. Proper stocking rates to maintain key plant species, rotation of pastures, deferment of grazing, and restriction of grazing during wet periods are the chief management needs.

This soil is used for trees, and part of the area is wooded. Potential productivity is good. Use of equipment is restricted part of the year because of the seasonal high water table. Machine planting in large areas is practical.

This soil is seriously limited for most nonfarm uses by the seasonal high water table and slow permeability. Capability subclass IIe.

WxB—Wurtsboro extremely stony loam, 0 to 8 percent slopes. This nearly level and gently sloping, extremely stony, well drained soil is on broad plateaus, mountains, and ridges. Slopes are generally smooth to concave and are 400 to 900 feet long. Areas are irregular in shape and are about 5 to more than 50 acres in size.

Typically, the surface layer is light brownish gray channery loam about 4 inches thick. The subsoil is 56 inches thick. The upper part of the subsoil is brown and strong brown, friable channery loam 5 inches thick; the next part is yellowish brown, friable gravelly fine sandy loam 11 inches thick; the next part is mottled yellowish brown, friable gravelly sandy loam 7 inches thick; and the lower part is mottled, brown and yellowish brown, firm and very firm and brittle gravelly fine sandy loam and gravelly sandy loam 33 inches thick.

Included with this soil in mapping are a few areas of nonstony, very stony, and flaggy Wurtsboro soils. Also included are scattered areas of Volusia, Swartswood, and Chippewa soils.

Permeability is slow, and available water capacity is moderate. Surface runoff is slow. The subsoil has a firm and very firm fragipan, which restricts rooting depth. In unlimed areas, reaction is extremely acid to strongly acid. A seasonal high water table is at a depth of 18 to 36 inches.

Most areas of this soil are used for woodland. A few areas are used for homesites and recreation.

This soil is too stony for cultivated crops and pasture. It is better suited to trees, for which it has good potential. Slow permeability, seasonal high water table, surface stones, and coarse fragments limit the potential for many nonfarm uses.

This soil is suited to trees, and most areas are wooded. Many idle areas are reverting to trees. Removing undesirable species helps to increase production. Large surface stones interfere with equipment use and machine plantings.

This soil is seriously limited for some nonfarm uses by slow permeability, the seasonal high water table, and surface stones. Slow permeability in the fragipan, the seasonal high water table, and high content of surface stones seriously limit onsite waste disposal. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass VIIs.

WxC—Wurtsboro extremely stony loam, 8 to 25 percent slopes. This sloping and moderately steep, extremely stony, well drained soil is on broad plateaus and sides of mountains and ridges. Slopes are generally rolling to hilly and are 300 to 750 feet long. Areas are irregular in shape and are about 5 to more than 100 acres in size.

Typically, the surface layer is light brownish gray channery loam about 4 inches thick. The subsoil is 56 inches thick. The upper part of the subsoil is brown and strong brown, friable channery loam 5 inches thick; the next part is yellowish brown, friable gravelly fine sandy loam 11 inches thick; the next part is mottled brown, friable gravelly fine sandy loam 7 inches thick; and the lower part is mottled, brown and yellowish brown, firm and very firm and brittle gravelly fine sandy loam and gravelly sandy loam 33 inches thick.

Included with this soil in mapping are a few areas of nonstony, very stony, and flaggy Wurtsboro soils. Also included are scattered areas of Volusia, Swartswood, and Chippewa soils.

Permeability is slow, and available water capacity is moderate. Surface runoff is slow. The subsoil has a firm and very firm fragipan, which restricts rooting depth. In unlimed areas, reaction is extremely acid to strongly acid throughout.

Most areas of this soil are used for woodland. A few areas are used for homesites and recreation.

This soil is too stony for cultivated crops and pasture. It is better suited to trees, for which it has good potential. Sloping to moderately steep slopes, slow permeability, seasonal high water table, surface stones, and coarse fragments limit the potential for many nonfarm uses.

This soil is suited to trees, and most areas are wooded. Many idle areas are reverting to wooded areas. Removing undesirable species helps to increase production. Large surface stones interfere with equipment use and machine planting.

This soil is seriously limited for some nonfarm uses by slope, slow permeability, and surface stones. Sloping to moderately steep slopes, slow permeability in the fragipan, and high content of surface stones seriously limit onsite waste disposal. Buildings with basements need foundation drains with proper outlets to prevent seepage of water into the basement. Capability subclass VIIs.

WyA—Wyoming gravelly sandy loam, 0 to 3 percent slopes. This nearly level, deep, somewhat excessively drained soil is on terraces, kames, eskers, and valley trains. Slopes are smooth and are 100 to 450 feet long. Areas are usually irregular in shape and normally are 3 to 18 acres or more in size.

Typically, the surface layer is dark yellowish brown, friable gravelly sandy loam 9 inches thick. The subsoil is brown, friable gravelly sandy loam 21 inches thick. The substratum, to a depth of 60 inches, is brown, loose stratified very gravelly loamy sand and sand.

Included with this soil in mapping are small areas of cobbly and stony Wyoming soils. Also included are small areas of Chenango and Braceville soils.

Permeability is rapid, and available water capacity is very low to low. In unlimed areas, reaction is very strongly acid to medium acid in the solum. Surface runoff is slow.

This soil is used mainly for general farm crops. A few areas are used for developments and as sources of sand and gravel.

This soil has fair potential for farming, for pasture, and for woodland. The rapid permeability and coarse fragments limit the potential for some nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is slight. Crops respond fairly well to fertilizer and to good management. The very low to low available water capacity seriously reduces crop production during dry growing seasons. Growing cover crops and incorporating some crop residue and manure into the surface layer help to maintain organic-matter content and good tilth. In places the gravelly surface layer interferes with the seeding of small grain and with mechanical harvesting of some crops.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed for optimum production. Water retention practices lengthen grazing periods.

Much of the acreage of this soil is wooded. Productivity is fair. Loss of seedlings is serious because of very low to low available water capacity. Machine planting in large areas is generally practical. Removing undesirable species leaves more moisture available for the desirable trees.

This soil is limited for nonfarm uses by rapid permeability and high proportion of gravel in the soil. The moderate depth to the underlying rock seriously limits onsite waste disposal. Capability subclass IIIs.

WyB—Wyoming gravelly sandy loam, 3 to 8 percent slopes. This gently sloping, deep, somewhat excessively drained soil is on stream terraces, benches, and broad kames adjacent to streams. Slopes are uniform to undulating and are often complex. They are about 50 to 350 feet long. Areas are irregular in shape and are 3 to 24 acres in size.

Typically, the surface layer is dark yellowish brown gravelly sandy loam about 9 inches thick. The subsoil is brown, friable and very friable gravelly and very gravelly sandy loam 19 inches thick. The substratum, to a depth of 60 inches, is brown, loose stratified very gravelly loamy sand and sand.

Included with this soil in mapping are small areas of Braceville, Rexford, and Chenango soils. Also included are a few areas of Wyoming soils that have a gravelly loam surface layer and a few small areas of Wyoming soils that have slopes of 0 to 3 percent. A few small areas of gravel pits are also included.

Permeability is rapid, and available water capacity is very low to low. Surface runoff is slow to medium. The surface layer is more than 15 percent gravel. In unlimed areas, reaction is very strongly acid to medium acid in the solum.

Most of the acreage of this soil is used for hay and cultivated crops. Some areas are used for housing developments, recreation, and woodland. A few large areas are idle and are reverting to trees. A few small areas are used as sources of sand and gravel.

This soil has fair potential for cultivated crops and pasture. Potential for homesites is good, but the rapid permeability limits onsite waste disposal. This soil is suited to trees and to recreation for which the gravelly surface is not a limitation.

If this soil is used for cultivated crops, the hazard of erosion is moderate. Crops respond well to fertilizer and to good management. The very low to low available water capacity seriously reduces crop production during dry growing seasons. Growing cover crops, using crop residue, and including hay in the cropping system maintain organic-matter content and good tilth. Stripcropping, minimum tillage, and cover crops control erosion. In places the gravelly surface layer interferes with the seeding of small grain and the mechanical harvesting of some crops.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Because of the rapid leaching of nutrients in this soil, periodic applications of nutrients are needed for optimum production. Water retention practices help to lengthen grazing periods.

This soil is fairly well suited to trees, and a large part of the acreage is wooded. Many idle areas are reverting to trees. Productivity is fair. Because of the very low to low available water capacity in this soil, removing undesirable trees leaves more water available for the desirable trees. Machine planting is practical in large areas.

This soil is somewhat limited for nonfarm uses by the gravelly surface and rapid permeability. The soil is suited to homesites. The rapid permeability limits onsite waste disposal because of the potential hazard of ground water contamination. Capability subclass IIIs.

WyC—Wyoming gravelly sandy loam, 8 to 15 percent slopes. This sloping, deep, somewhat excessively drained soil is on upper parts of sides of terraces, kames, moraines, and valley trains. Slopes are rolling and are about 100 to 600 feet long. Areas are rectangular to circular in shape and normally are 3 to 20 acres in size.

Typically, the surface layer is very dark grayish brown gravelly fine sandy loam about 1 inch thick. The subsurface layer is dark yellowish brown gravelly sandy loam 3 inches thick. The upper part of the subsoil is brown, friable gravelly sandy loam 4 inches thick; and the lower part is brown very gravelly sandy loam 18 inches thick. The substratum, to a depth of 60 inches, is brown, loose very gravelly loamy sand and sand.

Included with this soil in mapping are small areas of Braceville, Rexford, and Chenango soils. Also included

are small areas of Wyoming soils that have a gravelly loam surface layer.

Permeability is rapid, and available water capacity is very low to low. In unlimed areas, reaction is medium acid to very strongly acid in the solum. The surface layer is more than 15 percent gravel. Surface runoff is medium.

This soil is used mainly for crops, pasture, hay, and housing developments and as a source of sand and gravel.

This soil has fair potential for farming, for pasture, and for woodland. Rapid permeability, slope, and gravelly surface limit the potential for many nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is severe. Further erosion results in lower available water capacity for plants. Minimum tillage, diversions, cover crops, grasses and legumes in the cropping system reduce runoff and control erosion. Stripcropping can be used where the topography is suitable. During dry growing seasons crop production is reduced by the very low to low available water capacity. Incorporating some crop residue and manure into the surface layer helps to maintain organic-matter content and fertility.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed for optimum production. Water retention practices help to lengthen grazing periods.

A few acres of this soil are wooded. Productivity is fair. Loss of seedlings is serious because of very low to low available water capacity. Machine planting in large areas is generally practical. Removing undesirable species leaves more water available for desirable trees.

This soil is limited for nonfarm uses by slope, rapid permeability, and coarse fragments in the soil. This soil is fairly well suited to buildings, but the rapid permeability limits onsite waste disposal because of the possibility of ground water contamination. When this soil is disturbed for construction, erosion-control practices are needed. Capability subclass IVs.

WyD—Wyoming gravelly sandy loam, 15 to 25 percent slopes. This moderately steep, deep, somewhat excessively drained soil is on the sides of kames, terraces, and valley trains. Slopes are generally hilly and are about 200 to 700 feet long. Areas are rectangular to oval in shape and are 4 to 30 acres in size.

Typically, the surface layer is dark yellowish brown, friable gravelly sandy loam about 9 inches thick. The subsoil is brown, friable and very friable gravelly and very gravelly sandy loam 15 inches thick. The substratum, to a depth of 60 inches, is brown, loose stratified very gravelly loamy sand and sand.

Included with this soil in mapping are a few areas of severely eroded Wyoming soils and Wyoming soils that have a cobbly and stony surface layer. Scattered areas of Chenango and Swartswood soils are also included.

Permeability is rapid, and available water capacity is very low to low. Surface runoff is rapid. The surface layer is more than 15 percent gravel. In unlimed areas, reaction is very strongly acid to medium acid in the solum.

This soil is mostly idle. Some areas are used for woodland, housing developments, hay, and pasture and as sources of sand and gravel.

This soil has fair potential for farming and is fairly well suited to pasture and trees. The potential for homesites is poor because of moderately steep slopes and rapid permeability. Rapid permeability is a hazard for onsite waste disposal. Slope, rapid permeability, and coarse fragments limit most other nonfarm uses.

If this soil is used for cultivated crops, the hazard of erosion is severe. Crops respond fairly well to fertilizer and to good management. During dry growing seasons crop production is reduced because of the very low to low available water capacity. Growing cover crops, returning crop residue and manure to the soil, and including hay in the cropping system maintain the organic-matter content and good tilth. Contour stripcropping, minimum tillage, diversions, cover crops, and grass and legumes in the cropping system reduce runoff and control erosion.

If this soil is used for pasture, proper stocking rates to maintain key plant species and rotation of pastures are the chief management needs. Periodic applications of nutrients to maintain fertility are needed for optimum production. Water retention practices help to lengthen grazing periods.

This soil is fairly suited to trees. Productivity is fair. Loss of seedlings is serious because of the low to very low available water capacity. The moderately steep slopes limit equipment use and mechanical planting.

This soil is limited for nonfarm uses by moderately steep slope, rapid permeability, and coarse fragments. Slope limits building, and rapid permeability seriously limits onsite waste disposal. Ground water contamination is a hazard. Capability subclass IVe.

WyE—Wyoming gravelly sandy loam, 25 to 70 percent slopes. This steep and very steep, deep, somewhat excessively drained soil is on the sides of terraces, kames, and valley trains. Slopes are complex and are about 300 to 900 feet long. Areas are irregular in shape and are 5 to 50 acres in size.

Typically, the surface layer is dark yellowish brown, friable gravelly sandy loam about 9 inches thick. The subsoil is brown, friable and very friable gravelly and very gravelly sandy loam 11 inches thick. The substratum, to a depth of 60 inches, is brown, loose stratified very gravelly loamy sand and sand.

Included with this soil in mapping are a few areas of severely eroded and very stony Wyoming soils. Scattered areas of Chenango and Swartswood soils are along drainageways. Some wet areas are also included.

Permeability is rapid, and available water capacity is very low to low. Surface runoff is rapid. The surface layer

is more than 15 percent gravel. In unlimed areas, reaction is very strongly acid to medium acid in the solum.

This soil is mostly in woodland. A few small areas are idle.

This soil has very poor potential for farming. It is poorly suited to pasture and is fairly well suited to trees. The potential for homesites is poor, and rapid permeability and slope limit onsite waste disposal. Slope, rapid permeability, and coarse fragments limit most other nonfarm uses. This soil is too steep and erosive for crops and pasture.

This soil is fairly well suited to trees. Productivity is fair. Loss of seedlings is serious because of the very low to low available water capacity. Steep to very steep slope limits equipment use, harvesting, and mechanical planting.

This soil is limited for nonfarm uses by rapid permeability, steep to very steep slope, and coarse fragments. Recreation, wildlife habitat, development and open space are possible nonfarm uses. Capability subclass VIIe.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops and pasture and woodland; as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities; and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

John C. Spitzer, conservation agronomist, Soil Conservation Service, helped prepare this section.

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are discussed; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

Farming is not a major land use in Monroe County. Only 33,134 acres was used for crops and pasture in 1967. Of this total, 6,221 acres was used for permanent pasture; 3,959 acres for row crops, mainly corn; 5,474 acres for close-grown crops, mainly oats; 1,353 acres for rotation hay and pasture; 9,795 acres for permanent hay; and 150 acres for orchards. The rest is conservation use only or is idle cropland.

Most of the soils in Monroe County are too stony for crops and have poor potential for increased production of food. However, the soils with few or no stones on the surface have good potential. About 36,000 acres of potentially good cropland is currently used as woodland, and about 8,000 acres is used for pasture, hay, or temporarily idle cropland. In addition to the reserve productive capacity presented by this land, food production could also be increased considerably by extending the latest crop production technology to all cropland in the county. This soil survey can greatly facilitate the application of such technology.

Soil erosion is the major soil management problem on most of the cropland and pasture in Monroe County. Al-

lenwood, Clymer, Hartleton, and Leck Kill soils are potentially productive, but where slopes exceed 3 percent, the hazard of erosion is moderate to very severe.

Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a layer in or below the subsoil that limits the depth of the root zone. Such layers include fragipans, as in Lackawanna, Bath, Meckesville, Wellsboro, Mardin, and Buchanan soils, and bedrock, as in Weikert, Klinesville, Lordstown, and Oquaga soils. Erosion also reduces productivity on soils that tend to be droughty, such as Chenango, Rushtown, and Wyoming soils. Second, soil erosion on farmland may result in sediment being deposited in streams and reservoirs. Control of erosion minimizes the pollution of streams by sediment and improves water quality for municipal use, recreation, and fish and wildlife.

In many sloping fields, preparing a good seedbed and tilling are difficult on channery soils because the original surface layer has been eroded away, leaving many coarse fragments on the surface. Such areas are common on Weikert channery silt loam, eroded.

Erosion control practices provide a protective surface cover, reduce runoff, and increase infiltration. A cropping system that keeps plant cover on the soil for extended periods can hold soil erosion losses to amounts that will not reduce the productive capacity of the soils. On livestock farms, which require pasture and hay, the legume and grass forage crops in the cropping system reduce erosion on sloping land and also provide nutrients and improve tilth for the following crop.

Minimizing tillage and leaving crop residue on the surface help to increase infiltration and reduce the hazard of erosion. These practices can be adapted to most soils in the survey area. No-tillage for corn is effective in reducing erosion on sloping land and can be adapted to most soils in the survey area, except the poorly drained and very poorly drained soils.

Terraces and diversions reduce the length of slope, reducing runoff and erosion. They are most practical on deep, well-drained soils that have regular slopes. Bath, Clymer, Hartleton, Lackawanna, Leck Kill, and Meckesville soils are suitable for terraces and diversions. The other soils are less suitable for terraces or diversions because of irregular slopes, excessive wetness in the terrace channels, or bedrock at a depth of less than 40 inches.

Contour farming and stripcropping are common erosion-control practices in the survey area. They are suitable in areas of smooth, uniform slopes, including most areas of the sloping Bath, Hartleton, Lackawanna, and Meckesville soils.

In most areas of the sloping Allenwood, Chenango, and Wyoming soils, slopes are so short and irregular that contour tillage or terracing is not practical. On these soils, cropping systems that provide substantial plant cover are needed to control erosion. Additional soil protection is provided by minimum tillage.

Information for the design of erosion control practices for each kind of soil is available at local offices of the Soil Conservation Service.

Soil drainage is the major management need on about 15 percent of the acreage used for crops and pasture in the county. Some soils are naturally so wet that the production of crops common to the area is generally not successful without artificial drainage. These are the poorly drained and very poorly drained Shelmadine, Sheffield, Chippewa, and Norwich soils, which make up about 2,840 acres of farmland in the survey area. Unless artificially drained, the somewhat poorly drained soils are so wet that crops are damaged in most years. Alvira, Morris, Volusia, and Rexford soils, which make up about 4,637 acres of farmland, are somewhat poorly drained. Some areas of the wetter soils along drainageways and in swales are commonly included in areas of moderately well drained Philo, Kedron, Buchanan, and Braceville soils. Artificial drainage is needed in most of these wetter areas.

The design of both surface and subsurface drainage systems varies with the kind of soil. A combination of surface and subsurface drainage is needed in most areas of the poorly drained soils used for the more intensive cropping systems. Drains should be more closely spaced in soils with slow permeability than in the more permeable soils. Finding adequate outlets for subsurface drainage systems is often difficult in areas of Braceville, Shelmadine, Alden, and Norwich soils.

Soil fertility is naturally low in many soils in the survey area. Many upland soils are naturally strongly acid, and if they have never been limed, they require applications of ground limestone to raise the pH level sufficiently for good growth of alfalfa and other crops. Available phosphorus and magnesium levels are naturally low in most soils. Additions of lime and fertilizer should be based on the results of soil tests, crop needs, and the expected level of yields. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to apply.

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

Many soils used for crops in the survey area have a surface layer that is relatively low in organic matter. Generally, the structure of such soils is weak, and intense rainfall causes the exposed surface to form a crust. The crust is hard when dry and is nearly impervious to water. Once the crust forms, it reduces infiltration and increases runoff. Regular additions of crop residue, manure, and other organic matter help to improve soil structure and reduce crust formation.

Plowing in fall is generally not a good practice on soils that have a silt loam surface layer low in organic matter, because of the crust that forms during winter and spring. Many of the soils are nearly as dense and hard at planting

time after fall plowing as they were before they were plowed. Also, most of the cropland consists of sloping soils that are subject to damaging erosion if plowed in the fall.

Field crops suited to the soils and climate of the survey area include many that are not now commonly grown. Corn is the major row crop, although grain sorghum, potatoes, soybeans, and similar crops can be grown. Wheat, oats and barley are the common close-grown crops.

The most common specialty crops grown commercially in the survey area are apples, vegetables, and nursery plants. Deep soils that have good natural drainage and that warm early in spring are well suited to these crops. Good air drainage reduces frost damage.

In the survey area the Allenwood, Clymer, Hartleton, and Leck Kill soils have the best combination of soil properties and air drainage for fruit and vegetables. Pope soils are also good for vegetables, but flooding may damage the crops.

The latest information and suggestions for growing specialty crops can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the crop is not suited to or not commonly grown on the soil or that a given crop is not commonly irrigated.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay and pasture yields were estimated for the most productive varieties of grasses and legumes suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 5.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

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

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not included because the acreage of these crops is small. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the management concerns and productivity of the soils for these crops.

Capability classes and subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forest trees, or for engineering purposes.

In Monroe County all kinds of soil are grouped at two levels: capability class and subclass. These levels are defined in the following paragraphs. A survey area may not have soils of all classes.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

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

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and landforms have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class; they are designated by adding a small letter, *e, w, s,* or *c,*

to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

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

The acreage of soils in each capability class and subclass is indicated in table 6. All soils in the survey area except those named at a level higher than the series are included. Some of the soils that are well suited to crops and pasture may be in low-intensity use, for example, soils in capability classes I and II. Data in this table can be used to determine the farming potential of such soils.

The capability subclass is identified in the description of each soil map unit in the section "Soil maps for detailed planning."

Woodland management and productivity

Paxton G. Wolfe, woodland conservationist, Soil Conservation Service, assisted in preparing this section.

Monroe County has about 315,600 acres of woodland, which is about 81 percent of the county (*10*). Farmers own 10 percent of the woodland, industries and private concerns own 72 percent, and the Pennsylvania Bureau of Forestry and Game Commission owns 18 percent.

The woodland is made up of stands of second- and third-growth trees. The principal forest types (*7*) that make up the present woodland and the extent of each, as given by the U.S. Forest Service, are as follows:

Oak-hickory. This type makes up 57 percent of the total woodland. This cover type consists mainly of white oak, red oak, and hickory; although black oak is sometimes predominant. Other principal trees are yellow-poplar, beech, white ash, shagbark hickory, red maple, and chestnut oak.

Aspen-birch. This type makes up 12 percent of the woodland. Quaking aspen, bigtooth aspen, and gray birch dominate this cover type. Other principal trees are pin cherry, red maple, yellow birch, white pine, ash, and sugar maple.

Elm-ash-red maple. This type makes up 11 percent of the woodland. This cover type is predominately white ash, American elm, and red maple. Other trees are slippery elm, yellow birch, sycamore, and hemlock.

White pine. This type makes up 9 percent of the woodland. This cover type is 50 percent or more white pine. Other main trees are yellow-poplar, northern red oak, and white oak.

Maple-beech-birch. This type makes up 5 percent of the woodland. This cover type consists of sugar maple, beech, and yellow birch. Other trees are basswood, red maple, hemlock, red oak, white ash, white pine, black birch, and yellow-poplar in various amounts.

Virginia pine-pitch pine. This type makes up 4 percent of the woodland. Virginia pine and pitch pine are the dominant trees. Other principal trees are red oak, black oak, scarlet oak, chestnut oak, and hickory.

Other oaks. This type makes up 2 percent of the woodland. This cover type consists mainly of chestnut oak and red oak on the ridges. Other common trees are white oak, black oak, scarlet oak, pitch pine, Virginia pine, and red maple.

Sawtimber makes up approximately 25.1 percent of the acreage in commercial forests; poletimber, 42.2 percent; seedlings and saplings, 29.4 percent; and nonstocked, or forest lands that are less than 10 percent stocked with desirable trees, 3.3 percent.

The soils in Monroe County generally are capable of supporting a good stand of yellow-poplar, ash, red oak, and sugar maple. Trees grow more slowly on the shallow and poorly drained soils than on the deeper, well drained soils.

A landowner can encourage desirable trees by practicing good woodland management on those soils that have productivity ratings of very high, high, and moderately high. Help in planning a woodland improvement program can be obtained from the local Soil Conservation Service office or a consulting forester. Those soils having low potential productivity generally are not worth managing to increase yields of wood crops. Soils that are rated moderate are the most difficult to appraise for forest management. A thorough appraisal of the trees growing on the site and their quality is needed. The market potential for these trees must also be investigated to determine if woodland improvement is worth the cost.

The value of woodland in Monroe County is mainly its uses for esthetics, recreation, and watershed protection. However, the better sites are profitable if they are properly managed for wood crops and if they are protected from fire, insects, disease, and livestock grazing.

Table 7 contains information useful to woodland owners or forest managers planning use of soils for wood crops. Map unit symbols for soils suitable for wood crops are listed, and the ordination (woodland suitability) symbol for each soil is given. All soils bearing the same ordination symbol require the same general kinds of woodland management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or

rockiness; *w*, excessive water in or on the soil; *d*, restricted root depth; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates insignificant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the following order: x, w, d, f, and r.

In table 7 the soils are also rated for a number of factors to be considered in management. *Slight, moderate,* and *severe* are used to indicate the degree of major soil limitations.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if some measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings. Plant competition is not considered in the ratings. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Considered in the ratings of *windthrow hazard* are characteristics of the soil that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that trees in wooded areas are not expected to be blown down by commonly occurring winds; *moderate*, that some trees are blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

The *potential productivity* of merchantable or *important trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in 50 years. The site index applies to fully stocked, even-aged, unmanaged stands. Important trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

Engineering

Lloyd E. Thomas, assistant state conservation engineer, Soil Conservation Service, helped prepare this section.

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 8 shows, for each kind of soil, the degree and kind of limitations for building site development; table 9, for sanitary facilities; and table 11, for water management. Table 10 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

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

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 8. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 8 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 8 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 9 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the

specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, or *poor*, which, respectively, mean about the same as the terms *slight*, *moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 9 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 10 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some

of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 14 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 10 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 14.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 11 site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Aquifer-fed excavated ponds are bodies of water made by excavating a pit or dugout into a ground-water aquifer. Excluded are ponds that are fed by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Ratings in table 11 are for ponds that are properly designed, located, and constructed. Soil properties and site features that affect aquifer-fed ponds are depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Recreation

Recreation is important in Monroe County. The numerous and diversified recreational facilities attract thousands of tourists and residents each year. Among the major attractions are more than 30 golf courses, many swimming facilities, large lakes for boating, large areas of State game lands, ski slopes, playgrounds, and a large international race track. Other important recreational activities include camping, bowling, tennis, fishing, hiking, biking, and horseback riding.

More than 30 percent of the county is used for recreation. The largest recreational area is the 35,347 acres of State game lands. Other large areas are used for golf courses, ski slopes, boating and swimming facilities, campgrounds, and trails for hiking, biking, and horseback riding.

Most soils in the county have potential for some type of recreational development. Deep, well drained soils with few or no surface stones have the best potential. Many soils in the county have an extremely stony surface that seriously limits the potential for more intensive recreation. These stony soils have some potential for hiking trails, hunting, and other types of recreation that require only slight land alteration. The soils with the poorest potential for most kinds of recreation are poorly drained and very poorly drained soils and steep and very steep soils.

The soils of the survey area are rated in table 12 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 12 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 9, and interpretations for dwellings without basements and for local roads and streets, given in table 8.

Camp areas require such site preparation as shaping and leveling for tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

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

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

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They should have moderate slopes and have few or no stones or boulders on the surface.

Wildlife habitat

Clayton L. Heiney, and Richard L. Schroeder, wildlife biologists, Soil Conservation Service, assisted in preparing this section.

The presence and abundance of wildlife in Monroe County are related to the soil. The relationship, however, is not always easily distinguished. Soils affect wildlife through their influence on the vegetation that supplies food and cover for the wildlife.

Under natural conditions, the distribution of the various kinds of vegetation in an area depends on the pattern or combinations of soils. An area is inhabited by the kinds of wildlife whose habitat requirements are met by the vegetation in the area. If the natural conditions in the area are altered by drainage or by other practices used in managing farms or woodlands, the kinds and patterns of vegeta-

tion change, and consequently the kinds and numbers of wildlife change.

The principal species of wildlife in the county are white-tailed deer, black bear, snowshoe hare, gray squirrel, cottontail rabbit, ruffed grouse, bobwhite quail, ring-necked pheasant, woodcock, and waterfowl. Important furbearers are beaver, muskrat, otter, and mink. There is also a large variety of nongame wildlife, including songbirds, reptiles, amphibians, and small mammals. The wildlife in Monroe County contribute to maintaining the diversity and stability of ecosystems in the county.

White-tailed deer are considered forest species, but they neither prefer nor do well in large, mature forests. They prefer a combination of brush or young trees, lesser amounts of mature trees, and small open areas. Deer are found throughout Monroe County.

Gray squirrel, cottontail rabbit, and ruffed grouse are also found throughout the county. Ruffed grouse prefer young brush stands of trees and open areas similar to those that white-tailed deer frequent. Squirrels are especially common in areas of mature, nut-producing woodlands. Cottontail rabbit are found mostly in areas now farmed or once farmed. Abandoned farms growing up in brush usually contain many cottontail.

Black bear prefer forests that have mixed stands of conifers and hardwoods of various ages. They also prefer areas with ample water in streams, ponds, and lakes. In Monroe County, bear are found mostly on the Lackawanna-Wellsboro-Oquaga, Chippewa-Norwich-Mucky peat, Empeyville-Worth, and Clymer-Buchanan general soil map units.

Northeastern Pennsylvania, including Monroe County, has the State's best populations of snowshoe hare. Snowshoe hare are found in cool, shrubby bogs or swampland that is thickly overgrown with spruce, hemlock, willows, alders, or brush.

Muskrat, mink, beaver, and river otter are found along rivers, lakes, and ponds. Muskrats live throughout the county; whereas mink, beaver, and otter generally live in the more remote areas.

Bobwhite quail and ring-necked pheasant are in the southwestern part of Monroe County. Quail live in a small area almost entirely within the Weikert-Hartleton and Leck Kill-Klinesville map units. Ring-necked pheasant are in larger areas mostly within the Wyoming-Chenango-Pope, Weikert-Hartleton, and Leck Kill-Klinesville map units.

Monroe County has some of the State's best habitat for woodcock. Woodcock are found along stream bottoms and in areas with grassy or weedy openings and shrub or small tree thickets. Presence and abundance of woodcock depend mostly on the kinds of soil in the area. Earthworms are a major part of the woodcock's diet and their supply is directly affected by soil texture, moisture, temperature, and organic-matter content. Soil moisture appears to be the most important factor in determining earthworm populations. Lack of moisture or excessive moisture in the soil are harmful to earthworms. Earthworm production is higher in sandy loam and loam than in clay and silt. Areas that have soils with these characteristics and vegetation including alder, aspen, hawthorn, and dogwood probably contain a large population of woodcock.

Waterfowl are found in abundance in Monroe County. The most common species, mallards, Canada geese, wood ducks, and black ducks, occupy the Delaware River, its tributaries, and the ponds, lakes, and beaver dams of the area.

The distribution and abundance of the wildlife species in Monroe County have been greatly affected by patterns of land use, especially increasing urban development. The distribution of species, such as black bear and river otter, is affected more by man's activities and development than by soil or vegetation.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either are scarce or do not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In table 13, the soils in Monroe County are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

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

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are goldenrod and beggarweed.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of native plants are oak, aspen, cherry, apple, hawthorn, dogwood, hickory, blackberry, winterberry, and blueberry. Examples of fruit-producing shrubs that are commercially available and suitable for planting on soils rated *good* are Tatarian honeysuckle, autumn-olive, and crabapple.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, and cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, rushes, and sedges.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control structures in marshes or streams. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The kinds of wildlife attracted to these areas include pheasant, meadowlark, field sparrow, cottontail rabbit, and red fox.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Wetland habitat consists of open, marshy, or swampy, shallow water areas where water-tolerant plants grow. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features, engineering test data,

and data obtained from physical and chemical laboratory analyses of soils.

Engineering properties

Table 14 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 14 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 14 in the standard terms used by the U.S. Department of Agriculture (*8*). These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*1*).

The *Unified* system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Also in table 14 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterburg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 15 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Soil and water features

Table 16 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received 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 chiefly of deep, well drained to excessively drained sands or gravels. 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 that have a layer that impedes the downward movement of water or soils that have 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 clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction

of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Potential frost action refers to the likelihood of damage to pavements and other structures by frost heaving and low soil strength after thawing. Frost action results from the movement of soil moisture into the freezing temperature zone in the soil, which causes ice lenses to form. Soil texture, temperature, moisture content, porosity, permeability, and content of organic matter are the most important soil properties that affect frost action. It is assumed that the soil is not covered by insulating vegetation or snow and is not artificially drained. Silty and clayey soils that have a high water table in winter are most susceptible to frost action. Well drained very gravelly or sandy soils are the least susceptible.

Classification of the soils

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to "Soil taxonomy" (*9*).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 17, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Fluvaquents (*Fluv*, meaning stream produced, plus *aquent*, the suborder of Entisols that have an aquic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceeding the name of the great group. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Fluvaquents.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-loamy, mixed, nonacid, mesic, Typic Fluvaquents.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

Soil series and morphology

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

Characteristics of the soil and the material in which it formed are discussed for each series. The soil is then compared to similar soils and to nearby soils of other series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*8*). Unless otherwise noted, colors described are for moist soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or mapping units, of each soil series are described in the section "Soil maps for detailed planning."

Alden series

The Alden series is made up of fine-loamy, mixed, nonacid, mesic Mollic Haplaquepts. These soils are deep and very poorly drained. They formed in local alluvium and calcareous Wisconsin glacial till deposits derived from limestone and sandstone. The A horizon is mucky silt loam, and the B horizon is dark gray and gray, light silty clay loam. Alden soils are in slight depressions on the glaciated uplands. Slopes range from 0 to 3 percent.

Alden series are associated on the landscape with Benson, Wayland and Holly soils. Benson soils are shallow and well drained, Wayland soils are very poorly drained, and Holly soils are poorly drained.

Typical pedon of Alden mucky silt loam in a wooded area 6 miles east of East Stroudsburg on Township Route 461, 1 mile south of U. S. Highway 209, 45 feet northeast of power pole 3047, 10 feet northwest of edge of road:

A1—0 to 9 inches; black (10YR 2/1) mucky silt loam; moderate medium granular structure; friable, slightly sticky and slightly plastic; slightly acid; clear wavy boundary.

B21g—9 to 20 inches; dark gray (N 4/0) light silty clay loam; common medium and coarse distinct brownish yellow (10YR 6/6) and yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable, very sticky and very plastic; slightly acid; gradual smooth boundary.

B22g—20 to 30 inches; gray (N 5/0) light silty clay loam; many coarse prominent brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable; very sticky and very plastic; 2 percent coarse fragments; neutral; gradual smooth boundary.

B23g—30 to 35 inches; dark gray (N 4/0) light silty clay loam; many coarse prominent brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable, very sticky and very plastic; 5 percent coarse fragments; neutral; abrupt wavy boundary.

IIC—35 to 60 inches; dark gray (N 4/0) gravelly loam; many coarse prominent brownish yellow (10YR 6/6) mottles; massive; friable, slightly sticky and slightly plastic; 30 percent coarse fragments; neutral.

The solum ranges from 30 to 36 inches in thickness. Coarse fragments make up 0 to 10 percent of the solum and 15 to 35 percent of the IIC horizon. Reaction ranges from slightly acid to neutral.

The A1 horizon ranges from black (N 2/0) to very dark gray (10YR 3/1).

The B horizon ranges from dark gray (N 4/0) to pinkish gray (7.5YR 6/2). It is light silty clay loam and silt loam.

The IIC horizon is gravelly loam or loam. Its color is similar to that of the B horizon.

Allenwood series

The Allenwood series is made up of fine-loamy, mixed, mesic Typic Hapludults. These soils are deep and well drained. They formed in pre-Wisconsin glacial till derived from acid sandstone, shale, and siltstone. The Ap horizon is dark brown gravelly silt loam and the B horizon is strong brown yellowish red and red gravelly silty clay loam. Allenwood soils are on dissected ridges and broad plateaus. Slopes range from 8 to 20 percent.

Allenwood soils are associated on the landscape with Hartleton, Watson, Alvira, and Weikert soils. Hartleton soils are deep and well drained, Watson soils are deep and moderately well drained, Alvira soils are deep and somewhat poorly drained, and Weikert soils are shallow and well drained. Allenwood soils are redder and have more clay in the lower part of the subsoil than Hartleton soils.

Typical pedon of Allenwood gravelly silt loam, 3 to 8 percent slopes, in an oatfield about 1/2 mile southwest of Kresgeville on Township Route 356, 400 feet south of U. S. Highway 209, in a field 15 feet west of road:

Ap—0 to 9 inches; dark brown (10YR 4/3) gravelly silt loam; weak fine granular structure; friable, nonsticky and slightly plastic; 15 percent gravel; medium acid; abrupt smooth boundary.

B1—9 to 13 inches; strong brown (7.5YR 5/6) gravelly light silty clay loam; weak fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; thin patchy clay films on ped faces; few small wormholes; 15 percent gravel; medium acid; gradual wavy boundary.

B21t—13 to 23 inches; yellowish red (5YR 5/6) gravelly silty clay loam; moderate medium subangular blocky structure; firm, slightly sticky and plastic; thin and moderately thick patchy clay films on ped faces; 20 percent gravel; strongly acid; gradual wavy boundary.

B22t—23 to 30 inches; red (2.5YR 5/8) gravelly silty clay loam; moderate medium subangular blocky structure; firm, slightly sticky and plastic; thick continuous clay films on ped faces; few, thin black coatings; 35 percent gravel; very strongly acid; clear wavy boundary.

B23t—30 to 40 inches; red (2.5YR 5/6) gravelly silty clay loam; moderate medium and coarse, subangular blocky structure; firm, slightly sticky and plastic; thick continuous patchy clay films on ped faces; many thin black coatings; 25 percent gravel; very strongly acid; gradual wavy boundary.

B24t—40 to 48 inches; red (2.5YR 4/8) gravelly silty clay loam; moderate medium and coarse subangular blocky structure; firm, slightly sticky and plastic; moderately thick nearly continuous clay films on ped faces; many thin black coatings; 20 percent gravel; very strongly acid; gradual wavy boundary.

B3—48 to 59 inches; red (2.5YR 4/6) gravelly silty clay loam; weak medium and coarse blocky structure to massive; very firm, sticky and plastic; thin and moderately thick discontinuous clay films; many thin black coatings; 30 percent gravel; very strongly acid; gradual wavy boundary.

C—59 to 72 inches; red (2.5YR 4/6), yellowish red (5YR 4/6), and strong brown (7.5YR 5/6) reticulately mottled gravelly clay loam; massive; firm, sticky and slightly plastic; some clay films in pores; some black coatings; 40 percent gravel, very strongly acid.

The solum ranges from 48 to 75 inches in thickness. Depth to bedrock generally is more than 6 feet. Content of coarse fragments of subrounded gravel generally increases with depth and ranges from 15 to 25 percent in the A horizon, from 15 to 40 percent in the B horizon, and from 20 to 70 percent in the C horizon. Where the soil has not been limed, reaction is very strongly acid to extremely acid.

The A horizon ranges from dark grayish brown (10YR 4/2) to brown (7.5YR 5/4). It is silt loam or light silty clay loam.

The B horizon ranges from yellowish red (5YR 4/6) to reddish yellow (7.5YR 6/8). The B2 horizon ranges from light red (2.5YR 6/8) to yellowish red (5YR 4/6). The fine earth fraction of the B horizon is generally silty clay loam, but in some profiles it is heavy loam or clay loam.

The C horizon is similar to the B horizon in color or is variegated. Black stains are common. Texture is commonly gravelly or very gravelly silty clay loam, clay loam, or loam.

Alvira series

The Alvira series is made up of fine-loamy, mixed, mesic Aeric Fragiaquults. These soils are deep and somewhat poorly drained. They formed in pre-Wisconsin glacial till derived from acid sandstone, siltstone, and shale. The Ap horizon is dark grayish brown gravelly silt loam, and the B horizon is yellowish brown, brown, and strong brown gravelly silt loam, gravelly silty clay loam, and gravelly loam. Alvira soils are in upland depressions and on concave side slopes. Slopes range from 0 to 8 percent.

Alvira soils are associated on the landscape with Allenwood, Clymer, Laidig, Watson, Buchanan, and Shelmadine soils. Allenwood, Clymer, and Laidig soils are deep and well drained, Watson and Buchanan soils are deep and moderately well drained, and Shelmadine soils are deep and poorly drained.

Typical pedon of Alvira gravelly silt loam, 3 to 8 percent slopes, in a cultivated field 1-1/4 miles south of Kresgeville on Township Route 422, 690 feet north of intersection with Township Route 375, 50 feet east of center of road:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) gravelly silt loam; weak fine granular structure; friable, slightly plastic; 20 percent coarse fragments; medium acid; abrupt smooth boundary.

B2t—10 to 17 inches; light yellowish brown (10YR 6/4) gravelly silt loam; ped faces are light brownish gray (10YR 6/2); few fine distinct light gray (10YR 7/2) mottles; moderate medium subangular blocky structure; friable; slightly plastic; few thick and thin patchy clay films on ped faces and lining pores; 25 percent coarse fragments; medium acid; gradual wavy boundary.

Bx1—17 to 23 inches; brown (7.5YR 5/4) gravelly silty clay loam; prism faces are light gray (10YR 6/1); common medium distinct reddish yellow (7.5YR 6/8) and light gray (10YR 7/2) mottles; weak very coarse prismatic structure parting to moderate medium subangular blocky; firm and brittle, slightly sticky and slightly plastic; common thick and thin patchy clay films on ped faces and lining pores; medium acid; 30 percent coarse fragments; clear wavy boundary.

Bx2—23 to 34 inches; brown (7.5YR 5/4) gravelly silty clay loam; prism faces are light gray (10YR 6/1); many medium prominent strong brown (7.5YR 5/8) and light gray (10YR 7/2) mottles; moderate very coarse prismatic structure parting to moderate medium subangular blocky; firm and very brittle, sticky and slightly plastic; common thick patchy clay films on ped faces and lining pores; 35 percent coarse fragments; strongly acid; gradual irregular boundary.

Bx3—34 to 41 inches; strong brown (7.5YR 5/6) gravelly silt loam; prism faces are gray (N 6/0); many medium and coarse prominent white (10YR 8/2) and strong brown (7.5YR 5/8) mottles; moderate very coarse prismatic structure parting to moderate medium subangular blocky; firm and brittle, slightly sticky and slightly plastic; common thick patchy clay films on ped faces and in pores; 40 percent coarse fragments; strongly acid; gradual wavy boundary.

Bx4—41 to 60 inches; strong brown (7.5YR 5/6) gravelly loam; prism faces are gray (N 6/0); many coarse prominent light brownish gray (10YR 6/2) and dark brown (7.5YR 4/4) mottles; weak very coarse prismatic structure parting to moderate medium subangular blocky; firm and brittle, slightly sticky and slightly plastic; few thin patchy clay films in pores; 40 percent coarse fragments; strongly acid.

The solum ranges from 40 to 60 inches in thickness. Bedrock is at a depth of 3 1/2 to 10 feet. Depth to the fragipan ranges from 16 to 25 inches. Coarse fragments make up 10 to 30 percent of the soil above the Bx horizon and 20 to 50 percent of the Bx horizon. Where the soil has not been limed, reaction is strongly acid or very strongly acid.

The Ap horizon ranges from brown (7.5YR 4/4) to very dark grayish brown (10YR 3/2).

The B and Bt horizons range from brown (10YR 5/3) to reddish yellow (7.5YR 6/6). The Bx horizon ranges from

grayish brown (10YR 5/2) to yellowish red (5YR 5/6). Color of the prism faces ranges from light gray (N 7/0) to pinkish gray (7.5YR 6/2). The fine earth fraction of the B horizon ranges from silty clay loam to loam.

Bath series

The Bath series is made up of coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are deep and well drained. They formed in glacial till derived from siltstone, sandstone, and shale. The Ap horizon is channery silt loam, and the B horizon is yellowish brown and brown channery silt loam, channery loam, and very channery loam. Bath soils are on upland ridges and plateaus. Slopes range from 0 to 50 percent.

Bath soils are associated on the landscape with Swartswood, Mardin, Wurtsboro, Volusia, Chippewa, and Norwich soils. Swartswood soils are deep and well drained, Mardin and Wurtsboro soils are deep and moderately well drained, Volusia soils are deep and somewhat poorly drained, and Chippewa and Norwich soils are deep and poorly drained. Bath soils are finer textured than Swartswood and Wurtsboro soils.

Typical pedon of Bath channery silt loam, 3 to 8 percent slopes, in a cultivated field 2-3/4 miles north of Stroudsburg on Route 45019, 0.35 mile north of intersection with Route 45057, 400 feet west of road:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) channery silt loam; moderate fine and medium granular structure; very friable, slightly sticky and slightly plastic; 25 percent coarse fragments; medium acid; abrupt smooth boundary.

B21—10 to 15 inches; yellowish brown (10YR 5/4) channery silt loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; 25 percent coarse fragments; medium acid; clear wavy boundary.

B22—15 to 26 inches; yellowish brown (10YR 5/6) channery loam; weak medium and coarse subangular blocky structure; friable, slightly sticky and slightly plastic; 30 percent coarse fragments; strongly acid; gradual wavy boundary.

Bx1—26 to 31 inches; yellowish brown (10YR 5/4) channery loam; prism faces are light brownish gray (10YR 6/2) bordered by strong brown (7.5YR 5/6) rinds; moderate very coarse prismatic structure; firm and brittle, slightly sticky and slightly plastic; few thin clay films in pores; 35 percent coarse fragments; strongly acid; gradual wavy boundary.

Bx2—31 to 44 inches; yellowish brown (10YR 5/4) channery loam; prism faces are light brownish gray (10YR 6/2) bordered by strong brown (7.5YR 5/6) rinds; moderate very coarse prismatic structure; firm and brittle; few thin clay films in pores; 45 percent coarse fragments; strongly acid; diffuse wavy boundary.

Bx3—44 to 57 inches; yellowish brown (10YR 5/4) channery loam; prism faces are light brownish gray (10YR 6/2) bordered by strong brown (7.5YR 5/6) rinds; moderate very coarse prismatic structure; firm and brittle, slightly sticky and slightly plastic; common thin and moderately thick clay films in pores; 45 percent coarse fragments; medium acid; diffuse wavy boundary.

Bx4—57 to 68 inches; brown (10YR 5/3) very channery loam; moderate very coarse prismatic structure; firm and brittle, slightly sticky and slightly plastic; many thin and moderately thick clay films in pores; 65 percent coarse fragments; medium acid; abrupt wavy boundary.

IIC—68 to 79 inches; olive (5Y 5/4) sandstone fragments coated with silt and clay films; 95 percent coarse fragments; medium acid; abrupt wavy boundary.

IIR—79 inches; olive (5Y 5/4) fractured fine grained sandstone bedrock.

The solum ranges from 40 to 80 inches in thickness. Depth to the fragipan ranges from 26 to 40 inches. Bedrock is at a depth of 3-1/2 to 10 feet or more. Coarse fragments make up 15 to 40 percent of the A and B horizons and 20 to 65 percent of the Bx horizon. Where the soil has not been limed, reaction ranges from very strongly acid to medium acid above the Bx horizon, from strongly acid to slightly acid in the Bx horizon, and from strongly acid to neutral in the C horizon.

The A horizon ranges from very dark grayish brown (2.5Y 3/2) to yellowish brown (10YR 5/4). The fine earth fraction is silt loam.

The B and Bx horizons range from brown (7.5YR 4/4) to light olive brown (2.5Y 5/6). The fine earth fraction of the B horizon is silt loam or loam, and the fine earth fraction of the Bx horizon ranges from silt loam to sandy loam. The Bx horizon is firm or very firm and brittle.

The C horizon is similar to the B horizon in color.

Benson series

The Benson series is made up of loamy-skeletal, mixed, mesic Lithic Eutrochrepts. These soils are shallow and well drained. They formed in glacial till derived from limestone, calcareous shale, slate, sandstone, and quartzite. The Ap horizon is channery silt loam, and the B horizon is yellowish brown shaly and very shaly silt loam. Benson soils are on tops and sides of ridges. Slopes range from 0 to 70 percent.

Benson soils are associated on the landscape with Alden soils. Alden soils are deep and very poorly drained.

Typical pedon of Benson channery silt loam in an area of Benson-Rock outcrop complex, 8 to 25 percent slopes, in Middle Smithfield Township 4 miles east of Marshalls Creek along Township Route 550, 1.2 miles southeast of U. S. Highway 209, 10 feet east of road:

Ap—0 to 8 inches; brown (10YR 4/3) channery silt loam; weak fine granular structure; very friable, nonsticky

and nonplastic; 20 percent coarse fragments; neutral; abrupt smooth boundary.

B2—8 to 14 inches; yellowish brown (10YR 5/6) shaly silt loam; weak medium blocky structure; friable, slightly sticky and slightly plastic; 25 percent coarse fragments; neutral; clear wavy boundary.

B3—14 to 18 inches; yellowish brown (10YR 5/6) very shaly silt loam; weak medium subangular blocky structure; friable, sticky and slightly plastic; 50 to 65 percent coarse fragments; neutral; abrupt smooth boundary.

R—18 inches; very dark grayish brown (2.5Y 3/2) fine grained sandstone bedrock; moderately calcareous.

The solum ranges from 10 to 20 inches in thickness. Depth to bedrock ranges from 12 to 20 inches. Where the soil has not been limed, reaction is neutral to medium acid. Texture is dominantly channery silt loam or shaly silt loam; the lower part of the profile is gravelly silt loam and channery loam in places. Stones have been removed from the surface of most areas, but some stones are present throughout the profile. Coarse fragments smaller than stones make up 15 to 20 percent of the A horizon and 20 to 70 percent of the B and C horizon.

The Ap horizon ranges from dark grayish brown (10YR 4/2) to dark brown (10YR 4/3).

The B horizon ranges from strong brown (7.5YR 5/6) to dark yellowish brown (10YR 3/4).

Braceville series

The Braceville series is made up of coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are deep and moderately well drained. They formed in glacial outwash derived from sandstone, siltstone, and shale. The Ap horizon is dark grayish brown gravelly loam. The B horizon is brown gravelly loam and gravelly fine sandy loam, and the Bx horizon is brown, firm and brittle gravelly fine sandy loam. Braceville soils are on outwash terraces and kames. Slopes range from 0 to 8 percent slopes.

Braceville soils are associated on the landscape with Chenango, Wyoming, and Rexford soils. Chenango soils are deep and well drained to somewhat excessively drained, Wyoming soils are somewhat excessively drained, and Rexford soils are somewhat poorly drained to poorly drained.

Typical pedon of Braceville gravelly loam, 0 to 3 percent slopes, in a pasture 1 mile north of East Stroudsburg on Township Route 508, 800 feet west of road, 160 feet west of creek, 120 feet south of stone row:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) gravelly loam; moderate very fine and fine granular structure; friable, nonsticky and nonplastic; 15 percent coarse fragments; strongly acid; abrupt smooth boundary.

B1—10 to 15 inches; brown (10YR 5/3) gravelly loam; moderate fine and medium granular structure; friable, nonsticky and slightly plastic; 15 to 20 percent coarse fragments; strongly acid; clear wavy boundary.

B2—15 to 21 inches; brown (10YR 5/3) gravelly fine sandy loam; many medium distinct light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable, slightly sticky and nonplastic; few thin clay films in pores; 25 to 30 percent coarse fragments; common black concretions; strongly acid; clear wavy boundary.

Bx—21 to 36 inches; brown (10YR 4/3) gravelly fine sandy loam; many medium distinct brown (7.5YR 4/4) and light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure parting to moderate fine and medium subangular blocky; firm and brittle, slightly sticky and nonplastic; few thin clay films in pores; 35 percent coarse fragments; common black concretions; strongly acid; clear wavy boundary.

IIC1—36 to 40 inches; brown (10YR 5/3) very gravelly sandy loam; many medium distinct brown (7.5YR 4/4) and light brownish gray (10YR 6/2) mottles; massive; firm, slightly sticky and slightly plastic; 60 percent coarse fragments; common black concretions; strongly acid; abrupt wavy boundary.

IIC2—40 to 60 inches; grayish brown (10YR 5/2) stratified sand and gravel; single grain; strongly acid.

The solum ranges from 30 to 45 inches in thickness. Depth to bedrock ranges from 5 to 30 feet or more, and depth to the fragipan is 18 to 30 inches. Reaction ranges from very strongly acid to medium acid above the Bx horizon and from strongly acid to slightly acid in the Bx and C horizons. Coarse fragments make up 15 to 30 percent of the A and B horizons and 25 to 50 percent of the Bx horizon.

The Ap horizon ranges from dark brown (7.5YR 3/2) to olive brown (2.5Y 4/4). The fine earth fraction is loam.

The B horizon ranges from light olive brown (2.5Y 5/6) to brown (7.5YR 4/4 and 10YR 4/3). The fine earth fraction is silt loam to sandy loam.

Buchanan series

The Buchanan series is made up of fine-loamy, mixed, mesic Aquic Fragiudults. These soils are deep and moderately well drained to somewhat poorly drained. They formed in thick glacial till and colluvium derived from sandstone, siltstone, and shale. The Ap horizon is loam, and the B horizon is yellowish brown gravelly heavy loam and gravelly loam. Buchanan soils are on concave upper, mid, and lower foot slopes of ridges. Slopes range from 0 to 25 percent.

Buchanan soils formed in material similar to that on which the nearby Laidig, Clymer, and Alvira soils formed. They have a fragipan as do Laidig and Alvira soils. They are not so well drained as Laidig soils and are better drained than Alvira soils. Clymer soils are well drained and do not have a fragipan.

Typical pedon of Buchanan loam, 3 to 8 percent slopes, in an idle field near Jonas on Route 45043, 0.7 mile east of intersection with Route 45045, 40 feet north of road:

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; friable, slightly sticky and slightly plastic; 12 percent gravel; slightly acid; abrupt smooth boundary.

B21t—10 to 17 inches; yellowish brown (10YR 5/6) gravelly heavy loam; weak fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; many thin patchy clay films on ped faces; 20 percent gravel; slightly acid; clear wavy boundary.

B22t—17 to 24 inches; yellowish brown (10YR 5/6) gravelly loam; few medium distinct grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable, slightly sticky and nonplastic; many thin patchy clay films on ped faces; 20 percent gravel; medium acid; gradual smooth boundary.

B23t—24 to 29 inches; yellowish brown (10YR 5/6) gravelly loam; common medium distinct grayish brown (10YR 5/2) and strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable, slightly sticky and nonplastic; many thin patchy clay films on ped faces; 20 percent gravel and channers.

Bx1—29 to 35 inches; yellowish brown (10YR 5/6) gravelly loam; many coarse prominent light brownish gray (10YR 6/2) and strong brown (7.5YR 5/8) mottles; weak very coarse prismatic structure parting to moderate medium blocky; firm in place and brittle, slightly sticky and nonplastic; many thin patchy clay films on ped faces; 25 percent gravel and channers; strongly acid; clear smooth boundary.

Bx2—35 to 55 inches; yellowish brown (10YR 5/6) gravelly loam; many coarse prominent light gray (10YR 7/2) and strong brown (7.5YR 5/8) mottles; moderate very coarse prismatic structure parting to moderate medium blocky; firm in place and brittle; few thin patchy clay films on ped faces; 30 percent gravel and channers; strongly acid; abrupt smooth boundary.

C—55 to 65 inches; yellowish brown (10YR 5/6) gravelly loam; many coarse distinct strong brown (7.5YR 5/6) mottles; weak medium blocky structure; firm, slightly sticky and nonplastic; 40 percent gravel and channers; strongly acid.

The solum ranges from 40 to 60 inches in thickness. Depth to bedrock ranges from 5 to 12 feet or more. Depth to the fragipan ranges from 20 to 32 inches. Content of coarse fragments ranges from 5 to 35 percent above the fragipan and from 15 to 60 percent in the fragipan and the C horizon. Where the soil has not been limed, reaction is very strongly acid to extremely acid.

The Ap horizon is very dark grayish brown (10YR 3/2) to brown (10YR 4/3). The A1 horizon is very similar to the Ap horizon in color, but value ranges from 2 to 4 and chroma ranges from 1 to 3. A lighter colored A2 horizon is present in some profiles. The A horizon is generally loam.

The B horizon is brown (10YR 5/3) to reddish yellow (7.5YR 6/6). Texture ranges from gravelly silt loam to gravelly sandy clay loam. Mottles that are high in chroma are in the lower part of the Bt horizon and in the Bx horizon. The Bx horizon is firm or very firm and brittle.

The C horizon ranges from gray (10YR 6/1) to yellowish brown (10YR 5/6). It is gravelly loam to gravelly sandy clay loam. Gray to strong brown mottles are common.

Chenango series

The Chenango series is made up of loamy-skeletal, mixed, mesic Typic Dystrochrepts. These soils are well drained to somewhat excessively drained. They formed in outwash derived from sandstone and siltstone. The Ap horizon is dark grayish brown gravelly loam, and the B horizon is dark yellowish brown and yellowish brown gravelly fine sandy loam and gravelly loam. Chenango soils are on outwash plains, valley trains, and associated kames, eskers, and water-deposited parts of moraines. Slopes range from 0 to 15 percent.

Chenango soils are near Braceville, Wyoming, and Rexford soils. Chenango, Braceville, and Rexford soils formed in similar material. Chenango soils are better drained than the moderately well drained Braceville soils and the somewhat poorly drained Rexford soils. They do not have a fragipan, as do Braceville and Rexford soil. Chenango soils are less than 50 percent fine and coarser sand between depths of 10 to 24 inches, whereas Wyoming soils are more than 50 percent.

Typical pedon of Chenango gravelly loam, 3 to 8 percent slopes, in an idle field about 1.5 miles southeast of Stroudsburg on Route 45010, 3/4 mile east of junction with PA Route 191, 25 feet west of high tension tower:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) gravelly loam; weak fine granular structure; very friable; many roots; 20 percent gravel; strongly acid; abrupt smooth boundary.

B21—8 to 16 inches; dark yellowish brown (10YR 4/4) gravelly fine sandy loam; weak fine subangular blocky structure; friable; common roots; 30 percent gravel; strongly acid; clear smooth boundary.

B22—16 to 24 inches; yellowish brown (10YR 5/4) gravelly loam; weak fine subangular blocky structure; friable, slightly sticky; common roots; 25 percent gravel; strongly acid; clear irregular boundary.

B23—24 to 32 inches; yellowish brown (10YR 5/4) gravelly fine sandy loam; weak fine granular structure; friable, slightly sticky; few roots; 30 percent gravel; strongly acid; clear wavy boundary.

IIC—32 to 60 inches; brown (10YR 5/3) very gravelly loamy coarse sand; single grain; loose; few roots in upper part; 60 percent coarse fragments; strongly acid.

The solum thickness ranges from 24 to 36 inches in thickness. Bedrock is generally below a depth of 10 feet. Coarse fragments make up 15 to 35 percent of the A horizon, 20 to 60 percent of the B horizon, and 60 to 70 percent of the C horizon. Content of coarse fragments averages more than 35 percent in the 10- to 40-inch control section. Where the soil has not been limed, reaction is very strongly acid and strongly acid in the solum and strongly acid to neutral in the substratum.

The Ap horizon is very dark grayish brown (10YR 3/2) to olive brown (2.5Y 4/4).

The B horizon is olive brown (2.5Y 4/4) to strong brown (7.5YR 5/6) gravelly silt loam to gravelly sandy loam.

The C horizon has variegated colors of brown and dark brown. It is dominantly sand and gravel.

Chippewa series

The Chippewa series is made up of fine-loamy, mixed, mesic Typic Fragiaquepts. These soils are deep and poorly drained. They formed in glacial till derived from acid sandstone, siltstone, and shale. The A horizon is very dark grayish brown and olive gray silt loam and channery silt loam. The B horizon is olive gray and gray channery silt loam, and the Bx horizon is firm and brittle, gray and brown gravelly silt loam. Chippewa soils are in upland depressions and along natural drainageways. Slopes range from 0 to 8 percent.

Chippewa soils are associated on the landscape with Bath, Swartswood, Mardin, Wurtsboro, Volusia, and Norwich soils. Bath and Swartswood soils are deep and well drained, Mardin and Wurtsboro soils are deep and moderately well drained, Volusia soils are deep and somewhat poorly drained, and Norwich soils are deep and poorly drained. Chippewa soils are yellower than Norwich soils.

Typical pedon of Chippewa silt loam in an area of Chippewa and Norwich silt loams, 0 to 5 percent slopes, in a wooded area 1.2 miles northwest of Stroudsburg on Route 45057, 0.6 mile north of U.S. Highway 611, 60 feet northwest of power pole 69730, 110 feet north of edge of road:

A1—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam; moderate medium granular structure; friable; 10 percent coarse fragments; strongly acid; gradual wavy boundary.

A2g—7 to 11 inches; olive gray (5Y 4/2) channery silt loam; common medium faint light brownish gray (2.5Y 6/2) mottles; weak fine subangular blocky structure; friable; 15 percent coarse fragments; strongly acid; abrupt wavy boundary.

B21g—11 to 14 inches; olive gray (5Y 5/2) channery silt loam; many coarse prominent olive yellow (2.5Y 6/6) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; 20 percent coarse fragments; strongly acid; gradual smooth boundary.

B22g—14 to 19 inches; gray (5Y 5/1) channery silt loam; many coarse prominent yellowish brown (10YR 5/6) and light gray (10YR 7/1) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; 25 percent coarse fragments; strongly acid; abrupt smooth boundary.

Bx1g—19 to 31 inches; gray (5Y 5/1) gravelly silt loam; prism faces are light gray (5Y 7/1) bordered by brownish yellow (10YR 6/6) rinds; many coarse distinct olive yellow (2.5Y 6/6) mottles; moderate very coarse prismatic structure; very firm and brittle; common moderately thick clay films lining pores; 35 percent coarse fragments; medium acid; abrupt wavy boundary.

Bx2—31 to 60 inches; brown (10YR 4/3) gravelly loam; prism faces are gray (10YR 6/1) bordered by strong brown (7.5YR 5/6) rinds; common medium prominent gray (10YR 6/1) mottles; moderate very coarse prismatic structure; very firm and brittle; common medium thick clay films lining pores; 40 percent coarse fragments; medium acid.

The solum ranges from 40 to 60 inches in thickness. Depth to the fragipan ranges from 12 to 20 inches. Depth to bedrock ranges from 4 to more than 10 feet. Reaction is medium acid to very strongly acid above the Bx horizon and strongly acid to neutral in the Bx horizon. Coarse fragments make up 5 to 30 percent of the soil material above the Bx horizon and 20 to 50 percent of the Bx horizon. Content of coarse fragments generally increases with depth.

The A1 and Ap horizons range from black (10YR 2/1) to very dark grayish brown (2.5Y 3/2). The A2 horizon ranges from dark gray (10YR 4/1) to olive gray (5Y 5/2). The A2 horizon is channery loam or silt loam.

The B horizon ranges from gray (10YR 5/1) to olive (5Y 5/3). It is channery and gravelly loam and silt loam.

Clymer series

The Clymer series is made up of fine-loamy, mixed, mesic Typic Hapludults. These soils are deep and well drained. They formed in pre-Wisconsin glacial till derived from quartzite, conglomerate, and sandstone. The Ap horizon is dark grayish brown loam and the B horizon is yellowish brown and strong brown loam and clay loam. Clymer soils are on broad plateaus and ridges. Slopes range from 0 to 25 percent.

Clymer soils are associated on the landscape with Dekalb, Buchanan, Alvira, and Shelmadine soils. Dekalb soils are moderately deep and well drained, Buchanan soils are deep and moderately well drained, Alvira soils are deep and somewhat poorly drained, and Shelmadine soils are poorly drained.

Typical pedon of Clymer loam, 0 to 3 percent slopes, in an idle grass field in Tunkhannock Township, 3 miles southwest of Long Pond, 0.75 mile northwest of Route 45086, 100 feet east of PA Route 115:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) loam; weak fine granular structure; very friable; nonsticky and nonplastic; 5 percent coarse fragments; slightly acid; abrupt smooth boundary.

B1—9 to 22 inches; yellowish brown (10YR 5/6) loam; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; 5 percent coarse fragments; thin patchy clay films on ped faces; strongly acid; clear wavy boundary.

B21t—22 to 30 inches; strong brown (7.5YR 5/8) heavy loam; moderate medium blocky structure; friable, slightly sticky and slightly plastic; 5 to 10 percent coarse fragments; thin patchy clay films on ped faces; very strongly acid; gradual smooth boundary.

B22t—30 to 39 inches; strong brown (7.5YR 5/8) clay loam; moderate medium blocky structure; friable, sticky and plastic; 10 percent coarse fragments; common thick clay films on ped faces and lining pores; very strongly acid; gradual smooth boundary.

B23t—39 to 49 inches; strong brown (7.5YR 5/6) clay loam; moderate medium blocky structure; friable, sticky and very plastic; 10 percent coarse fragments; common thick clay films on ped faces and in pores; very strongly acid; gradual smooth boundary.

B3—49 to 60 inches; strong brown (7.5YR 5/6) heavy clay loam; moderate medium platy structure; firm, sticky and very plastic; 15 percent coarse fragments; common thick clay films on ped faces and in pores; very strongly acid.

The solum ranges from 40 to 70 inches in thickness. Depth to bedrock ranges from 6 to 25 feet. Coarse fragments make up 5 to 30 percent of the upper part of the solum and 10 to 60 percent of the lower part. Where the soil has not been limed, reaction ranges from strongly acid to extremely acid.

The A horizon ranges from brown (7.5YR 5/2) to dark yellowish brown (10YR 3/4). It is most commonly loam but is silt loam or sandy loam in some pedons.

The B horizon ranges from brown (7.5YR 5/4) to yellowish brown (10YR 5/8). It is most commonly clay loam or loam.

These soils have a thicker solum and are a few inches deeper to bedrock than is defined in the range for the series, but this does not alter their usefulness and behavior.

Dekalb series

The Dekalb series is made up of loamy-skeletal, mixed, mesic Typic Dystrochrepts. These soils are moderately deep and well drained. They formed in glacially influenced material derived from sandstone, siltstone, and some shale. The A2 horizon is thin gray channery loam, and the B and C horizons are yellowish brown very channery sandy loam. Dekalb soils are on the tops and sides of mountains and ridges. Slopes range from 0 to 80 percent.

Dekalb soils are associated on the landscape with Hazleton, Clymer, Buchanan, Alvira, and Shelmadine soils. Hazleton and Clymer soils are deep and well drained, Buchanan soils are deep and moderately well drained, Alvira soils are deep and somewhat poorly drained, and Shelmadine soils are deep and poorly drained. Dekalb soils are similar to Lordstown soils but are sandier.

Typical pedon of Dekalb channery loam in an area of Dekalb extremely stony loam, 0 to 8 percent slopes, in Tunkhannock Township, 2.65 miles northwest of McMichaels on Township Route 633, in a borrow pit 60 feet northeast of road:

O2—2 inches to 0; black (10YR 2/1) partially decomposed leaf litter; extremely acid; abrupt smooth boundary.

A2—0 to 2 inches; gray (10YR 6/1) channery loam; weak very fine granular structure; very friable, nonsticky and nonplastic; 40 percent coarse fragments; very strongly acid; abrupt wavy boundary.

B1—2 to 7 inches; yellowish brown (10YR 5/6) very channery loam; weak very fine subangular blocky structure; very friable, slightly sticky and nonplastic; 50 percent coarse fragments; very strongly acid; clear wavy boundary.

B21—7 to 15 inches; yellowish brown (10YR 5/8) very channery sandy loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; 55 percent coarse fragments; very strongly acid; clear wavy boundary.

B22—15 to 24 inches; yellowish brown (10YR 5/6) very channery sandy loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; 60 percent coarse fragments; very strongly acid; clear wavy boundary.

C—24 to 32 inches; yellowish brown (10YR 5/6) very channery sandy loam; weak very fine granular structure; friable, nonsticky and nonplastic; 85 percent coarse fragments; very strongly acid; abrupt wavy boundary.

R—32 inches; grayish brown (10YR 5/2) partly fractured fine grained sandstone bedrock.

The thickness of the solum and depth to bedrock range from 20 to 40 inches. Where the soil has not been limed, reaction is strongly acid to extremely acid. Coarse fragments make up 20 to 60 percent of the solum and 50 to 90 percent of the C horizon. Gravelly and shaly textures are common.

The A horizon ranges from dark grayish brown (10YR 4/2) to light yellowish brown (10YR 6/4). It is dominantly channery loam. The B horizon ranges from brown (7.5YR 5/4) to brownish yellow (10YR 6/8). The B and C horizons are channery or very channery sandy loam.

Empeyville series

The Empeyville series is made up of coarse-loamy, mixed, frigid Aquic Fragiorthods. These soils are deep and moderately well drained to somewhat poorly drained. They formed in glacial till derived from sandstone and siltstone. The thin A2 horizon is pinkish gray and gray loamy fine sand, and the Bhir and Bir horizons are dark reddish brown and strong brown fine sandy loam and gravelly fine sandy loam. The A'2 horizon below these is pale brown gravelly sandy loam, and the Bx horizon is mottled, yellowish brown and grayish brown, firm and brittle gravelly sandy loam, gravelly fine sandy loam, and gravelly loamy fine sand. Empeyville soils are on broad plateaus at the higher elevations. Slopes range from 0 to 8 percent.

Empeyville soils are associated on the landscape with Worth soils. Worth soils are deep and well drained.

Typical pedon of Empeyville gravelly sandy loam in an area of Empeyville extremely stony sandy loam, 0 to 8 percent slopes, on the north side of a borrow pit in Coolbaugh Township, 1.0 mile northeast of Tobyhanna on PA Route 423, on military reservation 500 feet east of Township Route 423:

O1—1 to 1/2 inch; leaf litter and twigs; abrupt wavy boundary.

O2—1/2 inch to 0; very dark gray (10YR 3/1) partially decomposed leaves and twigs; extremely acid; abrupt wavy boundary.

A2—0 to 3 inches; pinkish gray (5YR 7/2) gravelly loamy fine sand; weak very fine granular structure; very friable, nonsticky and nonplastic; 20 percent coarse fragments; very strongly acid; abrupt wavy boundary.

B21h—3 to 4 inches; dark reddish brown (5YR 3/4) very fine sandy loam; weak very fine granular structure; friable, nonsticky and nonplastic; 10 percent coarse fragments; very strongly acid; abrupt smooth boundary.

B22ir—4 to 8 inches; strong brown (7.5YR 5/6) gravelly fine sandy loam; weak very fine granular structure; friable, nonsticky and nonplastic; 20 percent coarse fragments; very strongly acid; clear wavy boundary.

B23ir—8 to 18 inches; strong brown (7.5YR 5/6) gravelly fine sandy loam; weak very fine subangular blocky structure; friable, nonsticky and nonplastic; 20 percent coarse fragments; very strongly acid; gradual wavy boundary.

A'2—18 to 22 inches; pale brown (10YR 6/3) gravelly sandy loam; few fine faint yellow (10YR 7/6) and grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure; friable, nonsticky and nonplastic; 20 percent coarse fragments; very strongly acid; clear wavy boundary.

B'x1—22 to 29 inches; yellowish brown (10YR 5/4) gravelly sandy loam; common medium distinct light gray (10YR 7/2) and brown (7.5YR 5/4) mottles; weak very coarse prismatic structure parting to weak fine subangular blocky; firm and brittle, nonsticky and nonplastic; few thin clay films in pores; 20 percent coarse fragments; strongly acid; clear wavy boundary.

B'x2—29 to 37 inches; yellowish brown (10YR 5/4) light gravelly fine sandy loam, common medium distinct yellow (10YR 7/6) and strong brown (7.5YR 5/6) mottles; weak very coarse prismatic structure parting to weak fine and medium subangular blocky; very firm and brittle, nonsticky and nonplastic; few thin clay films in pores; 30 percent coarse fragments; strongly acid; clear wavy boundary.

B'x3—37 to 42 inches; yellowish brown (10YR 5/4) gravelly fine sandy loam; many coarse prominent yellowish red (5YR 5/6), grayish brown (2.5Y 5/2), and very pale brown (10YR 8/4) mottles; moderate very coarse prismatic structure; very firm and brittle, nonsticky and nonplastic; few thin clay films in pores; 30 percent coarse fragments; strongly acid; gradual irregular boundary.

B'x4—42 to 60 inches; grayish brown (2.5Y 5/2) gravelly loamy fine sand; many coarse prominent strong brown (7.5YR 5/8) and very pale brown (10YR 7/4) mottles; moderate very coarse prismatic structure; very firm and brittle, nonsticky and nonplastic; few thin clay films in pores; many medium pores; 25 percent coarse fragments; strongly acid.

The solum ranges from 40 to 60 inches in thickness. Depth to bedrock ranges from 6 feet to 20 feet or more. Depth to the fragipan is at a depth of 14 to 22 inches. Coarse fragments make up 10 to 35 percent of the soil above the Bx horizon and 20 to 50 percent of the Bx horizon. Reaction is very strongly acid and strongly acid.

The A2 horizon is gray (10YR 6/1) and light gray (10YR 7/2). The A1 horizon is dark brown (7.5YR 3/2).

The B horizon ranges from brownish yellow (10YR 6/8) to dark reddish brown (5YR 3/3). The fine earth fraction of the B horizon ranges from loam to loamy fine sand.

Hartleton series

The Hartleton series is made up of loamy-skeletal, mixed, mesic Typic Hapludults. These soils are deep and well drained. They formed in pre-Wisconsin glacial till or frost-churned material derived from sandstone and shale. The thin A horizon is very dark grayish brown channery silt loam. The B1 horizon is brownish yellow channery silt loam, and the B2t, B3, and C horizons are yellowish brown channery silt loam, shaly silt loam, very shaly silt loam, and very channery silt loam. Hartleton soils are on the tops and sides of ridges and hills. Slopes range from 2 to 20 percent.

Hartleton soils are associated on the landscape with Allenwood, Weikert, Watson, and Alvira soils. Allenwood soils are deep and well drained, Weikert soils are shallow and well drained, Watson soils are deep and moderately well drained, and Alvira soils are deep and somewhat poorly drained. Hartleton soils are less red and have less clay in the lower part of the subsoil than Allenwood soils.

Typical pedon of Hartleton channery silt loam, 2 to 8 percent slopes, in a woodlot about 3.5 miles north of Kunkleton on Route 45003, 175 feet southwest of north edge of woods, along east side of road:

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) channery silt loam; weak very fine granular structure; very friable; many roots; 20 percent channers; very strongly acid; abrupt smooth boundary.

B1—2 to 8 inches; brownish yellow (10YR 6/6) channery silt loam; weak fine granular structure; very friable, slightly plastic; many roots; 25 percent coarse fragments; very strongly acid; clear smooth boundary.

B21t—8 to 16 inches; yellowish brown (10YR 5/6) channery silt loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; common thin patchy clay films in pores and on ped faces; common roots; 30 percent coarse fragments; strongly acid; clear wavy boundary.

B22t—16 to 23 inches; yellowish brown (10YR 5/6) shaly silt loam; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; common thin patchy clay films in pores and on ped faces; common roots; 30 percent coarse fragments; very strongly acid; clear wavy boundary.

B23t—23 to 28 inches; yellowish brown (10YR 5/6) very shaly silt loam; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; common thin patchy clay films in pores and on ped faces; few roots; 50 percent coarse fragments; very strongly acid; abrupt wavy boundary.

B3—28 to 37 inches; yellowish brown (10YR 5/6) very channery loam; moderate medium subangular blocky structure with some discernible platiness; friable; few roots; 60 percent coarse fragments; very strongly acid; clear wavy boundary.

C—37 to 47 inches; yellowish brown (10YR 5/6) very channery loam; massive; friable, slightly plastic; 75 percent channers; very strongly acid; abrupt smooth boundary.

R—47 inches; brown (7.5YR 4/4) fractured fine grained sandstone bedrock.

The solum ranges from 30 to 40 inches in thickness. Depth to bedrock ranges from 40 to more than 60 inches. Weighted average of all coarse fragments in the profile is more than 35 percent, by volume. Coarse fragments make up 15 to 30 percent of the A horizon, 25 to 70 percent of the B horizon, and 50 to 90 percent of the C horizon. Where this soil has not been limed, reaction is strongly acid or very strongly acid.

The A horizon is generally very dark grayish brown (10YR 3/2) to dark brown (7.5YR 4/4) channery silt loam or loam.

The B horizon ranges from brown (7.5YR 5/4) to brownish yellow (10YR 6/6). The fine earth fraction ranges from loam to silty clay loam.

The C horizon is similar to the B horizon in color. The fine earth fraction is silt loam or loam.

Hazleton series

The Hazleton series is made up of loamy-skeletal, mixed, mesic Typic Dystrochrepts. These soils are deep and well drained. They formed in pre-Wisconsin glacial till and colluvial material derived from sandstone, siltstone, and some shale. The thin A2 horizon is brown channery sandy loam, and the B and C horizons are brown, yellowish brown, and strong brown channery sandy loam. Hazleton soils are on tops and sides of broad plateaus, ridges, and mountains. Slopes range from 8 to 25 percent.

Hazleton soils are associated on the landscape with Dekalb, Clymer, and Buchanan soils. Dekalb soils are moderately deep and well drained, Clymer soils are deep and well drained, and Buchanan soils are deep and moderately well drained. Hazleton soils are coarser textured and have less clay in the subsoil than Clymer soils.

Typical pedon of Hazleton channery sandy loam in an area of Hazleton extremely stony sandy loam, 8 to 25 percent slopes, in a wooded area about 3 miles south of Gilbert on Township Route 369, 80 feet east of intersection with Township Route 371, 10 feet south of road:

O2—1 inch to 0; black (10YR 2/1) partially decomposed roots, twigs, and leaves; very strongly acid; abrupt smooth boundary.

A2—0 to 3 inches; brown (7.5YR 5/2) channery sandy loam; weak very fine granular structure; friable; 20 percent coarse fragments; very strongly acid; abrupt wavy boundary.

B21ir—3 to 5 inches; brown (10YR 4/3) channery fine sandy loam; weak fine granular structure; friable; 20 percent coarse fragments; very strongly acid; abrupt wavy boundary.

B22—5 to 18 inches; yellowish brown (10YR 5/6) channery sandy loam; weak fine subangular blocky structure; friable; 35 percent coarse fragments; very strongly acid; clear wavy boundary.

B23—18 to 31 inches; strong brown (7.5YR 5/6) channery coarse sandy loam; weak fine subangular blocky structure; friable; 35 percent coarse fragments; very strongly acid; gradual wavy boundary.

C—31 to 60 inches; brown (7.5YR 5/4) very channery very coarse sandy loam; weak fine granular structure to massive; 50 percent coarse fragments; very strongly acid.

The solum ranges from 28 to 45 inches in thickness. Depth to bedrock is 3 1/2 to more than 6 feet. Coarse fragments make up 15 to 60 percent of the solum and 30 to 70 percent of the C horizon. Reaction is strongly acid to extremely acid.

The A horizon is dark grayish brown (10YR 4/2) to yellowish brown (10YR 5/4) channery sandy loam.

The B horizon ranges from dark brown (10YR 4/3) to reddish yellow (7.5YR 6/8). The fine earth fraction generally is fine sandy loam to coarse sandy loam, but in a few pedons, part of the B horizon is loam.

The C horizon is dark brown (10YR 4/3) to reddish yellow (5YR 6/6). The fine earth fractions are sandy loam to coarse loamy sand.

Holly series

The Holly series is made up of fine-loamy, mixed, nonacid, mesic Typic Fluvaquents. These soils are deep and poorly drained. They formed in alluvium derived from acid sandstone and shale. The Ap horizon is very dark grayish brown and dark grayish brown silt loam, and the B horizon is mottled grayish brown and light grayish brown very fine sandy loam and loam. The IIC horizon is gray gravelly loam. The soils are on flood plains along major streams. Slopes range from 0 to 3 percent.

Holly soils are associated on the landscape with Pope, Philo, and Wayland soils. Pope soils are deep and well drained, Philo soils are deep and moderately well drained, and Wayland soils are very poorly drained.

Typical pedon of Holly silt loam in an idle field 1 mile west of Delaware Water Gap on Route 45010, 150 feet east of bridge, 60 feet north of road:

Ap1—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine and medium granular structure; friable; neutral; gradual smooth boundary.

Ap2—8 to 11 inches; dark grayish brown (10YR 4/2) silt loam; common medium distinct strong brown (7.5YR 5/6) mottles; weak medium granular structure; friable; neutral; clear wavy boundary.

B21g—11 to 16 inches; light brownish gray (10YR 6/2) very fine sandy loam; many coarse prominent strong brown (7.5YR 5/6) and gray (10YR 6/1) mottles; weak medium subangular blocky structure; friable; neutral; clear smooth boundary.

B22g—16 to 28 inches; light brownish gray (10YR 6/2) very fine sandy loam; many coarse prominent reddish yellow (7.5YR 6/6) and gray (10YR 6/1) mottles; weak medium subangular blocky structure; friable; 2 percent coarse fragments; neutral; gradual smooth boundary.

B23g—28 to 41 inches; light brownish gray (10YR 6/2) loam; many coarse prominent reddish yellow (7.5YR 6/6) and gray (10YR 6/1) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; 10 percent coarse fragments; neutral; clear wavy boundary.

IICg—41 to 60 inches; gray (10YR 6/1) gravelly loam; many coarse prominent reddish yellow (7.5YR 6/6) and pale brown (10YR 6/3) mottles; massive; friable, slightly sticky and slightly plastic; 45 percent coarse fragments; neutral.

The solum ranges from 40 to 56 inches in thickness. Bedrock is at a depth of more than 6 feet. Coarse fragments make up 0 to 15 percent of the solum. Content of coarse fragments varies widely in the C horizon. Reaction ranges from medium acid to neutral.

The A horizon ranges from very dark grayish brown (10YR 3/2) to dark grayish brown (10YR 4/2). It is silt loam or loam.

The B horizon ranges from dark gray (10YR 4/1) to light olive gray (5Y 6/2). It ranges from sandy loam to light silty clay loam.

The C horizon is gleyed and is low in chroma. It is massive with a variety of textures, including gravelly textures.

Kedron series

The Kedron series is made up of fine-loamy, mixed, mesic Aquic Fragiudults. These soils are deep and moderately well drained. They formed in pre-Wisconsin glacial till derived from acid siltstone, sandstone, and shale. The Ap horizon is brown silt loam and the Bt horizon is yellowish red and reddish brown heavy silt loam. The Bx and Cx horizons are reddish brown and yellowish red, firm and brittle heavy silt loam, gravelly loam, and gravelly silt loam. Kedron soils are on broad plateaus and ridges. Slopes range from 0 to 15 percent.

Kedron soils are associated on the landscape with Meckesville, Leck Kill, and Norwich soils. Meckesville and Leck Kill soils are deep and well drained, and Norwich soils are poorly drained.

Typical pedon of Kedron silt loam, 2 to 8 percent slopes, in a cultivated field 3-1/2 miles west of Effort on Route 45081, 515 feet west of Middle Creek, 510 feet due north, 27 feet west of center of sod waterway:

Ap—0 to 10 inches; brown (7.5YR 4/2) silt loam; weak fine granular structure; very friable, slightly sticky and slightly plastic; 10 percent coarse fragments; neutral; abrupt smooth boundary.

B21t—10 to 19 inches; yellowish red (5YR 4/6) heavy silt loam; weak fine and medium blocky structure; friable, slightly sticky and slightly plastic; many moderately thick clay films on ped faces; few black concretions; 5 to 10 percent coarse fragments; neutral; clear wavy boundary.

B22t—19 to 24 inches; reddish brown (5YR 5/4) heavy silt loam; many coarse faint pinkish gray (5YR 7/2) and strong brown (7.5YR 5/8) mottles; moderate fine and medium blocky structure; friable, slightly sticky and plastic; many thick clay films on ped faces and lining pores; few black concretions; 15 percent coarse fragments; medium acid; gradual wavy boundary.

Bx1—24 to 29 inches; reddish brown (2.5YR 5/4) heavy silt loam; prism faces are pinkish gray (5YR 6/2); many coarse prominent pinkish gray (5YR 7/2) and strong brown (7.5YR 5/8) mottles; moderate coarse prismatic structure parting to moderate medium su-

bangular blocky; very firm and brittle, slightly sticky and plastic; thin clay films coating ped faces; thick clay films lining pores; common black concretions; 15 percent coarse fragments; strongly acid; abrupt irregular boundary.

Bx2—29 to 37 inches; yellowish red (5YR 4/6) gravelly loam; prism faces are pinkish gray (5YR 6/2); many coarse prominent pinkish white (5YR 8/2), strong brown (7.5YR 5/8), and light reddish brown (5YR 6/3) mottles; moderate coarse prismatic structure; very firm and brittle, slightly sticky and slightly plastic; many thick clay films lining pores; numerous black concretions and stains; 20 percent coarse fragments; strongly acid; gradual wavy boundary.

Bx3—37 to 46 inches; yellowish red (5YR 4/6) gravelly silt loam; prism faces are pinkish gray (5YR 6/2); common coarse prominent strong brown (7.5YR 5/8), white (5YR 8/1), and light reddish brown (5YR 6/3) mottles; moderate coarse prismatic structure parting to moderate medium subangular blocky; very firm and brittle, slightly sticky; few thin clay films lining pores; numerous black concretions and stains; 15 percent coarse fragments; strongly acid; abrupt wavy boundary.

Cx—46 to 60 inches; reddish brown (2.5YR 4/4) gravelly loam; common medium distinct pinkish gray (5YR 6/2) mottles; massive; firm and brittle, slightly sticky; numerous black concretions and stains; 40 percent coarse fragments; strongly acid.

The solum is more than 40 inches thick. Depth to the fragipan ranges from 20 to 32 inches, and depth to bedrock ranges from 5 to more than 10 feet. Where the soil has not been limed, reaction is extremely acid to strongly acid throughout. Coarse fragments make up 5 to 30 percent of the soil above the Bx horizon and 15 to 50 percent of the Bx horizon.

The A horizon is dark brown (7.5YR 3/2) to reddish brown (5YR 4/3).

The B horizon ranges from reddish brown (5YR 4/3) to red (2.5YR 5/6). The fine earth fraction is silt loam to clay loam.

Klinesville series

The Klinesville series is made up of loamy-skeletal, mixed, mesic Lithic Dystrochrepts. These soils are shallow and well drained. They formed in glacial till and frost-churned and glacially-influenced material derived from siltstone, shale, and sandstone. The Ap horizon is dark reddish brown channery silt loam, and the B horizon is reddish brown very channery silt loam. Klinesville soils are on the tops and sides of ridges. Slopes range from 3 to 80 percent.

Klinesville soils are associated on the landscape and Leck Kill, Meckesville, Kedron, and Norwich soils. Leck Kill and Meckesville soils are deep and well drained, Kedron soils are moderately well drained, and Norwich soils are poorly drained.

Typical pedon of Klinesville channery silt loam, 8 to 15 percent slopes, in an idle field in Eldred Township, 2 miles south of Kresgeville, 100 yards north of Township Route 354, on left bank of driveway:

Ap—0 to 6 inches; dark reddish brown (5YR 3/3) channery silt loam; weak fine granular structure; friable, slightly sticky; 45 percent coarse fragments; medium acid; clear wavy boundary.

B2—6 to 15 inches; reddish brown (2.5YR 4/4) very channery silt loam; weak fine subangular blocky structure; friable, slightly sticky; 65 percent coarse fragments; medium acid; gradual wavy boundary.

C1—15 to 19 inches; weak red (2.5YR 4/2) partially weathered fragments of siltstone and shale with reddish brown (2.5YR 4/4) silt coatings; massive; loose; 90 percent coarse fragments; strongly acid; clear wavy boundary.

C2—19 to 48 inches; dusky red (2.5YR 3/2) frost-churned fragments of siltstone and shale; few thin patches of silt and clay; massive; loose; 98 percent coarse fragments; strongly acid; abrupt wavy boundary.

R—48 inches; dusky red (2.5YR 3/2) thin bedded shale and siltstone.

Solum ranges from 10 to 20 inches in thickness. Depth to bedrock ranges from 40 to 60 inches. Coarse fragments make up 40 to 75 percent of the solum, 70 to 90 percent of the C1 horizon, and 90 to 99 percent of the C2 horizon. The fine earth fraction of solum is silt loam or loam. Where the soil has not been limed, reaction is very strongly acid to medium acid.

The A horizon ranges from dark reddish brown (5YR 3/2) to reddish brown (2.5YR 4/4).

The B horizon ranges from dark reddish brown (5YR 3/3) to red (10YR 4/6).

These soils have a frost-churned C horizon between depths of 20 to 40 inches and bedrock below a depth of 20 inches which are outside the range defined for the series, but these differences do not alter their usefulness or behavior.

Lackawanna series

The Lackawanna series is made up of coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are deep and well drained. They formed in glacial till derived from sandstone, siltstone, and shale. The thin A horizon is pinkish gray channery loam. The B2 horizon is strong brown, brown, and reddish brown channery loam, and the Bx horizon is weak red, firm and brittle channery loam. Lackawanna soils are on broad plateaus and dissected mountains and ridges. Slopes range from 0 to 50 percent.

Lackawanna soils are associated on the landscape with Oquaga, Wellsboro, Morris, and Norwich soils. Oquaga soils are moderately deep and well drained, Wellsboro

soils are deep and moderately well drained, Morris soils are deep and somewhat poorly drained, and Norwich soils are deep and very poorly drained to poorly drained.

Typical pedon of Lackawanna channery loam in an area of Lackawanna extremely stony loam, 0 to 8 percent slopes, in a wooded area in Pocono Township, about 100 yards north of Cranberry Creek on Township Route 509 between Routes 45080 and 45081, 105 feet east of road:

O1—2 inches to 1 inch; mixed hardwood and conifer leaf litter; very strongly acid; abrupt wavy boundary.

O2—1 inch to 0; black (N 2/0) partially decomposed leaf litter; very strongly acid; abrupt wavy boundary.

A2—0 to 1 inch; pinkish gray (7.5YR 6/2) channery loam; 25 percent coarse fragments; very strongly acid; abrupt broken boundary.

B21ir—1 inch to 5 inches; strong brown (7.5YR 5/6) channery loam; weak thin platy structure parting to granular; friable, slightly sticky and slightly plastic; 25 percent coarse fragments; some humus staining in upper part; very strongly acid; clear wavy boundary.

B22—5 to 12 inches; brown (7.5YR 5/4) channery loam; weak medium granular structure; friable, slightly sticky and slightly plastic; 20 percent coarse fragments; very strongly acid; gradual wavy boundary.

B23—12 to 22 inches; reddish brown (5YR 5/3) channery loam; weak fine and medium subangular blocky structure; friable to firm, slightly sticky and slightly plastic; clay bridging between peds; 25 percent coarse fragments; very strongly acid; gradual wavy boundary.

B24—22 to 33 inches; reddish brown (5YR 5/3) channery loam; weak fine to medium subangular blocky structure; friable to firm, slightly sticky and slightly plastic; 30 percent coarse fragments; clay bridging between peds; very strongly acid; abrupt wavy boundary.

Bx1—33 to 45 inches; weak red (2.5YR 4/2) channery loam; weak very coarse prismatic structure with moderate medium and coarse platy interiors parting to fine blocky; brittle, very firm, slightly sticky and slightly plastic; 35 percent coarse fragments; thin clay films lining pores; few black coatings; very strongly acid; gradual wavy boundary.

Bx2—45 to 59 inches; weak red (2.5YR 4/2) channery loam; weak very coarse prismatic structure with moderate thick platy interiors parting to fine blocky; brittle and very firm, slightly sticky and plastic; thin patchy clay films on ped faces and lining pores; 35 percent coarse fragments; very strongly acid; gradual wavy boundary.

Bx3—59 to 75 inches; weak red (2.5YR 4/2) channery loam; weak coarse prismatic structure with weak medium platy interiors parting to weak fine blocky; brittle, very firm, slightly sticky and plastic; common thick patchy clay films on ped faces and lining pores; 40 percent coarse fragments; very strongly acid.

The solum thickness ranges from 40 to more than 60 inches in thickness. Where the soil has not been limed, reaction is strongly acid and very strongly acid. Depth to bedrock ranges from less than 3-1/2 to more than 20 feet. Depth to the fragipan ranges from 24 to 36 inches. Texture is dominantly channery silt loam to channery sandy loam. Coarse fragments smaller than stones make up 15 to 40 percent of the solum and normally increase in number with depth.

The A horizon ranges from dark brown (7.5YR 3/2) to dark yellowish brown (10YR 4/4). Where present, the A2 horizon is brown (10YR 4/3) to pinkish gray (7.5YR 6/2).

The B horizon ranges from strong brown (7.5YR 5/6) to dark reddish brown (5YR 3/4) in the upper part and from reddish brown (2.5YR 5/4) to dark reddish brown (5YR 3/2) in the lower part.

Laidig series

The Laidig series is made up of fine-loamy, mixed, mesic Typic Fragiudults. These soils are deep and well drained. They formed in colluvium derived from sandstone and shale. The A horizon is dark yellowish brown gravelly loam. The B horizon is strong brown and yellowish brown, and the Bx horizon is strong brown, firm and brittle gravelly fine sandy loam and gravelly loam. Laidig soils are on foot slopes and sides of ridges and in lower areas on plateaus. Slopes range from 0 to 25 percent.

Laidig soils are associated on the landscape with Clymer, Buchanan, Alvira, and Shelmadine soils. Clymer soils are deep and well drained, Buchanan soils are deep and moderately well drained, Alvira soils are deep and somewhat poorly drained, and Shelmadine soils are deep and poorly drained. Unlike Clymer soils, Laidig soils have a fragipan.

Typical pedon of Laidig gravelly loam in an area of Laidig extremely stony loam, 0 to 8 percent slopes, in a wooded area 3-1/2 miles northwest of Effort on Township Route 628, 0.65 mile north of Route 45043, 400 feet east of Township Route 628, 60 feet south of road:

A1—0 to 6 inches; dark yellowish brown (10YR 4/4) gravelly loam; weak fine granular structure; friable, slightly sticky; 15 percent coarse fragments; strongly acid; abrupt smooth boundary.

B21t—6 to 15 inches; strong brown (7.5YR 5/8) gravelly loam; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; many thick clay films on ped faces and in pores; 15 percent coarse fragments; strongly acid; gradual smooth boundary.

B22t—15 to 22 inches; yellowish brown (10YR 5/6) gravelly loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; many thick clay films on ped faces and in pores; 20 percent coarse fragments; strongly acid; clear wavy boundary.

B23t—22 to 31 inches; strong brown (7.5YR 5/6) gravelly loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; many thick

clay films on ped faces and in pores; 15 percent coarse fragments; strongly acid; clear wavy boundary.

Bx1—31 to 36 inches; strong brown (7.5YR 5/6) gravelly fine sandy loam; weak very coarse prismatic structure parting to moderate medium subangular blocky; firm and brittle, slightly sticky and slightly plastic; common thick clay films on ped faces and in pores; 20 percent coarse fragments; strongly acid; clear wavy boundary.

Bx2—36 to 42 inches; strong brown (7.5YR 5/6) gravelly loam; few medium faint light brown (7.5YR 6/4) mottles; weak very coarse prismatic structure parting to moderate medium subangular blocky; very firm and brittle, slightly sticky and slightly plastic; common thick clay films on ped faces and in pores; 25 percent coarse fragments; very strongly acid; clear wavy boundary.

Bx3—42 to 60 inches; strong brown (7.5YR 5/6) gravelly loam; few medium faint light brown (7.5YR 6/4) mottles; weak very coarse prismatic structure parting to moderate medium subangular blocky; firm and brittle, slightly sticky and slightly plastic; few thin clay films on ped faces and in pores; 30 percent coarse fragments; very strongly acid.

The solum ranges from 60 to 80 inches in thickness. Depth to the fragipan ranges from 30 to 50 inches, and depth to bedrock ranges from 3-1/2 to 20 feet or more. Coarse fragments make up 15 to 30 percent of the A and B horizons and 20 to 70 percent of the Bx and C horizons. Reaction is strongly acid to extremely acid.

The A1 horizon is dark grayish brown (10YR 4/2) to yellowish brown (10YR 5/4). In some pedons there is a gray (10YR 5/1) to reddish yellow (7.5YR 6/6) A2 horizon.

The B horizon is brown (7.5YR 4/4) to yellowish brown (10YR 5/8), and the Bx horizon is dark brown (7.5YR 4/4) to brownish yellow (10YR 6/6). The fine earth fraction of the B and Bx horizons ranges from silt loam to sandy clay loam. Mottles are below a depth of 30 inches.

Lawrenceville series

The Lawrenceville series is made up of fine-silty, mixed, mesic Typic Fragiudalfs. These soils are deep and moderately well drained. They formed in pre-Wisconsin glacial outwash derived from sandstone, shale, and siltstone. The Ap horizon is dark brown silt loam. The B horizon is yellowish brown silty clay loam, and the Bx horizon is yellowish brown silt loam. Lawrenceville soils are in broad valleys on stream terraces. Slopes range from 0 to 3 percent.

Lawrenceville soils are associated on the landscape with Sheffield and Braceville soils. Sheffield soils are poorly drained and Braceville soils are moderately well drained. Lawrenceville soils are finer textured and contain fewer coarse fragments throughout than Braceville soils.

Typical pedon of Lawrenceville silt loam in Polk Township 1/4 mile west of Gilbert, 400 feet north of U. S. Highway 209:

Ap—0 to 10 inches; dark brown (10YR 4/3) silt loam; moderate fine and medium granular structure; friable, slightly sticky and slightly plastic; 5 to 10 percent coarse fragments; neutral; abrupt smooth boundary.

B1—10 to 12 inches; yellowish brown (10YR 5/6) silty clay loam; moderate fine subangular blocky structure; friable, slightly sticky and plastic; 5 percent coarse fragments; neutral; clear smooth boundary.

B21t—12 to 16 inches; yellowish brown (10YR 5/6) silty clay loam; weak medium prismatic structure parting to moderate fine subangular blocky; friable, sticky and plastic; thin clay films lining pores; 5 percent coarse fragments; neutral; gradual wavy boundary.

B22t—16 to 22 inches; yellowish brown (10YR 5/6) silty clay loam; weak fine prismatic structure parting to moderate medium blocky; friable, sticky and plastic; thin patchy clay films on ped faces and lining pores; 5 percent coarse fragments; neutral; gradual wavy boundary.

B23t—22 to 25 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct pale yellow (2.5Y 7/4) and pinkish gray (7.5YR 7/2) mottles; weak fine prismatic structure parting to moderate medium blocky; friable, sticky and plastic; thick clay films on ped faces and lining pores; 5 percent coarse fragments; strongly acid; clear wavy boundary.

Bx1—25 to 37 inches; yellowish brown (10YR 5/6) silty clay loam; many coarse prominent light gray (10YR 7/2), yellowish red (5YR 5/8), and reddish yellow (7.5YR 6/8) mottles; weak very coarse prismatic structure parting to moderate medium blocky; firm and brittle, slightly sticky and plastic; thick clay films lining pores; 5 percent coarse fragments; strongly acid; abrupt irregular boundary.

IIBx2—37 to 60 inches; yellowish brown (10YR 5/4) very gravelly silt loam; many coarse prominent light gray (5Y 6/1) and reddish yellow (7.5YR 6/8) mottles; moderate very coarse prismatic structure parting to moderate medium blocky; very firm and brittle, sticky and slightly plastic; few patchy clay film lining pores; 50 to 60 percent coarse fragments; very strongly acid.

The solum ranges from 40 to 60 inches in thickness. Bedrock is at a depth of 4 to 6 feet or more. Depth to the fragipan ranges from 24 to 36 inches. Coarse fragments make up 0 to 10 percent of the soil above the Bx horizon, 5 to 25 percent of the Bx horizon, and as much as 65 percent of the IIBx horizon. Where the soil has not been limed, reaction ranges from strongly acid to very strongly acid.

The A horizon is very dark grayish brown (10YR 3/2) to brown (10YR 4/3).

The B and Bx horizons are dark yellowish brown (10YR 4/4) to strong brown (7.5YR 5/6). The fine earth fraction is silt loam and silty clay loam.

These soils have a higher proportion of coarse fragments in the lower part of the solum than is defined in the

range for the series, but this does not alter their usefulness or behavior.

Leck Kill series

The Leck Kill series is made up of fine-loamy, mixed, mesic Typic Hapludults. These soils are deep and well drained. They formed in residuum or glacial till deposits. The Ap horizon is reddish brown channery loam, and the B horizon is reddish brown and red channery silt loam. Leck Kill soils are on upland hills and ridges. Slopes range from 2 to 25 percent.

Leck Kill soils are associated on the landscape with Kedron, Meckesville, and Klinesville soils. Meckesville soils are deep and well drained, Kedron soils are moderately well drained and Klinesville soils are shallow and well drained. Unlike Meckesville soils, Leck Kill soils do not have a fragipan.

Typical pedon of Leck Kill channery silt loam, 8 to 15 percent slopes, in a woodlot in Eldred Township about 3 miles east of Kresgeville on Township Route 375, 0.75 mile east of intersection with Route 45003 at road cut on south side of road:

Ap—0 to 7 inches; reddish brown (5YR 4/4) channery silt loam; weak very fine granular structure; friable, slightly sticky and slightly plastic; 25 percent coarse fragments; strongly acid; abrupt smooth boundary.

B21t—7 to 17 inches; reddish brown (2.5YR 4/4) channery silt loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; 25 percent coarse fragments; common thicky patchy clay films on ped faces and in pores; strongly acid; gradual smooth boundary.

B22t—17 to 28 inches; reddish brown (2.5YR 4/4) channery silt loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; 30 percent coarse fragments; common thick patchy clay films on ped faces and in pores; strongly acid; abrupt smooth boundary.

B23t—28 to 40 inches; red (2.5YR 4/6) channery silt loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; 35 percent coarse fragments; common thick patchy clay films on ped faces and in pores; strongly acid; abrupt wavy boundary.

C1—40 to 50 inches; red (2.5YR 4/6) very channery silt loam; moderate medium platy structure; friable, nonsticky and nonplastic; 70 percent coarse fragments; very strongly acid; clear irregular boundary.

C2—50 to 60 inches; red (2.5YR 4/6) very channery silt loam; dusky red (10R 3/3) channery fragments; massive; influenced by coarse fragments which have been fractured and churned; friable, nonsticky and nonplastic; 85 to 95 percent fragments; very strongly acid.

The solum ranges from 30 to 40 inches in thickness. Depth to bedrock ranges from 3 1/2 to 6 feet. Content of coarse fragments of sandstone or shale, as much as 10 inches long, increases with depth. They make up 15 to 25 percent of the surface layer, 20 to 40 percent of the B horizon, and 60 to 90 percent of the C horizon. Weighted average of coarse fragments in the control section is less than 35 percent. Where this soil has not been limed, reaction ranges from medium acid to very strongly acid.

The A horizon ranges from dark brown (7.5YR 3/2) to reddish brown (5YR 4/4). The fine earth fraction is silt loam or loam.

The B horizon ranges from yellowish red (5YR 5/6) to dusky red (10YR 3/4). The fine earth fraction ranges from silt loam to silty clay loam.

The C horizon is similar to the B horizon in color and in texture of the fine earth fraction.

Lordstown series

The Lordstown series is made up of coarse-loamy, mixed, mesic Typic Dystrochrepts. These soils are moderately deep and well drained. They formed in glacial till derived from acid sandstone, siltstone, and shale. The A horizon is brown channery silt loam, and the B horizon is yellowish brown channery silt loam, channery loam, and very channery loam. Lordstown soils are on tops and sides of mountains and ridges. Slopes range from 0 to 70 percent.

Lordstown soils are associated on the landscape with Swartswood, Wurtsboro, Volusia, and Chippewa soils. Swartswood soils are deep and well drained, Wurtsboro soils are deep and moderately well drained, Volusia soils are somewhat poorly drained, and Chippewa soils are deep and poorly drained. Lordstown soils are similar to Oquaga soils but are less red.

Typical pedon of Lordstown channery silt loam in an area of Lordstown extremely stony silt loam, 0 to 8 percent slopes, in Chestnuthill Township about 2 miles northwest of Brodheadsville on Township Route 417, south on Township Route 434 onto old township road; 1 mile south of Township Route 417, 600 feet in woods from north field, 40 feet east of old road:

O1—2 to 2-1/2 inches; partially disintegrated mixed hardwood leaves and trees; abrupt wavy boundary.

O2—1-1/2 inches to 0; black (5YR 2/1) partially decomposed mixed hardwood leaves and twigs; very friable, nonsticky and nonplastic; very strongly acid; abrupt wavy boundary.

A2—0 to 7 inches; brown (10YR 5/3) channery silt loam; weak very fine granular structure; very friable, slightly sticky and slightly plastic; 20 percent coarse fragments; very strongly acid; clear smooth boundary.

B21—7 to 13 inches; yellowish brown (10YR 5/4) channery silt loam; weak medium very fine granular structure; friable, slightly sticky and slightly plastic; 25 per-

cent coarse fragments; very strongly acid; clear wavy boundary.

B22—13 to 20 inches; yellowish brown (10YR 5/4) channery loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; 35 percent coarse fragments; very strongly acid; clear wavy boundary.

B3—20 to 26 inches; yellowish brown (10YR 5/4) very channery loam; weak medium blocky structure; friable, slightly sticky and nonplastic; 55 percent coarse fragments; very strongly acid; clear wavy boundary.

C—26 to 32 inches; dark brown (10YR 4/3) very channery silt loam; massive; friable; 60 percent coarse fragments; very strongly acid; abrupt wavy boundary.

R—32 inches; very dark gray (N 3/0) partially fractured siltstone bedrock.

Thickness of the solum and depth to bedrock range from 20 to 40 inches. Coarse fragments make up 20 to 30 percent of the A horizon, 25 to 55 percent of the B horizon, and 40 to 70 percent of the C horizon. Where the soil has not been limed, reaction ranges from strongly to very strongly acid.

The A horizon is dark grayish brown (10YR 4/2) to brown (10YR 5/3).

The B horizon is dark brown (7.5YR 4/4) to olive yellow (2.5Y 6/6). The fine earth fraction of the B horizon is loam and silt loam.

These soils have a slightly higher proportion of coarse fragments in the solum than is defined in the range for series, but this does not alter their usefulness or behavior.

Mardin series

The Mardin series is made up of coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are deep and moderately well drained. They formed in glacial till derived from siltstone, sandstone, and shale. The A horizon is dark brown channery silt loam. The B horizon is yellowish brown channery silt loam and gravelly loam, and the Bx horizon is yellowish brown, firm and brittle gravelly loam and gravelly silt loam. Mardin soils are on tops and sides of plateaus, ridges, and hills. Slopes range from 0 to 25 percent.

Mardin soils are associated on the landscape with Lordstown, Bath, Volusia, and Chippewa soils. Lordstown soils are moderately deep and well drained, Bath soils are deep and well drained, Volusia soils are somewhat poorly drained, and Chippewa soils are poorly drained. Mardin soils are similar to Wurtsboro soils in color but are finer textured. Mardin soils are similar to Wellsboro soils in texture but are less red.

Typical pedon of Mardin channery silt loam, 2 to 8 percent slopes, in a field in Chestnuthill Township about 2 miles northwest of Brodheadsville, 0.4 mile south of Township Route 417 on Township Route 534, 500 feet south and 255 feet east of end of Township Route 534, 75 feet north of woods:

Ap—0 to 9 inches; dark brown (10YR 4/3) channery silt loam; weak fine granular structure; friable, slightly sticky and slightly plastic; 20 percent coarse fragments; medium acid; abrupt smooth boundary.

B1—9 to 18 inches; yellowish brown (10YR 5/6) channery silt loam; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; 25 percent coarse fragments; medium acid; clear wavy boundary.

B2—18 to 24 inches; yellowish brown (10YR 5/4) gravelly loam; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; 25 percent coarse fragments; medium acid; gradual wavy boundary.

Bx1—24 to 29 inches; yellowish brown (10YR 5/4) gravelly loam; common medium distinct light gray (10YR 7/2) and strong brown (7.5YR 5/8) mottles; weak very coarse prismatic structure; firm and brittle, slightly sticky and slightly plastic; occasional thin patchy clay films on ped faces; 20 percent coarse fragments; strongly acid; abrupt smooth boundary.

Bx2—29 to 35 inches; yellowish brown (10YR 5/4) gravelly loam; common medium prominent light gray (10YR 7/1), light brownish gray (10YR 6/2), and strong brown (7.5YR 5/8) mottles; weak very coarse prismatic structure parting to moderate medium blocky; firm, brittle, slightly sticky and slightly plastic; few thin patchy thin clay films on ped faces; 20 percent coarse fragments; medium acid; clear wavy boundary.

Bx3—35 to 45 inches; yellowish brown (10YR 5/4) gravelly loam; many coarse prominent light gray (10YR 7/1) and strong brown (7.5YR 5/8) mottles; weak very coarse prismatic structure parting to moderate medium blocky; firm, brittle, slightly sticky and slightly plastic; few thin clay films on ped faces; 25 percent coarse fragments; strongly acid; clear smooth boundary.

Bx4—45 to 52 inches; yellowish brown (10YR 5/4) gravelly silt loam; common medium distinct light gray (10YR 7/2) and strong brown (7.5YR 5/8) mottles; weak very coarse prismatic structure parting to moderate coarse blocky; very firm, brittle, slightly sticky and slightly plastic; few thin patchy clay films on ped faces; 25 percent coarse fragments; strongly acid; abrupt wavy boundary.

Bx5—52 to 70 inches; yellowish brown (10YR 5/4) gravelly silt loam; common medium distinct light gray (10YR 7/2) and strong brown (7.5YR 5/8) mottles; weak very coarse prismatic structure parting to moderate coarse blocky; very firm, brittle, slightly sticky and slightly plastic; few thin patchy clay films on ped faces; 35 percent coarse fragments; strongly acid; clear wavy boundary.

C—70 to 110 inches; yellowish brown (10YR 5/4) very gravelly loam; weak thick platy structure; very firm, slightly sticky and slightly plastic; many thin patchy clay films on ped faces; 50 percent coarse fragments; strongly acid.

The solum ranges from 40 to 70 inches in thickness. Depth to bedrock ranges from 3-1/2 to 20 feet or more. Depth to the fragipan ranges from 14 to 26 inches. Reaction ranges from very strongly acid to medium acid above the Bx horizon, from very strongly acid to slightly acid in the Bx horizon, and from very strongly acid to neutral in the C horizon. Coarse fragments make up 10 to 35 percent of the solum above the Bx horizon and 20 to 60 percent of the Bx and C horizons.

The B horizon ranges from dark brown (7.5YR 3/2) to light olive brown (2.5Y 5/4). The fine earth fraction of the B horizon is mostly loam and silt loam.

Meckesville series

The Meckesville series is made up of fine-loamy, mixed, mesic Typic Fragiudults. These soils are deep and well drained. They formed in pre-Wisconsin glacial till derived from sandstone, siltstone, and shale. The A horizon is dark brown gravelly loam. The B horizon is reddish brown and weak red gravelly loam and channery loam, and the Bx horizon is weak red, firm and brittle channery loam. Meckesville soils are on mountains, ridges, and broad plateaus. Slopes range from 0 to 25 percent.

Meckesville soils are associated on the landscape with Leck Kill, Kedron, and Klinesville soils. Leck Kill soils are deep and well drained, Kedron soils are moderately well drained, and Klinesville soils are shallow and well drained. Unlike Leck Kill soils, Meckesville soils have a fragipan.

Typical pedon of Meckesville gravelly loam, 3 to 8 percent slopes, in a gently sloping cultivated field 2.5 miles north of Effort on Route 45055, 134 feet southwest of road:

Ap—0 to 9 inches; dark brown (7.5YR 4/2) gravelly loam; moderate medium grangular structure; friable, nonsticky and nonplastic; 20 percent coarse fragments; medium acid; abrupt smooth boundary.

B21t—9 to 16 inches; reddish brown (5YR 4/4) gravelly loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common thin patchy clay films on ped faces; 25 percent coarse fragments; strongly acid; clear wavy boundary.

B22t—16 to 26 inches; reddish brown (2.5YR 4/4) gravelly loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common thin patchy clay films on ped faces; few black stains; 30 percent coarse fragments; strongly acid; gradual smooth boundary.

B23t—26 to 32 inches; weak red (10YR 4/4) channery loam; moderate medium subangular blocky structure; friable, nonsticky and slightly plastic; many moderately thick patchy clay films on ped faces; few black stains; 40 percent coarse fragments; very strongly acid; abrupt wavy boundary.

Bx—32 to 60 inches; weak red (10YR 4/4) channery loam; weak very coarse prismatic structure parting to moderate medium subangular blocky; very firm and brittle, slightly sticky and slightly plastic; many moderately thick patchy clay films on ped faces; few black stains; 45 percent coarse fragments; very strongly acid.

The solum ranges from 50 to 75 inches in thickness. Depth to bedrock ranges from 6 feet to more than 20 feet. Depth to the fragipan ranges from 26 to 40 inches. Coarse fragments make up 15 to 30 percent of the upper part of the solum, 25 to 50 percent of the lower part of the solum, and as much as 80 percent of the C horizon. Where the soil has not been limed, reaction is strongly acid to very strongly acid.

The A horizon ranges from dark reddish brown (5YR 2/2) to brown (7.5YR 5/4). The fine earth fraction ranges from silt loam to loam.

The Bt horizon is dark reddish brown (5YR 3/3) to red (10YR 5/6). The Bx horizon ranges from weak red (10YR 4/4) to dark reddish brown (5YR 3/4). The fine earth fraction of the B and Bx horizons ranges from loam to silty clay loam or clay loam.

Morris series

The Morris series is made up of coarse-loamy, mixed, mesic Aeric Fragiaquepts. These soils are deep and somewhat poorly drained. They formed in glacial till derived from sandstone, siltstone, and shale. The A and B horizons are dark reddish brown channery silt loam. The A'2 horizon below is mottled pinkish gray gravelly loam, and the Bx horizon is weak red and reddish brown gravelly loam. Morris soils are in concave areas on mountains, plateaus, and ridges. Slopes range from 0 to 20 percent.

Morris soils are associated on the landscape with Oquaga, Lackawanna, Wellsboro, and Norwich soils. Oquaga soils are moderately deep and well drained, Lackawanna soils are deep and well drained, Wellsboro soils are moderately well drained, and Norwich soils are poorly drained to very poorly drained.

Typical pedon of Morris channery silt loam, 2 to 10 percent slopes, in an idle field in Pocono Township, 1 mile north of Bartonville on Township Route 487, 1/2 mile north of intersection with Township Route 625, 450 feet north of old farmhouse, 150 feet northwest of road:

Ap—0 to 7 inches; dark reddish brown (5YR 3/2) channery silt loam; pinkish gray (5YR 7/2) dry; moderate medium and coarse granular structure; very friable, nonsticky and slightly plastic; many roots; 15 percent coarse fragments; strongly acid; clear smooth boundary.

B2—7 to 10 inches; reddish brown (5YR 5/3) channery silt loam; common medium distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; 15 percent coarse fragments; strongly acid; clear smooth boundary.

A'2g—10 to 15 inches; pinkish gray (7.5YR 6/2) gravelly loam; common medium distinct strong brown (7.5YR 5/8) mottles; moderate medium and coarse subangular blocky structure; friable, slightly sticky and slightly plastic; 40 percent coarse fragments; strongly acid; abrupt wavy boundary.

B'x1g—15 to 23 inches; weak red (2.5YR 5/2) gravelly loam; many medium distinct reddish brown (5YR 5/4) mottles; prism faces are pinkish gray (7.5YR 7/2) bordered by yellowish red (5YR 5/6) rinds; strong very coarse prismatic structure parting to weak medium blocky; firm and slightly brittle, slightly sticky and slightly plastic; few very thick clay films in pores; 40 percent coarse fragments; strongly acid; gradual wavy boundary.

B'x2—23 to 32 inches; reddish brown (2.5YR 4/4) gravelly loam; many common distinct pinkish gray (5YR 7/2) and yellowish red (5YR 5/6) mottles; prism faces are pinkish gray (7.5YR 7/2) bordered by yellowish red (5YR 5/6) rinds; strong very coarse prismatic structure; very firm and brittle, slightly sticky and slightly plastic; few thin to moderately thick clay films in pores; 30 percent coarse fragments; strongly acid; gradual wavy boundary.

B'x3—32 to 48 inches; reddish brown (2.5YR 4/4) gravelly loam; many common distinct yellowish red (5YR 5/6) mottles; prism faces are light gray (5YR 7/1) bordered by yellowish red (5YR 5/6) rinds; strong very coarse prismatic structure; firm and brittle, slightly sticky and slightly plastic; common moderately thick clay films in pores; 30 percent coarse fragments; strongly acid; gradual wavy boundary.

B'x4—48 to 60 inches; reddish brown (2.5YR 4/4) gravelly loam; many common distinct yellowish red (5YR 5/6) mottles; prism faces are light gray (5YR 7/1) bordered by yellowish red (5YR 5/6) rinds; strong very coarse prismatic structure; firm and brittle, slightly sticky and slightly plastic; few thin clay films in pores; 35 percent coarse fragments; medium acid.

The solum ranges from 40 to 70 inches. Depth to bedrock ranges from 3-1/2 to 20 feet or more. Depth to the fragipan ranges from 10 to 20 inches. Coarse fragments make up 10 to 40 inches of the A and B horizons and 15 to 50 percent of the Bx and C horizons. Reaction ranges from very strongly acid to medium acid in the A and B horizons and the upper part of the Bx horizon and from strongly acid to slightly acid in the lower part of the Bx horizon and in the C horizon.

The A horizon ranges from black (10YR 2/1) to light reddish brown (5YR 6/3). The fine earth fraction is silt loam and loam.

The B horizon is dark reddish brown (5YR 3/2) to light gray (10YR 7/2). The fine earth fraction is loam and silt loam.

The Bx horizon is weak red (2.5YR 4/2) to strong brown (7.5YR 5/6), the fine earth fraction is silt loam and loam.

Norwich series

The Norwich series is made up of fine-loamy, mixed, mesic Typic Fragiaquepts. These soils are deep and very poorly drained to poorly drained. They formed in glacial till derived from acid siltstone, sandstone, and shale. The A1 horizon is very dark brown channery silt loam, and the A2 horizon is gray channery silt loam. The B2 horizon is light gray channery loam, and the Bx horizon is brown and reddish gray, firm and brittle channery loam and channery fine sandy loam. Norwich soils are in upland depressions on broad plateaus and mountains and on a few low-lying areas in valleys. Slopes range from 0 to 8 percent.

Norwich soils are associated on the landscape with Lackawanna, Wellsboro, Morris, and Chippewa soils. Lackawanna soils are deep and well drained, Wellsboro soils are deep and moderately well drained, Morris soils are deep and somewhat poorly drained, and Chippewa soils are deep and poorly drained. Norwich soils are redder than Chippewa soils.

Typical pedon of Norwich channery silt loam in an area of Chippewa and Norwich extremely stony soils, 0 to 8 percent slopes, in a wooded area 3 miles northwest of Wagners, 1.25 miles east of Route 45039 on North Arrow Drive, at road cut on north side:

A1—0 to 8 inches; very dark brown (10YR 2/2), light brownish gray (10YR 6/2) dry, channery silt loam; moderate fine and medium granular structure; friable; 20 percent coarse fragments; strongly acid; abrupt wavy boundary.

A2g—8 to 12 inches; gray (10YR 5/1) channery silt loam; common coarse prominent yellowish brown (10YR 5/6) and gray (10YR 6/1) mottles; weak medium subangular blocky structure; friable, nonsticky and nonplastic; 25 percent coarse fragments; medium acid; clear wavy boundary.

B2g—12 to 16 inches; light gray (10YR 6/1) channery loam; many coarse prominent brownish yellow (10YR 6/6) mottles; weak coarse subangular blocky structure; friable, nonsticky and nonplastic; 25 percent coarse fragments; medium acid; abrupt smooth boundary.

Bx1g—16 to 30 inches; brown (7.5YR 5/2) channery loam; prism faces are light gray (10YR 6/1) bordered by yellowish brown (10YR 5/6) rinds; many coarse prominent yellowish brown (10YR 5/6) and (10YR 5/8), gray (5YR 6/1), and light yellowish brown (10YR 6/4) mottles; moderate very coarse prismatic structure; very firm and brittle, nonsticky and nonplastic; common thin clay films lining pores; 30 percent coarse fragments; slightly acid; gradual smooth boundary.

Bx2g—30 to 42 inches; reddish gray (5YR 5/2) channery fine sandy loam; prism faces are light gray (10YR 6/1) bordered by yellowish brown (10YR 5/6) rinds; many coarse prominent brown (7.5YR 5/4) and pinkish gray (7.5YR 6/2) mottles; moderate very coarse prismatic structure; very firm and brittle; common thin clay films lining pores; 35 percent coarse fragments; slightly acid; gradual smooth boundary.

IIcg—42 to 60 inches; pinkish gray (7.5YR 7/2) streaked with reddish yellow (7.5YR 6/6) channery heavy silt loam; many coarse prominent gray (5YR 6/1) and yellowish red (5YR 5/8) mottles; moderate thin platy structure; friable, slightly sticky and slightly plastic; 15 percent coarse fragments; slightly acid.

The solum ranges from 36 to 50 inches in thickness. Depth to the fragipan ranges from 10 to 22 inches. Bedrock is below a depth of 42 inches. Coarse fragments make up 5 to 30 percent of the A and B2 horizons and 15 to 45 percent of the Bx and C horizons. Reaction ranges from strongly acid to slightly acid.

The A1 and Ap horizons range from dark brown (7.5YR 4/2) to black (10YR 2/1). The A2 horizon ranges from olive gray (5Y 4/2) to gray (5YR 6/1). It is channery silt loam or loam.

The B horizon ranges from olive gray (5Y 4/2) to gray (5YR 6/1). It is channery silt loam or loam. The Bx horizon ranges from dark gray (10YR 4/1) to weak red (2.5YR 5/2). Texture ranges from channery sandy loam to silt loam.

The C horizon is similar to the Bx horizon in color and texture.

Oquaga series

The Oquaga series is made up of loamy-skeletal, mixed, mesic Typic Dystrochrepts. These soils are moderately deep and well drained. They formed in glacial till derived from siltstone, sandstone, and some shale. The thin A2 horizon is dark reddish brown channery sandy loam, and the B horizon is dark reddish brown, reddish brown, strong brown, and dark brown channery loam. Oquaga soils are on the tops and sides of mountains, ridges, and plateaus. Slopes range from 0 to 70 percent.

Oquaga soils are associated on the landscape with Lackawanna, Wellsboro, Morris, and Norwich soils. Lackawanna soils are deep and well drained, Wellsboro soils are moderately well drained, Morris soils are somewhat poorly drained, and Norwich soils are very poorly drained to poorly drained. Oquaga soils are near the moderately deep, well drained Lordstown soils but are redder than those soils.

Typical pedon of Oquaga channery loam in an area of Oquaga-Lackawanna extremely stony loams, 8 to 25 percent slopes, in Mount Pocono Borough, on water company property, east of power substation about 150 feet east of shale pit, 75 feet east of pole number 30-629:

O1—4 to 2 inches; mixed hardwood leaf litter; abrupt smooth boundary.

O2—2 inches to 0; black (5YR 2/1) partially decomposed hardwood leaf litter; strongly acid; abrupt smooth boundary.

A2—0 to 1 inch; dark reddish brown (5YR 3/3) channery sandy loam; weak fine granular structure; friable, nonsticky and nonplastic; 40 percent coarse fragments; extremely acid; clear discontinuous boundary.

B21h—1 inch to 3 inches; dark reddish brown (5YR 3/3) channery loam; weak fine granular structure; friable, nonsticky and nonplastic; 45 percent coarse fragments; extremely acid; abrupt wavy boundary.

B22ir—3 to 5 inches; reddish brown (5YR 4/3) channery loam; weak fine granular structure; friable, nonsticky and nonplastic; 45 percent coarse fragments; extremely acid; clear wavy boundary.

B23—5 to 12 inches; strong brown (7.5YR 5/6) channery loam; weak fine subangular blocky structure; friable, nonsticky and slightly plastic; 40 percent coarse fragments; few thin clay films; some bridging; very strongly acid; gradual wavy boundary.

B24—12 to 18 inches; dark brown (7.5YR 4/4) channery loam; weak fine subangular blocky structure; friable, nonsticky and slightly plastic; 45 percent coarse fragments; very strongly acid; clear wavy boundary.

C—18 to 26 inches; reddish brown (5YR 4/4) very channery loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; 80 percent coarse fragments; very strongly acid; clear wavy boundary.

R—26 inches; dark yellowish gray (10YR 4/1) partially weathered sandstone; very strongly acid.

The solum ranges from 18 to 35 inches in thickness. Bedrock is at a depth of 20 to 40 inches. Coarse fragments make up 20 to 40 percent of the A horizon, 25 to 60 percent of the B horizon, and 35 to 80 percent of the C horizon. Where the soil has not been limed, reaction ranges from very strongly acid to strongly acid.

The A horizon ranges from dark reddish brown (5YR 3/2) to brown (7.5YR 5/4). The fine earth fraction is loam or silt loam.

The B horizon is brown (7.5YR 5/4) to dark red (2.5YR 3/6). The fine earth fraction is loam and silt loam.

The C horizon is dusky red (2.5YR 3/2) to brown (7.5YR 5/4). It is similar to the B horizon in color.

Philo series

The Philo series is made up of coarse-loamy, mixed, mesic Fluvaquentic Dystrochrepts. These soils are deep, and moderately well drained. They formed in alluvium derived from sandstone, siltstone, and shale. The Ap horizon is brown silt loam, and the B horizon is yellowish brown and brown silt loam and fine sandy loam. Philo soils are on flood plains along major streams. Slopes range from 0 to 3 percent.

Philo soils are associated on the landscape with Pope, Holly, and Wayland soils. Pope soils are deep and well drained, Holly soils are poorly drained, and Wayland soils are very poorly drained.

Typical pedon of Philo silt loam in a young woodlot in Polk Township, 2 miles southwest of Gilbert on Township Route 352, 1,250 feet north of intersection with Route 45063, 560 feet south of Pohopoco Creek, in an open pit 40 feet east of road:

Ap—0 to 10 inches; brown (10YR 4/3) silt loam; weak very fine granular structure; friable, slightly sticky and slightly plastic; 1 percent coarse fragments; strongly acid; abrupt smooth boundary.

B1—10 to 18 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; friable, slightly sticky and slightly plastic; few wormholes; strongly acid; gradual wavy boundary.

B21—18 to 25 inches; brown (7.5YR 5/4) very fine sandy loam; many coarse distinct strong brown (7.5YR 5/8) and pinkish gray (5YR 6/2) mottles; weak coarse prismatic structure parting to weak fine and medium subangular blocky; friable, slightly sticky and slightly plastic; very strongly acid; gradual irregular boundary.

B22—25 to 31 inches; brown (7.5YR 5/4) fine sandy loam; many coarse prominent pinkish gray (7.5YR 7/2) and yellowish red (5YR 5/8) mottles; weak coarse subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films on ped faces; very strongly acid; gradual wavy boundary.

B3—31 to 40 inches; brown (7.5YR 5/4) fine sandy loam; many coarse prominent gray (10YR 6/1) and brownish yellow (10YR 6/8) mottles; weak very thick platy structure parting to weak medium subangular blocky; friable, nonsticky and nonplastic; few thin clay films; 5 percent coarse fragments; very strongly acid; abrupt wavy boundary.

IIC—40 to 60 inches; brown (10YR 5/3) gravelly fine sandy loam; many medium prominent light gray (10YR 7/1) and brownish yellow (10YR 6/8) mottles; massive; firm, nonsticky and nonplastic; 50 percent coarse fragments; very strongly acid.

The solum ranges from 20 to 42 inches in thickness. Bedrock is below a depth of 4 feet. Coarse fragments make up 0 to 20 percent of the control section. Where the soil has not been limed, reaction ranges from very strongly acid to medium acid.

The A horizon ranges from dark brown (7.5YR 3/2) to brown (10YR 4/3). It is mainly silt loam.

The B horizon ranges from brown (10YR 4/3) to reddish yellow (7.5YR 6/6). The fine earth fraction ranges from silt loam to sandy loam.

Pope series

The Pope series is made up of coarse-loamy, mixed, mesic Fluventic Dystrochrepts. These soils are deep and well drained. They formed in alluvium derived from sandstone, siltstone, and shale. The Ap horizon is very dark grayish brown silt loam, and the B horizon is brown and dark yellowish brown silt loam. Pope soils are on flood plains along major streams. Slopes range from 0 to 3 percent.

Pope soils are associated on the landscape with Philo, Holly, and Wayland soils. Philo soils are deep and moderately well drained, Holly soils are poorly drained, and Wayland soils are very poorly drained.

Typical pedon of Pope silt loam in a pasture in Middle Smithfield Township, 4.25 miles north of Shawnee of Township Route 546, 600 feet southeast of Route 45012, 60 feet southwest of road:

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; very friable; many roots; neutral; abrupt smooth boundary.

B21—10 to 18 inches; brown (7.5YR 4/4) silt loam; weak fine granular structure; very friable; many wormholes and tongues stained with organic matter; common roots; slightly acid; gradual irregular boundary.

B22—18 to 30 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure with weak tendency to platiness; very friable; few wormholes; common roots; strongly acid; diffuse irregular boundary.

C—30 to 60 inches; brown (10YR 4/3) loamy very fine sand; weak granular structure with very weak tendency to platiness; very friable; few wormholes; few roots; strongly acid.

The solum ranges from 30 to 40 inches in thickness. Depth to sand and gravel material is more than 40 inches. Bedrock generally is below a depth of 60 inches. Where the soil has not been limed, reaction ranges from strongly acid to very strongly acid above 5 feet. The solum is generally free of gravel; however, some pedons are as much as 20 percent gravel in individual horizons.

The A horizon is very dark grayish brown (10YR 3/2) to dark yellowish brown (10YR 4/4). It is mainly silt loam.

The B horizon ranges from brown (10YR 4/3) to yellowish brown (10YR 5/4) and from silt loam to sandy loam.

Rexford series

The Rexford series is made up of coarse-loamy, mixed, mesic Aeric Fragiaquepts. These soils are deep and somewhat poorly drained to poorly drained. They formed in glacial outwash deposits derived from siltstone, sandstone, and shale. The Ap horizon is dark grayish brown gravelly silt loam. The B2 horizon is mottled brown gravelly loam, and the Bx horizon is brown and pale brown, firm and brittle gravelly sandy loam. Rexford soils are on stream terraces and water-sorted moraines. Slopes range from 0 to 8 percent.

Rexford soils are associated on the landscape with Chenango, Wyoming, and Braceville soils. Chenango soils are deep and well drained to excessively drained, Wyoming soils are excessively drained, and Braceville soils are moderately well drained.

Typical pedon of Rexford gravelly silt loam, 0 to 3 percent slopes, in Chestnuthill Township, 0.7 mile north of Brodheadsville on Township Route 432, 90 feet south of power pole number B-32919, 20 feet west of road:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) gravelly silt loam; weak fine granular structure; very friable, nonsticky and nonplastic; 15 percent coarse fragments; medium acid; abrupt smooth boundary.

B2—10 to 16 inches; brown (7.5YR 5/2) gravelly loam; common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm, nonsticky and slightly plastic; 15 to 20 percent coarse fragments; medium acid; abrupt wavy boundary.

Bx1—16 to 22 inches; brown (7.5YR 5/4) gravelly fine sandy loam; many coarse prominent light brownish gray (10YR 6/2) and reddish yellow (7.5YR 6/8) mottles; weak very coarse prismatic structure parting to moderate medium blocky; very firm and brittle; few thin patchy clay films on ped faces; 30 percent coarse fragments; slightly acid; gradual wavy boundary.

Bx2—22 to 29 inches; pale brown (10YR 6/3) gravelly fine sandy loam; many coarse prominent light gray (10YR 7/2) and reddish yellow (7.5YR 6/8) mottles; weak very coarse prismatic structure parting to moderate medium blocky; very firm and brittle, slightly plastic; occasional thin patchy clay films on ped faces; 35 percent coarse fragments; slightly acid; gradual irregular boundary.

IIBx3g—29 to 36 inches; gray (5Y 6/1) gravelly sandy loam; many coarse prominent light yellowish brown (10YR 6/4) and strong brown (7.5YR 5/8) mottles; weak very coarse prismatic structure parting to moderate medium blocky; firm and brittle; few thin clay films in pores; 25 to 30 percent coarse fragments; slightly acid; clear irregular boundary.

IIICg—36 to 60 inches; gray (5YR 6/1) very gravelly coarse sandy loam; many coarse prominent pink (5YR 7/3) and light yellowish brown (2.5Y 6/4) mottles; massive; very firm; 65 to 70 percent coarse fragments; slightly acid.

The solum ranges from 24 to 40 inches in thickness. Depth to the fragipan ranges from 15 to 20 inches. Depth to bedrock ranges from 6 to 20 feet. Coarse fragments make up 10 to 40 percent of individual horizons of the solum. Where the soil has not been limed, reaction ranges from very strongly acid to medium acid above the Bx horizon and from medium acid to slightly acid in the Bx and C horizons.

The A horizon is dark gray (10YR 4/1) to dark grayish brown (10YR 4/2).

The B horizon is brown (7.5YR 4/2) to gray (10YR 5/1). The fine earth fraction is silt loam to sandy loam.

The Bx horizon ranges from dark gray (5Y 5/1) to light reddish brown (5YR 6/4). It is mostly loam or sandy loam.

The C horizon is more variable than the B and Bx horizons in color and texture.

Rushtown series

The Rushtown series is made up of loamy-skeletal over fragmental, mixed, mesic Typic Dystrochrepts. These soils are deep and well drained. They formed in colluvial material derived from shale. The Ap horizon is dark grayish brown shaly silt loam, and the B horizon is dark yellowish brown and yellowish brown very shaly silt loam. Rushtown soils are on low hills, on foot slopes of ridges, and on a few alluvial fans. Slopes range from 5 to 30 percent.

Rushtown soils are associated on the landscape with Weikert, Hartleton, Allenwood, Watson, Alvira, and Shelmadine soils. Weikert soils are shallow and well drained, Hartleton and Allenwood soils are deep and well drained, Watson soils are moderately well drained, Alvira soils are somewhat poorly drained, and Shelmadine soils are poorly drained. Rushtown soils contain more coarse fragments and less fine earth material than Hartleton and Allenwood soils.

Typical pedon of Rushtown shaly silt loam, 5 to 15 percent slopes, in an idle field 1/2 mile northwest of Gilbert on Township Route 413, 200 feet west of intersection with Township Route 450, 50 feet north of road along shale pit cut:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) shaly silt loam; weak fine and very fine granular structure; friable, nonsticky and nonplastic; 50 percent fine shale chips uniformly about 1 centimeter in size; neutral; abrupt smooth boundary.

B1—9 to 14 inches; dark yellowish brown (10YR 4/4) very shaly silt loam; very fine granular structure; friable; nonsticky and nonplastic; 50 percent fine shale chips uniformly about 1 centimeter in size; neutral; diffuse wavy boundary.

B2—14 to 20 inches; yellowish brown (10YR 5/6) very shaly silt loam; weak medium granular structure; loose, nonsticky and nonplastic; 60 percent fine shale chips uniformly about 1 centimeter in size; neutral; diffuse wavy boundary.

C—20 to 60 inches; yellowish brown (10YR 5/6) very shaly silt loam; massive; loose, nonsticky and nonplastic; 90 percent fine shale chips 1 to 2 centimeters in size; slightly acid.

The solum ranges from 20 to 40 inches in thickness. Depth to bedrock is 3 to more than 15 feet. Coarse fragments make up 40 to 60 percent of the solum and 50 to 90 percent of the C horizon. Reaction is neutral to

slightly acid where the soil has been limed and medium acid to strongly acid where the soil has not been limed.

The A horizon is very dark grayish brown (10YR 3/2) to brown (10YR 4/3). The fine earth fraction is silt loam or loam.

The B and C horizon are dark yellowish brown (10YR 4/4) to strong brown (7.5YR 5/6) very shaly silt loam or loam.

These soils are higher in reaction in the solum and C horizon than is defined in the range for the series, but this difference does not alter their usefulness and behavior.

Sheffield series

The Sheffield series is made up of fine-silty, mixed, mesic Typic Fragiaqualfs. These soils are deep and poorly drained. They formed in old alluvium derived from sandstone, siltstone, and shale. The Ap horizon is dark grayish brown silt loam. The B2 horizon is mottled light gray silty clay loam, and the Bx horizon is gray, firm and brittle silty clay loam. Sheffield soils are on old stream terraces. Slopes range from 0 to 3 percent.

Sheffield soils are associated on the landscape with Lawrenceville soils. Lawrenceville soils are deep and moderately well drained.

Typical pedon of Sheffield silt loam in an idle field in Chestnuthill Township, about 1.3 miles south of Effort on Township Route 445, 0.3 miles west of junction with Route 45003, in a field 200 feet south of road, 150 feet west of old ice house, in an open pit:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; nonsticky and nonplastic; neutral; abrupt smooth boundary.

B21t—7 to 10 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium distinct reddish yellow (7.5YR 6/6) and light gray (10YR 7/2) mottles; weak fine subangular blocky structure; friable, slightly sticky and plastic; slightly acid; clear wavy boundary.

B22t—10 to 19 inches; light brownish gray (N 7/0) silty clay loam; many coarse prominent reddish yellow (7.5YR 6/8) and grayish brown (2.5Y 5/2) mottles; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm, sticky and very plastic; slightly acid; gradual wavy boundary.

Bx1—19 to 28 inches; gray (N 6/0) silty clay loam; many coarse prominent reddish yellow (7.5YR 6/8) and grayish brown (2.5Y 5/2) mottles; moderate very coarse prismatic structure parting to moderate medium subangular blocky; very firm and brittle, sticky and very plastic; medium acid; gradual wavy boundary.

Bx2—28 to 38 inches; light gray (N 7/0) silty clay loam; many coarse prominent light gray (2.5Y 7/2) and strong brown (7.5YR 5/8) mottles; moderate very coarse prismatic structure parting to coarse subangular blocky; very firm and brittle, sticky and very plastic; few black stains and concretions; few shale fragments; strongly acid; abrupt irregular boundary.

IIC1—38 to 48 inches; brown (10YR 5/3) shaly silty clay loam; many coarse prominent pink (7.5YR 7/4) and gray (10YR 6/1) mottles; massive; very firm, sticky and slightly plastic; 50 percent coarse fragments; many black concretions and stains; medium acid; abrupt irregular boundary.

IIC2—48 to 66 inches; strong brown (7.5YR 5/6) shaly silty clay loam; common medium and coarse prominent pinkish gray (5YR 6/2) mottles; massive; very firm, sticky and plastic; 35 percent coarse fragments; many black concretions and stains; neutral.

The solum ranges from 36 to 50 inches in thickness. Depth to bedrock ranges from 4 feet to more than 15 feet. Depth to the fragipan ranges from 15 to 26 inches. Coarse fragments make up 0 to 10 percent of the solum. Reaction is strongly acid to neutral.

The A horizon is dark gray (10YR 4/1) to grayish brown (2.5Y 5/2) to light gray (N 7/0) heavy silt loam or silty clay loam.

The Bx horizon is dark grayish brown (10YR 4/2) to olive (5Y 5/4) silt loam or silty clay loam.

Depth to carbonates is a few inches more in these soils than is defined in the range for the series, but this difference does not alter the usefulness or behavior of the soils.

Shelmadine series

The Shelmadine series is made up of fine-loamy, mixed, mesic Typic Fragiaquults. These soils are deep and poorly drained. They formed in pre-Wisconsin glacial till derived from acid shale, siltstone, and sandstone. The A horizon is very dark grayish brown silt loam. The B horizon is mottled grayish brown and light brownish gray shaly silt loam, and the Bx horizon is light yellowish brown and olive brown, firm and brittle shaly loam. Shelmadine soils are on upland flats and in depressions. Slopes range from 0 to 8 percent.

Shelmadine soils are associated on the landscape with Allenwood, Hartleton, Watson, Buchanan, and Alvira soils. Allenwood and Hartleton soils are deep and well drained, Watson soils are deep and moderately well drained, Buchanan soils are deep and moderately well drained to somewhat poorly drained, and Alvira soils are deep and somewhat poorly drained.

Typical pedon of Shelmadine silt loam in an area of Shelmadine very stony silt loam, 0 to 8 percent slopes, in a wooded area 1 mile south of McIlhaney on Township Route 361, 0.63 mile west of PA. Route 115, 300 feet west of bend in road, 50 feet north of road:

O2—1 inch to 0; black (10YR 2/1) partially decomposed leaves and twigs; strongly acid; abrupt wavy boundary.

A1—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable, nonsticky and slightly plastic; 10 percent coarse fragments; strongly acid; clear wavy boundary.

B1g—6 to 10 inches; grayish brown (2.5Y 5/2) shaly silt loam; many medium distinct light gray (2.5Y 7/2) and few fine distinct strong brown (7.5YR 5/8) mottles; weak medium granular structure; friable, sticky and plastic; many thin clay films in pores; 15 percent coarse fragments; strongly acid; clear wavy boundary.

B2tg—10 to 20 inches; light brownish gray (2.5Y 6/2) shaly heavy silt loam; many coarse prominent light gray (10YR 7/2) and strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable, sticky and plastic; many thin clay films on ped faces and in pores; 20 percent coarse fragments; strongly acid; abrupt wavy boundary.

Bx1g—20 to 36 inches; light yellowish brown (2.5Y 6/4) shaly loam; prism faces are grayish brown (10YR 5/2); many coarse prominent light gray (10YR 7/2) and strong brown (7.5YR 5/8) mottles; moderate very coarse prismatic structure; firm and brittle, sticky and plastic; many thin clay films on ped faces and in pores; many black concretions; 20 percent coarse fragments; strongly acid; gradual smooth boundary.

Bx2g—36 to 48 inches; olive brown (2.5Y 4/4) shaly loam; prism faces are grayish brown (10YR 5/2); many coarse prominent gray (10YR 6/1) and strong brown (7.5YR 5/6) mottles; moderate very coarse prismatic structure; firm and brittle, sticky and plastic; many thin clay films on ped faces and in pores; many black concretions; 25 percent coarse fragments; very strongly acid; abrupt wavy boundary.

C—48 to 60 inches; dark brown (10YR 4/3) very channery loam; many coarse prominent gray (10YR 6/1) and strong brown (7.5YR 5/8) mottles; massive; friable, slightly plastic; 60 percent coarse fragments; very strongly acid.

The solum ranges from 40 to 56 inches in thickness. Depth to the fragipan ranges from 18 to 26 inches. Bedrock is below a depth of 5 feet. Coarse fragments make up 5 to 25 percent of the solum and 15 to 70 percent of the C horizon. Where the soil has not been limed, reaction ranges from strongly acid to extremely acid.

The A1 and Ap horizons range from very dark gray (10YR 3/1) to grayish brown (2.5Y 5/2).

The B and Bx horizons are dark grayish brown (10YR 4/2), to light yellowish brown (2.5Y 6/4). The fine earth fraction ranges from silt loam to silty clay loam in the B horizon and from loam to silt loam in the Bx horizon.

The C horizon ranges from gray to strong brown.

Swartswood series

The Swartswood series is made up of coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are deep and well drained. They formed in glacial till derived from sandstone, siltstone, and some shale. The thin A1 and A2 horizons are channery fine sandy loam and channery sandy loam. The B2 horizon is channery sandy loam and gravelly sandy loam, and the Bx horizon is firm and brittle channery sandy loam. Swartswood soils are on tops and sides of plateaus and ridges. Slopes range from 0 to 25 percent.

Swartswood soils are associated on the landscape with Wurtsboro, Volusia, and Chippewa soils. Wurtsboro soils are deep and moderately well drained, Volusia soils are somewhat poorly drained, and Chippewa soils are poorly drained.

Typical pedon of Swartswood channery sandy loam in an area of Swartswood extremely stony sandy loam, 8 to 25 percent slopes, in a woodlot in Middle Smithfield Township, in Resica Falls Boy Scouts of America Camp, about 5 miles north of Marshalls Creek, 1/4 mile east of PA Route 402, at entrance to Big Springs Camp, 500 feet east of telephone pole No. 7:

A1—0 to 1 inch; very dark gray (10YR 3/1) channery fine sandy loam; weak fine granular structure; friable; 20 percent coarse fragments; very strongly acid; abrupt wavy boundary.

A2—1 inch to 2 inches; grayish brown (10YR 5/2) channery sandy loam; weak fine granular structure; friable; 20 percent coarse fragments; very strongly acid; abrupt wavy boundary.

B21ir—2 to 6 inches; dark yellowish brown (10YR 4/4) channery sandy loam; weak fine granular structure; friable, slightly sticky; 20 percent coarse fragments; very strongly acid; clear wavy boundary.

B22—6 to 15 inches; dark yellowish brown (10YR 4/4) channery sandy loam; weak fine subangular blocky structure with some very weak thin plates; very friable, slightly sticky; 25 percent coarse fragments; very strongly acid; gradual wavy boundary.

B23—15 to 23 inches; dark brown (10YR 4/3) gravelly sandy loam; weak fine subangular blocky structure; friable, slightly sticky; 30 percent coarse fragments; very strongly acid; gradual wavy boundary.

B24—23 to 29 inches; brown (10YR 5/3) gravelly sandy loam; (10YR 4/3) stains; weak fine subangular blocky structure; very friable, slightly sticky; 35 percent coarse fragments; very strongly acid; gradual wavy boundary.

B25—29 to 34 inches; yellowish brown (10YR 5/4) gravelly loam; weak medium subangular blocky structure; friable, slightly sticky; few thin clay films on ped faces; 35 percent coarse fragments; very strongly acid; clear wavy boundary.

Bx—34 to 60 inches; yellowish brown (10YR 5/4) very gravelly sandy loam; brown (7.5YR 4/4) stains; weak very coarse prismatic structure with massive interiors; firm and brittle, slightly sticky; common patchy clay films in pores; 50 percent coarse fragments; very strongly acid.

The solum ranges from 50 to 70 inches in thickness. Depth to the fragipan ranges from 24 to 36 inches. Bedrock is at a depth of 4 to more than 20 feet. Coarse fragments in individual horizons make up 15 to 40 percent of the soil above the Bx horizon and 25 to 60 percent of the Bx and C horizons. Where the soil has not been limed, reaction ranges from strongly acid to extremely acid. The fine earth fraction of the solum is fine sandy loam, sandy loam, or loam.

The A horizon is black (10YR 2/1) to brown (10YR 5/3).

The B horizon is reddish brown (5YR 4/3) to brownish yellow (10YR 6/6). The Bx horizon is similar to the B horizon in color.

Volusia series

The Volusia series is made up of fine-loamy, mixed, mesic Aeric Fragiaquepts. These soils are deep and somewhat poorly drained. They formed in glacial till derived from siltstone, sandstone, and some shale. The B2 horizon is mottled, light yellowish brown gravelly silt loam and gravelly loam, and the Bx horizon is light olive gray and olive gray, firm to very firm and brittle gravelly loam. Volusia soils are in concave areas on mountains, plateaus, and ridges. Slopes range from 0 to 8 percent.

Volusia soils are associated on the landscape with Lordstown, Bath, Swartswood, Mardin, Wurtsboro, and Chippewa soils. Lordstown soils are moderately deep and well drained, Bath and Swartswood soils are deep and well drained, Mardin and Wurtsboro soils are moderately well drained, and Chippewa soils are poorly drained.

Typical pedon of Volusia gravelly silt loam in an area of Volusia extremely stony silt loam, 0 to 8 percent slopes, in a wooded area on the Pennsylvania State Forest property, 5-1/2 miles north of Marshalls Creek on Route 45017, 1,750 feet east of Route 45017 on old logging road, 335 feet west of Y in logging road, 65 feet north of road:

O1—2 inches to 1 inch; leaf litter and twigs.

O2—1 inch to 0; dark reddish brown (5YR 3/2) partially decomposed leaves and twigs; extremely acid.

A2—0 to 2 inches; light brownish gray (10YR 6/2) gravelly silt loam; weak very fine granular structure; very friable, nonsticky and nonplastic; 15 to 20 percent coarse fragments; very strongly acid; abrupt broken boundary.

B—2 to 5 inches; yellowish brown (10YR 5/4) gravelly silt loam; weak fine granular structure; very friable, slightly sticky and nonplastic; 20 percent coarse fragments; very strongly acid; clear wavy boundary.

B21—5 to 10 inches; light yellowish brown (2.5Y 6/4) gravelly silt loam; common medium faint light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; 15 percent coarse fragments; very strongly acid; clear wavy boundary.

B22—10 to 16 inches; light yellowish brown (2.5Y 6/4) gravelly loam; common medium distinct brownish yellow (10YR 6/6) and light gray (10YR 7/2) mottles; moderate medium subangular blocky structure; firm, slightly sticky and nonplastic; 15 to 20 percent coarse fragments; very strongly acid; gradual wavy boundary.

Bx1g—16 to 22 inches; light olive gray (5Y 6/2) gravelly loam; common medium faint light gray (5Y 7/1) and yellow (10YR 8/8) mottles; weak very coarse prismatic structure parting to moderate medium subangular blocky; firm and brittle, nonsticky and nonplastic; 15 to 20 percent coarse fragments; strongly acid; gradual wavy boundary.

Bx2g—22 to 28 inches; olive gray (5Y 5/2) gravelly loam; many coarse prominent yellow (10YR 7/8) and reddish yellow (7.5YR 7/8) mottles; weak very coarse prismatic structure parting to moderate medium subangular blocky; firm and brittle, nonsticky and nonplastic; few thin clay films lining pores; 20 percent coarse fragments; strongly acid; gradual wavy boundary.

Bx3—28 to 36 inches; olive gray (5Y 5/2) gravelly loam; many coarse prominent white (5Y 8/1) and yellow (10YR 7/8) mottles; moderate very coarse prismatic structure parting to moderate medium blocky; very firm and brittle slightly sticky and slightly plastic; 20 to 25 percent coarse fragments; strongly acid; gradual wavy boundary.

Bx4—36 to 60 inches; olive gray (5Y 5/2) gravelly loam; many coarse prominent white (5Y 8/1) and yellow (10YR 7/8) mottles; moderate coarse prismatic structure parting to moderate medium blocky; very firm and brittle, slightly sticky and nonplastic; 40 to 45 percent coarse fragments; strongly acid.

The solum ranges from 40 to 70 inches in thickness. Bedrock is at a depth of 4 to more than 30 feet. Depth to the fragipan ranges from 10 to 20 inches. Coarse fragments make up 15 to 35 percent of the soil above the Bx horizon and 15 to 50 percent of the Bx and C horizons. Reaction is medium acid to very strongly acid in the upper part of the solum and strongly acid to medium acid in the lower part.

The A horizon, including the A2 horizon is very dark grayish brown (2.5Y 3/2) to pale brown (10YR 6/3).

The B and Bx horizons are dark olive gray (5Y 3/2) to yellowish brown (10YR 5/4). The fine earth fraction is mainly loam and silt loam.

Watson series

The Watson series is made up of fine-loamy, mixed, mesic Typic Fragiudults. These soils are deep and moderately well drained. They formed in pre-Wisconsin glacial till derived from sandstone, siltstone, and shale. The Ap horizon is dark brown silt loam. The B2 horizon is strong brown and reddish yellow gravelly silty clay loam and gravelly clay loam, and the Bx horizon is yellowish red

gravelly clay loam and gravelly loam. The soils are on broad plateaus, ridgetops, and foot slopes. Slopes range from 0 to 12 percent.

Watson soils are associated on the landscape with Allenwood, Hartleton, Alvira, and Shelmadine soils. Allenwood and Hartleton soils are deep and well drained, Alvira soils are somewhat poorly drained, and Shelmadine soils are poorly drained.

Typical pedon of Watson silt loam, 2 to 8 percent slopes, in a cultivated field in Chestnuthill Township, 0.5 mile east of Effort on Township Road 417, 35 feet south of road:

Ap—0 to 10 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; friable, slightly sticky and slightly plastic; 10 percent gravel; slightly acid; abrupt smooth boundary.

B21t—10 to 16 inches; strong brown (7.5YR 5/6) gravelly light silty clay loam; moderate fine subangular blocky structure; friable, sticky and plastic; thin patchy clay films on ped faces; 15 percent gravel, medium acid; gradual wavy boundary.

B22t—16 to 23 inches; reddish yellow (7.5YR 6/6) gravelly clay loam; moderate medium and fine blocky structure; friable, sticky and plastic thin discontinuous clay films on ped faces; 15 percent gravel; medium acid; clear wavy boundary.

B23t—23 to 27 inches; reddish yellow (7.5YR 6/6) gravelly silty clay loam; common medium faint very pale brown (10YR 7/3) mottles; moderate medium blocky structure; firm, sticky and plastic; thin continuous clay films on ped faces; 20 percent gravel; medium acid; abrupt wavy boundary.

Bx1—27 to 46 inches; yellowish red (5YR 5/6) gravelly light clay loam; gray (10YR 6/1) coatings on prism faces; many coarse prominent light gray (10YR 7/2) mottles; weak very coarse prismatic structure parting to moderate medium blocky; very firm, brittle, sticky and plastic; moderately thick discontinuous clay films on ped faces and in pores; many black stains; 30 percent gravel; strongly acid; gradual wavy boundary.

Bx2—46 to 60 inches; yellowish red (5YR 5/6) gravelly heavy loam; gray (10YR 6/1) coatings on prism faces; many coarse prominent light gray (2.5Y 7/2) and reddish yellow (7.5YR 6/8) mottles; weak very coarse prismatic structure parting to moderate medium blocky; very firm, brittle, sticky and plastic; thick patchy clay films on ped faces and in pores; many coarse black stains; 40 percent gravel; strongly acid.

The solum ranges from 40 to 66 inches in thickness. Bedrock is below a depth of 5 feet. Depth to the fragipan ranges from 18 to 32 inches. Coarse fragments make up 5 to 20 percent of the A horizon, 10 to 40 percent of the Bt horizon and 10 to 50 percent of the Bx horizon. Where the soil has not been limed reaction is very strongly acid or strongly acid.

The A horizon is dark reddish brown (5YR 3/2) to dark yellowish brown (10YR 4/4). The fine earth fraction is silt loam or loam.

The Bt horizon is reddish brown (5YR 5/4) to yellowish brown (10YR 5/8). The fine earth fraction of the Bt horizon is loam to silty clay loam. The Bx horizon is reddish brown (2.5YR 4/4) to reddish yellow (7.5YR 6/6). The fine earth fraction of the Bx horizon is loam to silty clay loam.

Wayland series

The Wayland series is made up of fine-silty, mixed, nonacid, mesic Mollic Fluvaquents. These soils are deep and very poorly drained. They formed in alluvium and slack-water deposits. The thick A horizon is very dark gray and dark gray silty clay loam and the B horizon is gray silty clay loam. Wayland soils are in depressions along headwaters and on flood plains along the major streams of the county. Slopes range from 0 to 3 percent.

Wayland soils are associated on the landscape with Pope, Philo, and Holly soils and Mucky peat. Pope soils are deep and well drained; Philo soils are moderately well drained, Holly soils are poorly drained, and Mucky peat is very poorly drained. Unlike the organic Mucky peat, Wayland soils are mineral soils.

Typical pedon of Wayland silty clay loam in an idle field, 1 mile south of Gilbert on Route 45003, 25 feet west of road, 15 feet north of Weir Creek:

A1—0 to 9 inches; very dark gray (10YR 3/1) silty clay loam; moderate medium granular structure; friable, slightly sticky and slightly plastic; medium acid; gradual wavy boundary.

A3g—9 to 17 inches; dark gray (10YR 4/1) silty clay loam; common medium distinct light olive gray (5Y 6/2) mottles; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; neutral; abrupt wavy boundary.

Bg—17 to 30 inches; gray (5Y 5/1) silty clay loam; many coarse prominent brownish yellow (10YR 6/6) and light gray (5Y 7/2) mottles; weak coarse and very coarse subangular blocky structure; friable, sticky and plastic; neutral; clear smooth boundary.

Cg—30 to 41 inches; gray (N 5/0) silty clay loam; many coarse prominent greenish gray (5GY 6/1) and olive yellow (2.5Y 6/6) mottles; massive; friable, slightly sticky and slightly plastic; 2 percent coarse fragments; neutral; abrupt smooth boundary.

IICg—41 to 60 inches; dark gray (N 4/0) gravelly loam; many coarse prominent greenish gray (5GY 5/1) and light reddish brown (5YR 6/4) mottles; massive; friable, slightly sticky and nonplastic; 40 percent coarse fragments; neutral.

The solum ranges from 20 to 36 inches in thickness. Depth to bedrock ranges from 6 feet to more than 10 feet. Thin sandy layers are present in some pedons. The solum is mainly silty clay loam, but silt loam is present in some

pedons. Where the soil has not been limed, reaction is medium acid in the upper part of the solum and ranges from slightly acid to moderately alkaline in the lower part of the solum and in the C horizon. Coarse fragments are absent or scarce in the solum, but are as much as 50 percent of the C or IIC horizons.

The A horizon is very dark grayish brown (10YR 3/2) to black (N 2/0). Value is 5 or less when dry.

The B horizon ranges from gray (5Y 5/1) to dark gray (N 4/0).

Weikert series

The Weikert series is made up of loamy-skeletal, mixed, mesic Lithic Dystrochrepts. These soils are shallow and well drained. They formed in pre-Wisconsin glacial till and frost-churned material derived from shale, siltstone, and sandstone. The A horizon is very dark grayish brown channery silt loam. The B horizon is yellowish brown very shaly silt loam, and the thick C horizon is fractured shale. Weikert soils are on the tops and sides of dissected ridges. Slopes range from 3 to 70 percent.

Weikert soils are associated on the landscape with Hartleton, Allenwood, Watson, Alvira, and Shelmadine soils. Hartleton and Allenwood soils are deep and well drained, Watson soils are moderately well drained, Alvira soils are somewhat poorly drained, and Shelmadine soils are poorly drained. Weikert soils are in positions on the landscape similar to the positions of Klinesville soils but are yellower than those soils.

Typical pedon of Weikert channery silt loam, 3 to 8 percent slopes, eroded, about 1-1/2 miles south of Gilbert on Route 45003 near the top of the ridge, 60 feet from edge of woods, on east side of road:

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) channery silt loam; weak very fine granular structure; very friable, slightly sticky and nonplastic; 40 percent coarse fragments; neutral; clear wavy boundary.

B21—6 to 10 inches; yellowish brown (10YR 5/6) very shaly silt loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; 50 percent coarse fragments; strongly acid; gradual wavy boundary.

B22—10 to 16 inches; yellowish brown (10YR 5/6) very shaly silt loam; weak fine subangular blocky structure; friable, nonsticky and nonplastic; 60 percent coarse fragments; strongly acid; clear wavy boundary.

C1—16 to 19 inches; yellowish brown (10YR 5/6) silt on and between dark gray (10YR 4/1) shale fragments; massive; friable, nonsticky and plastic; 80 percent coarse fragments; very strongly acid; clear wavy boundary.

C2—19 to 40 inches; dark gray (10YR 4/1) fractured shale with silt coatings; massive; loose; 98 percent coarse fragments; very strongly acid; abrupt wavy boundary.

R—40 inches; dark gray fractured shale bedrock.

The solum ranges from 8 to 20 inches in thickness. Depth to bedrock ranges from 40 to 60 inches. Coarse fragments make up 20 to 50 percent of the A horizon, 30 to 65 percent of the B horizon and 60 to 95 percent of the C horizon. Where the soil has not been limed, reaction ranges from medium acid to very strongly acid.

The A horizon ranges from dark grayish brown (10YR 4/2) to brown (10YR 5/3). The fine earth fraction is silt loam and loam.

The B and C horizons are dark brown (10YR 4/3) to reddish yellow (7.5YR 6/6). The fine earth fraction is silt loam and loam in the B horizon.

These soils have a high proportion of coarse fragments and they are deeper to bedrock than is defined in the range for the series, but these differences do not alter their usefulness or behavior.

Wellsboro series

The Wellsboro series is made up of coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are deep and moderately well drained. They formed in glacial till derived from sandstone, siltstone, and shale. The A horizon is dark brown channery loam. The B horizon is brown and reddish brown gravelly loam, and the Bx horizon is reddish brown and weak red, very firm and brittle channery loam. Wellsboro soils are on tops and sides of ridges. Slopes range from 0 to 25 percent.

Wellsboro soils are associated on the landscape with Oquaga, Lackawanna, Morris, and Norwich soils. Oquaga soils are moderately deep and well drained, Lackawanna soils are deep and well drained, and Morris soils are somewhat poorly drained, and Norwich soils are poorly drained to very poorly drained.

Typical pedon of Wellsboro channery loam, 3 to 8 percent slopes, in an idle hayfield in Tobyhanna Township, 0.5 mile east of Blakeslee Corners on PA Route 940, 250 feet east of corner of woods, 15 feet south of edge of woods:

Ap—0 to 10 inches; dark brown (7.5YR 4/2) channery loam; moderate fine granular structure; friable, slightly sticky; 15 percent coarse fragments; neutral; abrupt wavy boundary.

B1—10 to 19 inches; brown (7.5YR 5/4) gravelly loam; moderate fine subangular blocky structure; friable, slightly sticky and plastic; 20 percent coarse fragments; neutral; abrupt wavy boundary.

B2—19 to 23 inches; reddish brown (5YR 4/4) gravelly loam; many medium distinct pinkish gray (5YR 6/2) and strong brown (7.5YR 5/8) mottles; moderate medium blocky structure; friable, slightly sticky and slightly plastic; 20 percent coarse fragments; slightly acid; abrupt wavy boundary.

Bx1—23 to 37 inches; reddish brown (2.5YR 4/4) channery loam; common medium distinct strong brown (7.5YR 5/8) and weak red (2.5YR 5/2) mottles; weak very coarse prismatic structure parting to moderate

medium and coarse subangular blocky; very firm and brittle, nonsticky and slightly plastic; few thin clay films lining pores; 20 to 25 percent fragments; medium acid; gradual smooth boundary.

Bx2—37 to 60 inches; weak red (10YR 4/3) channery loam; common medium distinct weak red (2.5YR 5/2) and yellowish red (5YR 5/8) mottles; weak very coarse prismatic structure parting to moderate medium and coarse subangular blocky; very firm and brittle, nonsticky and slightly plastic; common thin clay films on ped faces and lining pores; 25 to 30 percent coarse fragments; medium acid.

The solum ranges from 40 to 70 inches in thickness. Depth to bedrock ranges from 4 to more than 20 feet. Depth to the fragipan ranges from 18 to 24 inches. Coarse fragments make up 10 to 35 percent of the A and B horizons and 15 to 50 percent of the Bx and C horizons. Where the soil has not been limed, reaction is very strongly acid to medium acid.

The A horizon ranges from dark reddish brown (5YR 3/2) to brown (10YR 4/3). The fine earth fraction is loam or silt loam.

The B horizon is reddish brown (2.5YR 4/4) to yellowish brown (10YR 5/6). In places chroma is 2 below a depth of 20 inches. The fine earth fraction is loam or silt loam.

The Bx horizon ranges from dusky red (10R 3/2) to reddish brown (5YR 5/4). The fine earth fraction ranges from sandy loam to silt loam.

Worth series

The Worth series is made up of coarse-loamy, mixed, frigid Typic Fragiorthods. These soils are deep and well drained. They formed in glacial till derived from sandstone and conglomerate with some siltstone. The A and B horizons are gravelly fine sandy loam. The A'2 horizon below is gravelly loamy fine sand, and the Bx horizon is firm and brittle gravelly very fine sandy loam. Worth soils are on broad plateaus generally above elevations of 1,700 feet. Slopes range from 0 to 25 percent.

Worth soils are associated on the landscape with Empeyville soils. Empeyville soils are deep and moderately well drained to somewhat poorly drained.

Typical pedon of Worth gravelly fine sandy loam in an area of Worth extremely stony sandy loam, 0 to 8 percent slopes, about 1 mile northwest of Mount Pocono on PA Route 611, west of Route 611 on road to Tegawitha Girls Camp, 650 feet southwest of the Y intersection in road at entrance, at borrow pit on south side:

O1—1-1/2 inches to 1 inch; mainly mixed hardwood leaf litter.

O2—1 inch to 0; black (N 2/0) partially decomposed hardwood leaf litter; very strongly acid; abrupt wavy boundary.

A1—0 to 4 inches; pinkish gray (7.5YR 6/2) gravelly fine sandy loam; weak fine and very fine granular structure; very friable, nonsticky and nonplastic; 15 percent coarse fragments; very strongly acid; gradual irregular boundary.

B21hir—4 to 7 inches; dark reddish brown (5YR 3/4) gravelly fine sandy loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; 15 percent coarse fragments; strongly acid; diffuse wavy boundary.

B22ir—7 to 18 inches; brown (7.5YR 5/4) gravelly fine sandy loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; 20 percent coarse fragments; strongly acid; diffuse wavy boundary.

B23—18 to 23 inches; yellowish brown (10YR 5/6) gravelly fine sandy loam; weak medium and fine granular structure; friable, nonsticky and nonplastic; 35 percent coarse fragments; strongly acid; diffuse broken boundary.

A'2—23 to 30 inches; brown (10YR 5/3) gravelly loamy fine sandy; weak fine subangular blocky structure; friable; nonsticky and nonplastic; 20 percent coarse fragments; strongly acid; diffuse irregular boundary.

Bx—30 to 60 inches; dark brown (10YR 4/3) gravelly very fine sandy loam; prism faces are pale brown (10YR 6/3) and brown (7.5YR 5/4); weak very coarse prismatic structure parting to moderate medium and fine subangular blocky; firm and brittle, nonsticky and nonplastic; 25 percent coarse fragments; strongly acid.

The solum ranges from 40 to 60 inches in thickness. Depth to bedrock ranges from 5 to more than 10 feet. Depth to the fragipan ranges from 18 to 36 inches. Coarse fragments make up 15 to 35 percent of the soil above the Bx horizon and 25 to 50 percent of the Bx horizon. Reaction ranges from strongly acid to very strongly acid.

The A1 horizon generally is black (10YR 2/1) to very dark grayish brown (10YR 3/2), and the A2 horizon is pinkish gray.

The upper part of the B horizon is yellowish red (5YR 5/6) to dark yellowish brown (10YR 3/4), and the lower part is reddish brown (5YR 5/4) to yellowish brown (10YR 5/6). The fine earth fraction of the B horizon is loam to loamy sand. The Bx horizon is reddish brown (5YR 4/3) to grayish brown (2.5Y 5/2). The fine earth fraction is loam to loamy sand.

In these soils the fragipan is a few inches deeper, reaction is slightly lower, and some horizons are sandier than is defined in the range for the series, but these differences do not alter the usefulness or behavior of the soils.

Wurtsboro series

The Wurtsboro series is made up of coarse-loamy, mixed, mesic Typic Fragiochrepts. These soils are deep and moderately well drained. They formed in glacial till derived from sandstone with some siltstone and shale.

The B horizon is brown, strong brown, and yellowish brown channery loam to gravelly sandy loam, and the Bx horizon is brown, firm to very firm and brittle gravelly fine sandy loam and gravelly sandy loam. Wurtsboro soils are on broad plateaus, mountains, and ridges. Slopes range from 0 to 25 percent.

Wurtsboro soils are associated on the landscape with Lordstown, Swartswood, Volusia, and Chippewa soils. Lordstown soils are moderately deep and well drained, Swartswood soils are deep and well drained, Volusia soils are somewhat poorly drained, and Chippewa soils are poorly drained.

Typical pedon of Wurtsboro channery loam in an area of Wurtsboro extremely stony loam, 0 to 8 percent slopes, in a borrow pit in Coolbaugh Township about 3.7 miles northwest of Tobyhanna on PA Route 611, 600 feet north of route 611 on trail road, 300 feet south of Township Route 627, southeast side of pit:

O1—2 inches to 1 inch; mixed hardwood and softwood leaf litter; abrupt smooth boundary.

O2—1 inch to 0; black (10YR 2/1) partially decomposed leaf litter; very strongly acid; abrupt irregular boundary.

A2—0 to 4 inches; light brownish gray (10YR 6/2) channery loam; weak fine granular structure; friable, nonsticky and nonplastic; 15 percent coarse fragments; very strongly acid; abrupt irregular boundary.

B21hir—4 to 6 inches; brown (7.5YR 4/4) channery loam; weak very fine granular structure; friable, nonsticky and nonplastic; 15 percent coarse fragments; very strongly acid; abrupt irregular boundary.

B22ir—6 to 9 inches; strong brown (7.5YR 5/6) channery loam; weak very fine granular structure; friable, nonsticky and nonplastic; 15 to 20 percent coarse fragments; very strongly acid; clear wavy boundary.

B23—9 to 17 inches; yellowish brown (10YR 5/6) gravelly fine sandy loam; weak fine granular structure; friable, nonsticky and nonplastic; 15 to 20 percent coarse fragments; very strongly acid; clear wavy boundary.

B24—17 to 20 inches; yellowish brown (10YR 5/6) gravelly fine sandy loam; weak fine granular structure; friable, nonsticky and nonplastic; 20 percent coarse fragments; very strongly acid; clear wavy boundary.

B25—20 to 27 inches; yellowish brown (10YR 5/4) gravelly sandy loam; common medium faint to distinct light brownish gray (10YR 6/2) and brown (7.5YR 5/4) mottles; weak thin and medium platy structure; friable, nonsticky and slightly plastic; 25 percent coarse fragments; very strongly acid; clear wavy boundary.

Bx1—27 to 34 inches; brown (7.5YR 5/4) gravelly fine sandy loam; many coarse distinct pinkish gray (7.5YR 7/2), reddish yellow (7.5YR 7/8), and light brownish gray (10YR 6/2) mottles; weak very thick platy structure parting to moderate medium subangular blocky; firm and brittle, nonsticky and nonplastic; few thin clay films lining pores; few black stains on peds; 20 to 25 percent coarse fragments; very strongly acid; gradual irregular boundary.

Bx2—34 to 42 inches; brown (7.5YR 5/4) gravelly fine sandy loam; many coarse prominent light gray (10YR 7/2) and reddish yellow (7.5YR 6/8) mottles; moderate very coarse prismatic structure; very firm and brittle, slightly sticky and nonplastic; few thin patchy clay films lining pores; common black stains on peds; 25 percent coarse fragments; very strongly acid; gradual wavy boundary.

Bx3—42 to 60 inches; yellowish brown (10YR 5/4) gravelly sandy loam; common medium distinct pinkish gray (7.5YR 6/2) and reddish yellow (7.5YR 6/6) mottles; moderate very coarse prismatic structure parting to moderate medium and coarse subangular blocky; very firm and brittle, slightly sticky and nonplastic; few thin clay films lining pores; common black stains on peds; 15 to 20 percent coarse fragments; very strongly acid.

The solum ranges from 48 to 70 inches in thickness. Depth to bedrock is 4 to more than 10 feet. Depth to the fragipan is 18 to 28 inches. Coarse fragments make up 10 to 40 percent of individual horizons above the Bx horizon and 15 to 55 percent of the Bx and C horizons. Where the soil has not been limed, reaction ranges from extremely acid to strongly acid.

The A horizon, including the A2 horizon, is very dark grayish brown (10YR 3/2) to pale brown (10YR 6/3). The fine earth fraction is loam to sandy loam.

The B horizon is dark brown (7.5YR 4/2) to light olive brown (2.5Y 5/6). The fine earth fraction ranges from loamy to sandy loam.

Wyoming series

The Wyoming series is made up of loamy-skeletal, mixed, mesic Typic Dystrochrepts. These soils are deep and somewhat excessively drained. They formed in glacial outwash derived from sandstone and siltstone with some shale. The A and B horizons are gravelly fine sandy loam to very gravelly coarse sandy loam, and the C horizon is sand and gravel. Wyoming soils are on terraces, kames, eskers, and valley trains adjacent to streams. Slopes range from 0 to 70 percent.

Wyoming soils are near Braceville, Chenango, and Rexford soils. Braceville soils are moderately well drained, and Rexford soils are somewhat poorly drained. Wyoming soils are better drained and lack the fragipan that Braceville and Rexford soils have. They have more sand in the upper part of the solum than Chenango soils.

Typical pedon of Wyoming gravelly sandy loam, 8 to 15 percent slopes, about 1.2 miles northeast of Marshalls Creek on U. S. Route 209, 80 feet north of road, 54 feet east of power pole PE228:

A1—0 to 1 inch; very dark grayish brown (10YR 3/2) gravelly fine sandy loam; weak very fine granular

structure; friable, nonsticky and nonplastic; 35 percent coarse fragments; strongly acid; clear wavy boundary.

A2—1 inch to 4 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; weak very fine granular structure; friable, slightly sticky and slightly plastic; 30 percent coarse fragments; strongly acid; clear wavy boundary.

B21—4 to 8 inches; brown (7.5YR 5/4) gravelly sandy loam; weak very fine granular structure; friable, slightly sticky and slightly plastic; 50 percent coarse fragments; strongly acid; gradual wavy boundary.

B22—8 to 18 inches; brown (7.5YR 5/4) very gravelly sandy loam; weak fine granular structure; friable, nonsticky and nonplastic; 60 percent coarse fragments; strongly acid; gradual irregular boundary.

B3—18 to 26 inches; brown (7.5YR 5/4) very gravelly coarse sandy loam; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; 60 percent coarse fragments; strongly acid.

C—26 to 60 inches; brown (10YR 4/3) stratified very gravelly loamy sand and sand; single grain; loose, nonsticky and nonplastic; 75 percent coarse fragments; strongly acid.

The solum ranges from 18 to 35 inches in thickness. Coarse fragments, mainly gravel, make up 15 to 50 percent of the A horizon, 20 to 60 percent of the B horizon, and 35 to 75 percent of the C horizon. The solum is medium acid to very strongly acid.

The A horizon is very dark grayish brown (10YR 3/2) to brown (7.5YR 5/4). The fine earth fraction is loam or sandy loam.

The B horizon ranges from brown (10YR 4/3) to reddish brown (2.5YR 5/4). The fine earth fraction is sandy loam.

The C horizon has variegated colors similar to the colors of the B horizon. The C horizon is sand and gravel.

Formation of the soils

Soils are formed by weathering and by other processes that act on the parent material. The properties of the soil at any point on the earth depend on the combination of several factors at that point: the physical and chemical composition of the parent material, climate, plant and animal life, relief, and time. These factors are so closely interrelated that few generalizations can be made about the effects of any one. The relative influence of each factor differs from place to place, and each modifies the effect of the others. For example, the effects of climate and of plant and animal life are influenced by relief and by the nature of the parent material. In some places the influence of one factor is dominant.

In the following pages, the five major factors of soil formation are discussed in relation to their effects on the soils in Monroe County.

Parent material

Parent material is the unconsolidated mass in which a soil forms. In the early stage of soil formation, properties inherited from parent material are most evident. Later these properties are modified, and the soil acquires its own characteristics. The kind of parent material, however, affects the texture and mineral composition of the soil.

In Monroe County, soils formed in glacial till, a mixture of glacial till and residuum, a mixture of glacial till and colluvium, glacial outwash, recent stream alluvium, old stream alluvium and outwash, and organic material. Most of the soil material was deposited or influenced by the glaciers, which melted 10,000 to 60,000 years ago. Alluvial and organic material of recent origin are still being deposited.

Soils that formed in glacial till are the most extensive. They have a wide range of characteristics; the most distinguishing is a compact subsoil. Lackawanna, Wellsboro, Morris, Bath, and Volusia soils formed in glacial till. Weikert, Dekalb, Hartleton, and Leck Kill soils formed in a mixture of glacial till and residuum. Laidig, Clymer, and Buchanan soils formed in a mixture of glacial till and colluvium. Soils that formed in glacial outwash material on terraces are generally underlain by stratified sand and gravel. Examples are Wyoming, Chenango, and Braceville soils. An exception is Rushtown soils, which are influenced by colluvium and are underlain by fine shale chips.

Soils on flood plains and low terraces formed in waterlaid material called recent alluvium. These soils have little profile development. Examples are Pope, Philo, Holly, and Wayland soils. Lawrenceville and Sheffield soils formed in old stream alluvium and outwash. Mucky peat formed in organic material.

Climate

The climate of Monroe County is a humid continental type. It affects the formation of soils by influencing the rate at which rock weathers and minerals and organic matter decompose. Temperature and its changes affect the differential expansion and contraction characteristics of minerals in the rock and the rate of organic decomposition. The amount of precipitation affects the solubility of minerals in rocks.

Additional information on climate is given in the section "General Nature of the County."

Plant and animal life

Hardwood trees apparently have had more effect on the formation of soils in Monroe County than have other kinds of plants. Forests of hardwoods, mainly oak-hickory, originally covered most of the county. Forests of sugar maple, beech, and yellow birch occupied less extensive areas. Hemlock and pine also grew in small areas at higher elevation; the sites where they grew were cooler and wetter than most sites at lower elevations.

The soils in this county are typical of those that form under forest. Where the soils have not been disturbed, a layer of leaf litter covers the surface and is underlain by black organic material 1 to 3 inches thick. The organic material is commonly underlain by a dark colored surface layer 1 to 2 inches thick; beneath which is a light colored subsurface several inches thick, similar to the one in the profile described as typical of the Hazleton series.

When the forests were cleared and the soils were farmed, the layers of organic matter were incorporated into the plow layer or were burned. Thus, in many places, the soils were left open to wind and rain that produce accelerated erosion.

Since the soils were first cleared, man has had a major effect on them through such practices as cultivation, liming, artificial drainage, manuring, and maintenance of perennial grasses and legumes. This effect will continue. The neutral reaction of the upper 8 inches of the profile described as typical of the Pope series is an example of man's influence.

Relief

Relief influences soil formation through its influence on drainage, erosion, plant cover, and soil temperature. Relief varies widely and accounts for many differences in the soils in Monroe County.

Some nearly level soils on flood plains and streams terraces, such as Alden soils, had an excess of water during formation; the gray subsoil characteristic of these soils is the result of a lack of oxidation. Gently sloping and sloping soils commonly show more clearly the influence of all soil-forming factors. A fragipan often forms, as in Bath soils. Excess water runs off without excessive erosion, and a normal soil profile develops as in Allenwood, Leck Kill, and Hartleton soils. Some steep soils are shallow and show slight development because geologic erosion removes the soil almost as fast as the parent material forms and the profile develops; Weikert soils are an example of this. Some sloping and moderately steep soils are deep because parent material slowly moved down and accumulated at the lower part of the slope and because weathering of the underlying rock proceeded faster than geologic erosion; Laidig and Buchanan soils are examples.

Soil temperature and plant cover on north-facing slopes differ slightly from soil temperature and plant cover on south-facing slopes, but not enough to significantly affect soil formation.

Time

The amount of time required for a soil to form depends on the other soil-forming factors. Less time is required for a soil to form in a warm, moist climate than in a cool, dry climate. Some kinds of parent material are more resistant to the soil forming processes than other kinds. For example, quartz sand changes very little even if it is exposed for centuries.

The relative degree of profile development, rather than the number of years a soil has been forming, determines the age of the soil. When soils begin to form in loose material, they have characteristics almost identical to those of the parent material. Such soils are said to be immature, or youthful. Among the immature soils in Monroe County are Pope soils. These soils are on flood plains where alluvium still accumulates. They have indistinct horizons and little other evidence of soil formation. Steep soils, such as those of the Weikert series, do not have a well defined profile, because erosion removes soil almost as fast as it forms.

A soil is generally said to be mature when it has acquired well developed profile characteristics. Allenwood and Meckesville soils, for example, are mature. These soils are deep to bedrock and have distinct horizons, and the soil aggregates in them have a definite arrangement in relation to each other.

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Glossary

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

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

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

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

	Inches
Very low	less than 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	More than 5.2

Basal till. Compact glacial till deposited beneath the ice.

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

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

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

Channery soil. A soil, that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

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

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

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil. A map unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Compressible. Excessive decrease in volume of soft soil under load.

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

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

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

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

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

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

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

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

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

Cemented.—Hard; little affected by moistening.

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

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is 40 or 80 inches (1 or 2 meters).

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

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

Cutbanks cave. Unstable walls of cuts made by earth-moving equipment. The soil sloughs easily.

Deferred grazing. A delay in grazing until range plants have reached a specified stage of growth. Grazing is deferred in order to increase the vigor of forage and to allow desirable plants to produce seed. Contrasts with continuous grazing and rotation grazing.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

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

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

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

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

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

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

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

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

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

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.

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

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

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

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake. The rapid movement of water into the soil.

Favorable. Favorable soil features for the specified use.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

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.*

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May*, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

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

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

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

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action. Freezing and thawing of soil moisture. Frost action can damage structures and plant roots.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the assorted and unassorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by melt water as it flows from glacial ice.

Glacial till (geology). Unassorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material from 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table, which is the upper limit of saturation.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

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

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming 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.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

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 A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hummocky. Refers to a landscape of hillocks, separated by low sags, having sharply rounded tops and steep sides. Hummocky relief resembles rolling or undulating relief, but the tops of ridges are narrower and the sides are shorter and less even.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

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

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.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

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

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. Inadequate strength for supporting loads.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is greater than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material mixed with mineral soil material. The content of organic matter is more than 20 percent.

Munsell notation. A designation of color by degrees of the three single variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by water that originated mainly from the melting of glacial ice. Glacial outwash is commonly in valleys on landforms known as valley trains, outwash terraces, eskers, kame terraces, kames, outwash fans, or deltas.

Outwash plain. A land form of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the bases of differences in slope, stoniness, thickness, or some other characteristic that affects management. These differences are too small to justify separate series.

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Moving water forms subsurface tunnels or pipelike cavities in the soil.

Pitting. Formation of pits as a result of the melting of ground ice after the removal of plant cover.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Poorly graded. Refers to soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets. Surface or subsurface drainage outlets difficult or expensive to install.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground 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.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

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.

Slow intake. The slow movement of water into the soil.

Slow refill. The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the mate-

rial in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining 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).

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. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface soil. 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."

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 or management.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, 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. Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to a soil or soil material consisting of particles well distributed over a wide range in size or diameter. Such a soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Illustrations

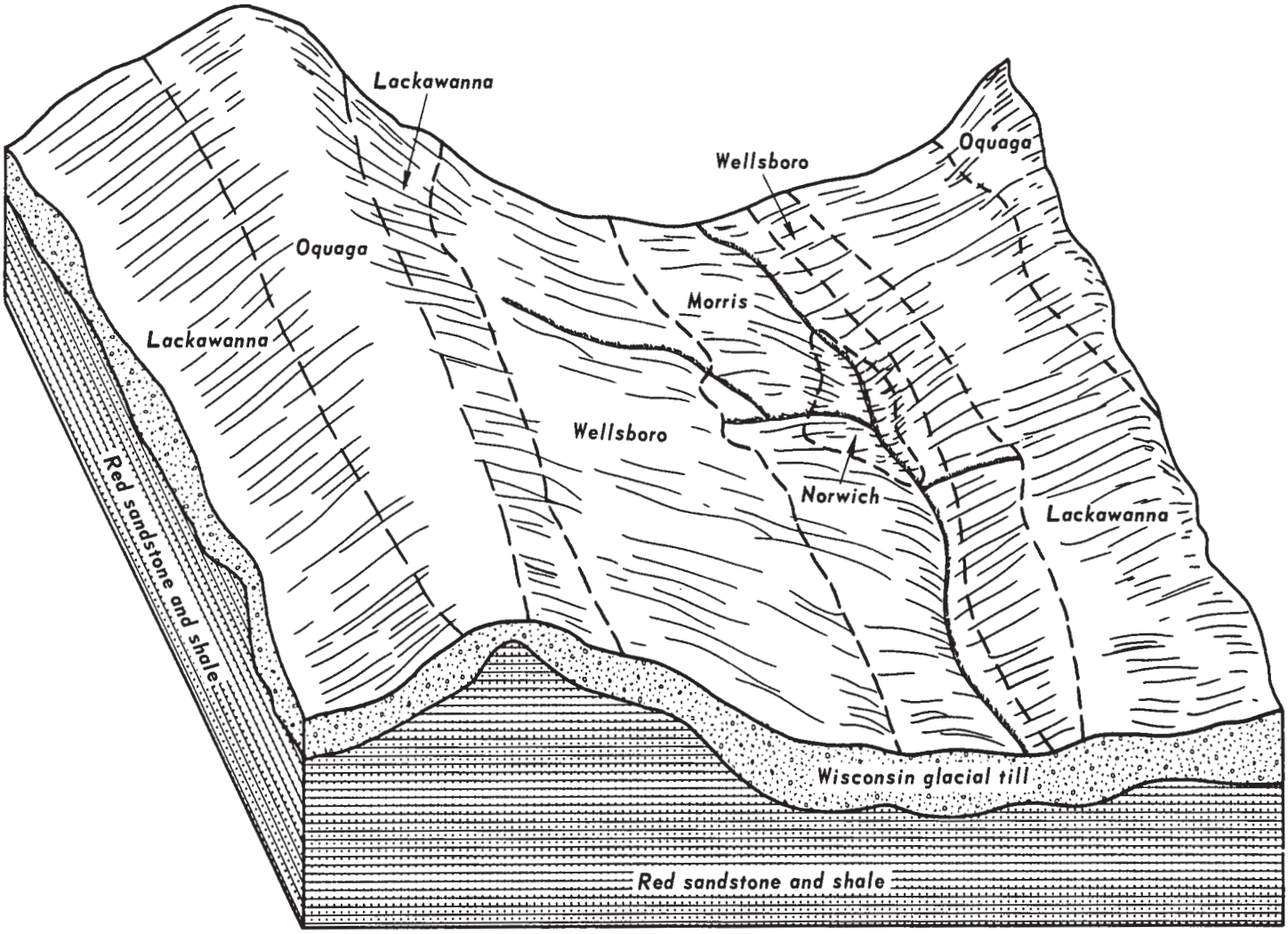

Figure 1.—Typical pattern of soils and underlying material in the Lackawanna-Wellsboro-Oquaga map unit.

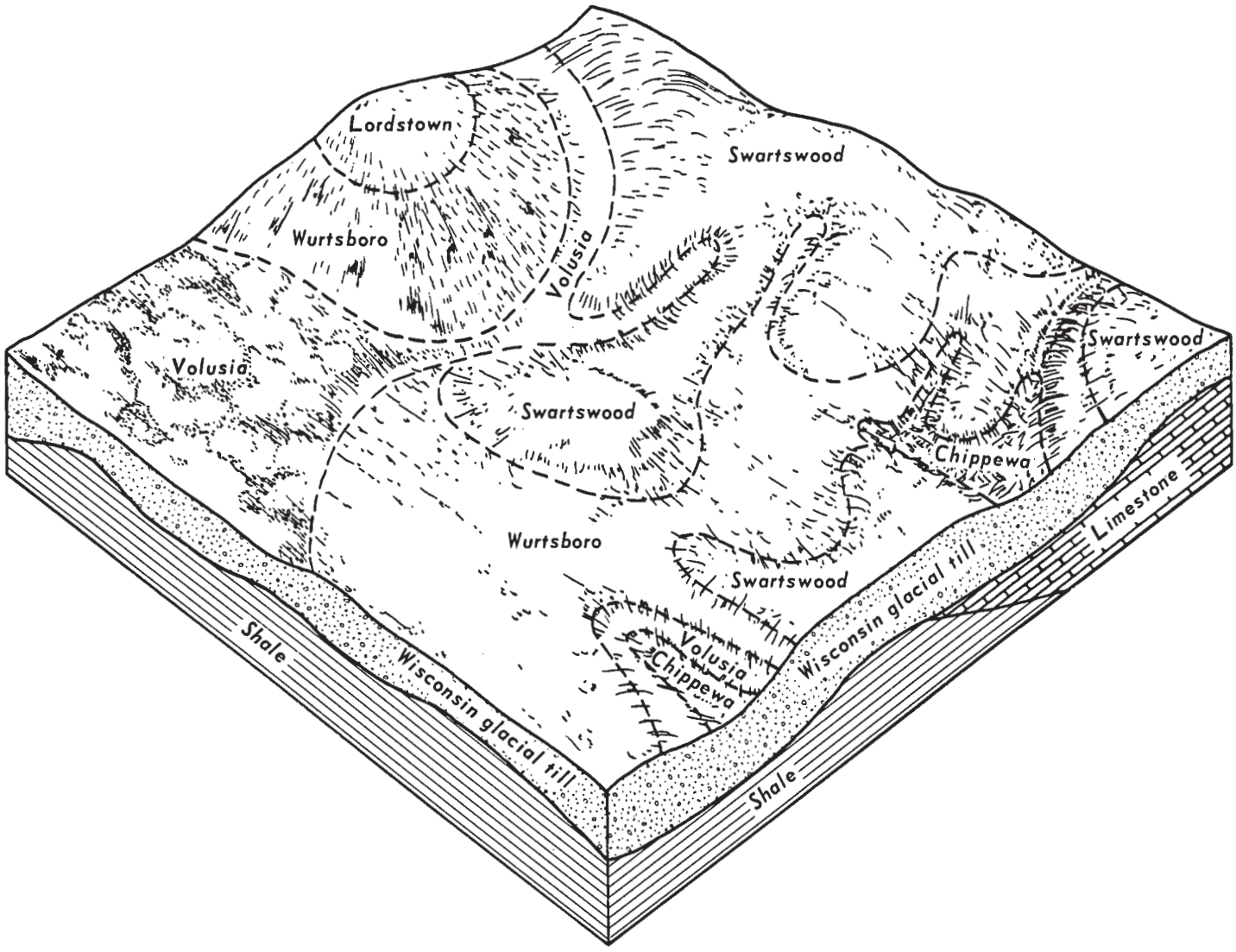

Figure 2.—Typical pattern of soils and underlying material in the Wurtsboro-Swartswood-Volusia map unit.

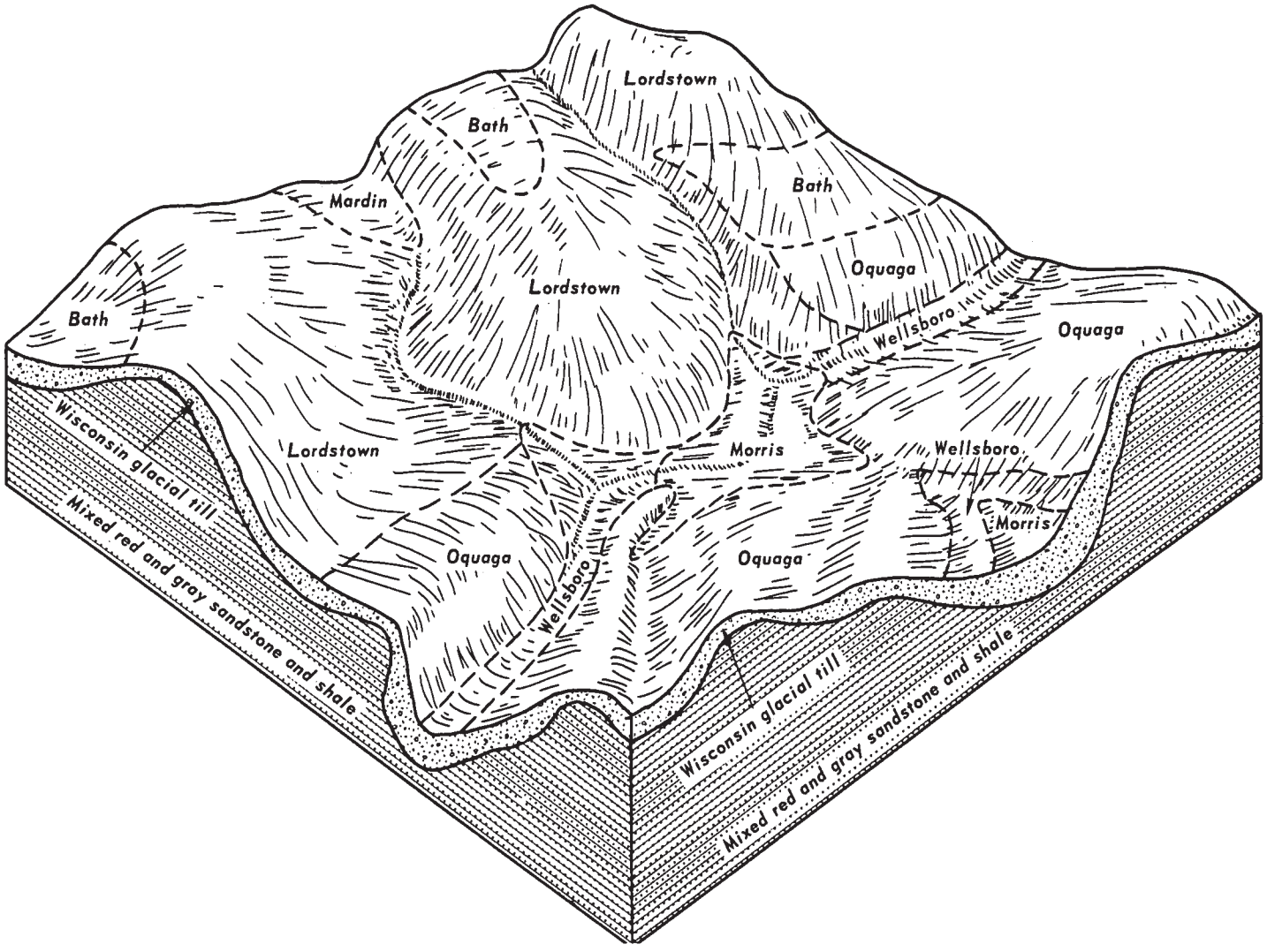

Figure 3.—Typical pattern of soils and underlying material in the Lordstown-Oquaga map unit.

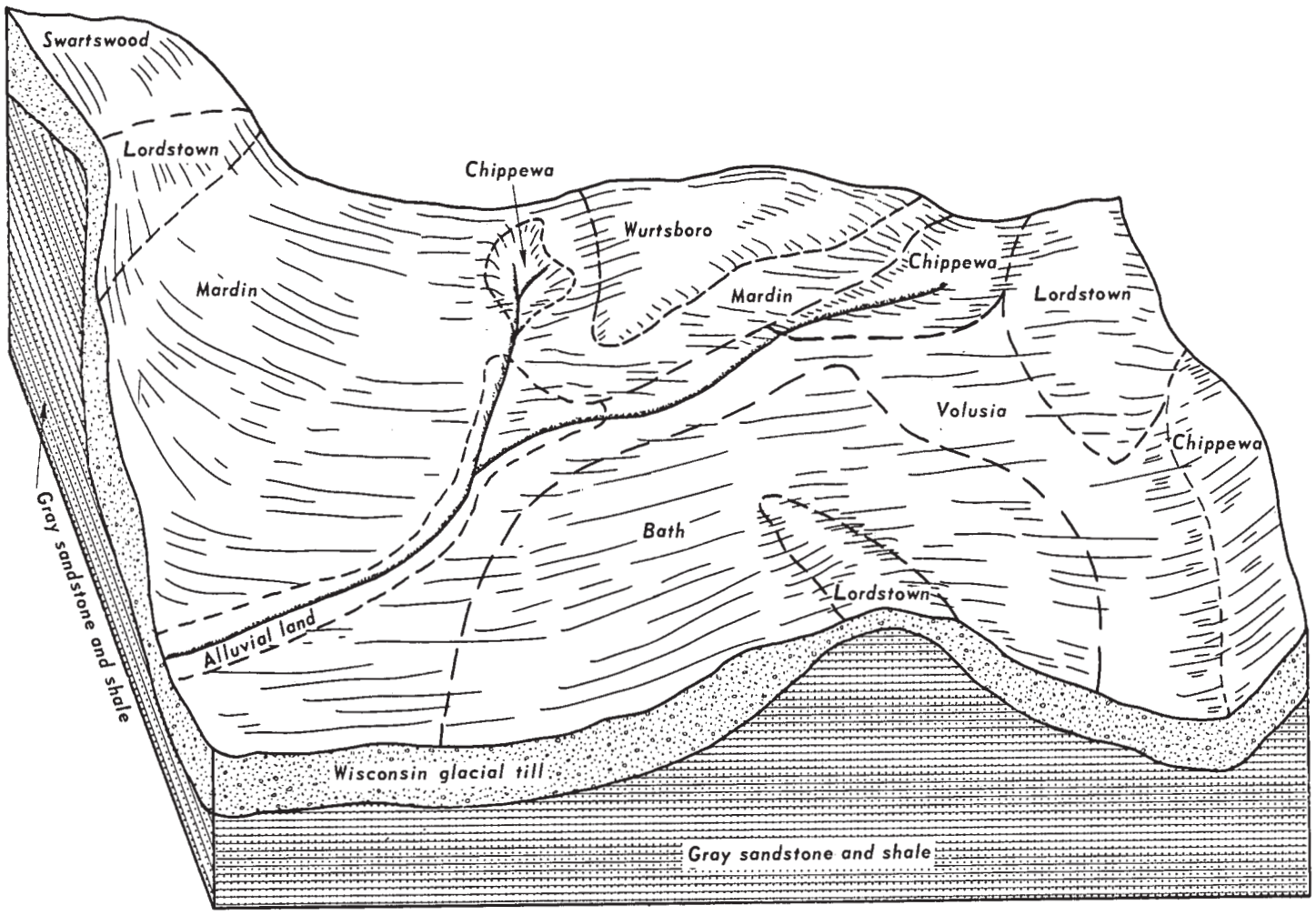

Figure 4.—Typical pattern of soils and underlying material in the Mardin-Bath-Volusia map unit.

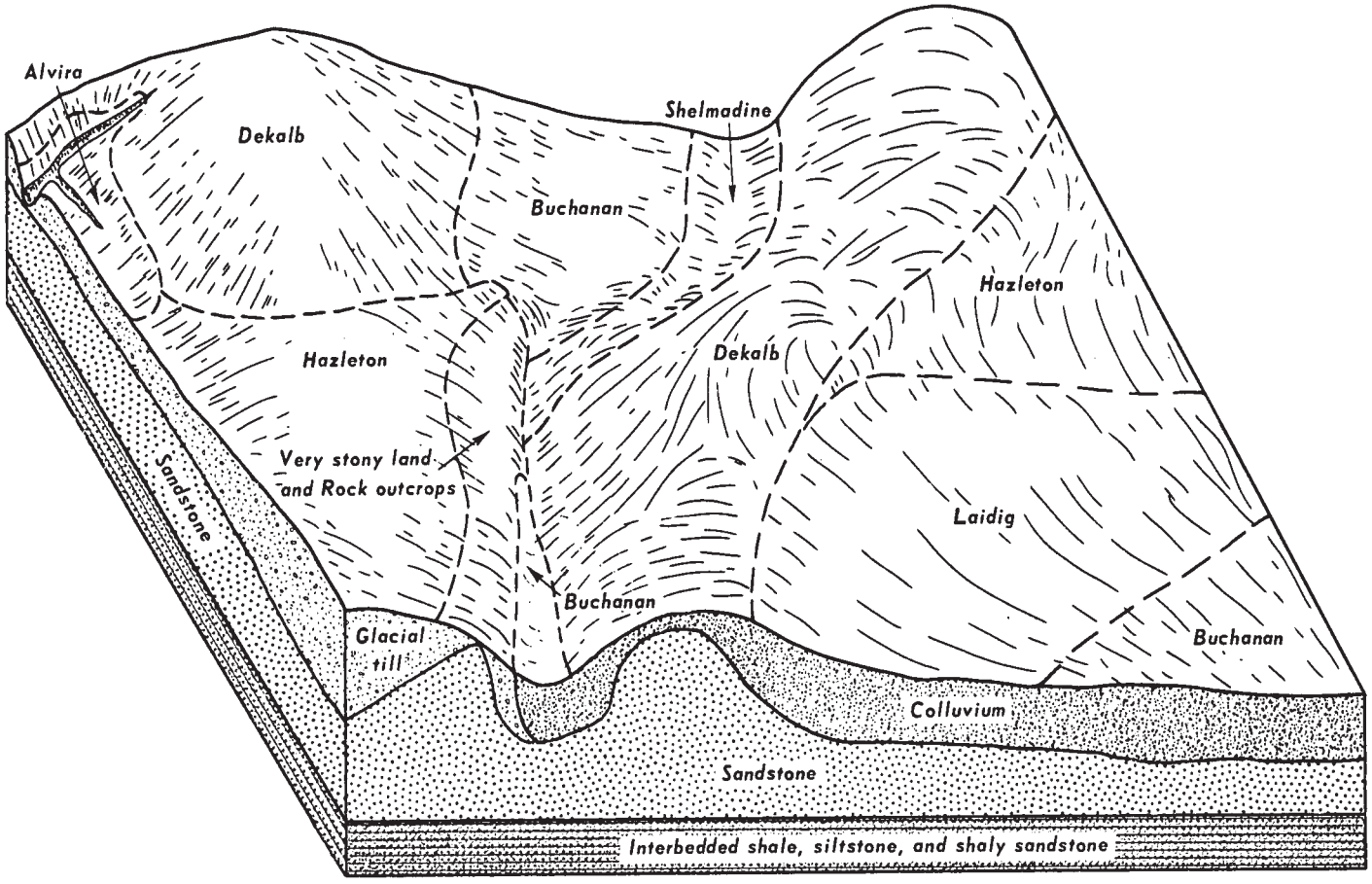

Figure 5.—Typical pattern of soils and underlying material in the Dekalb-Hazleton-Laidig map unit.

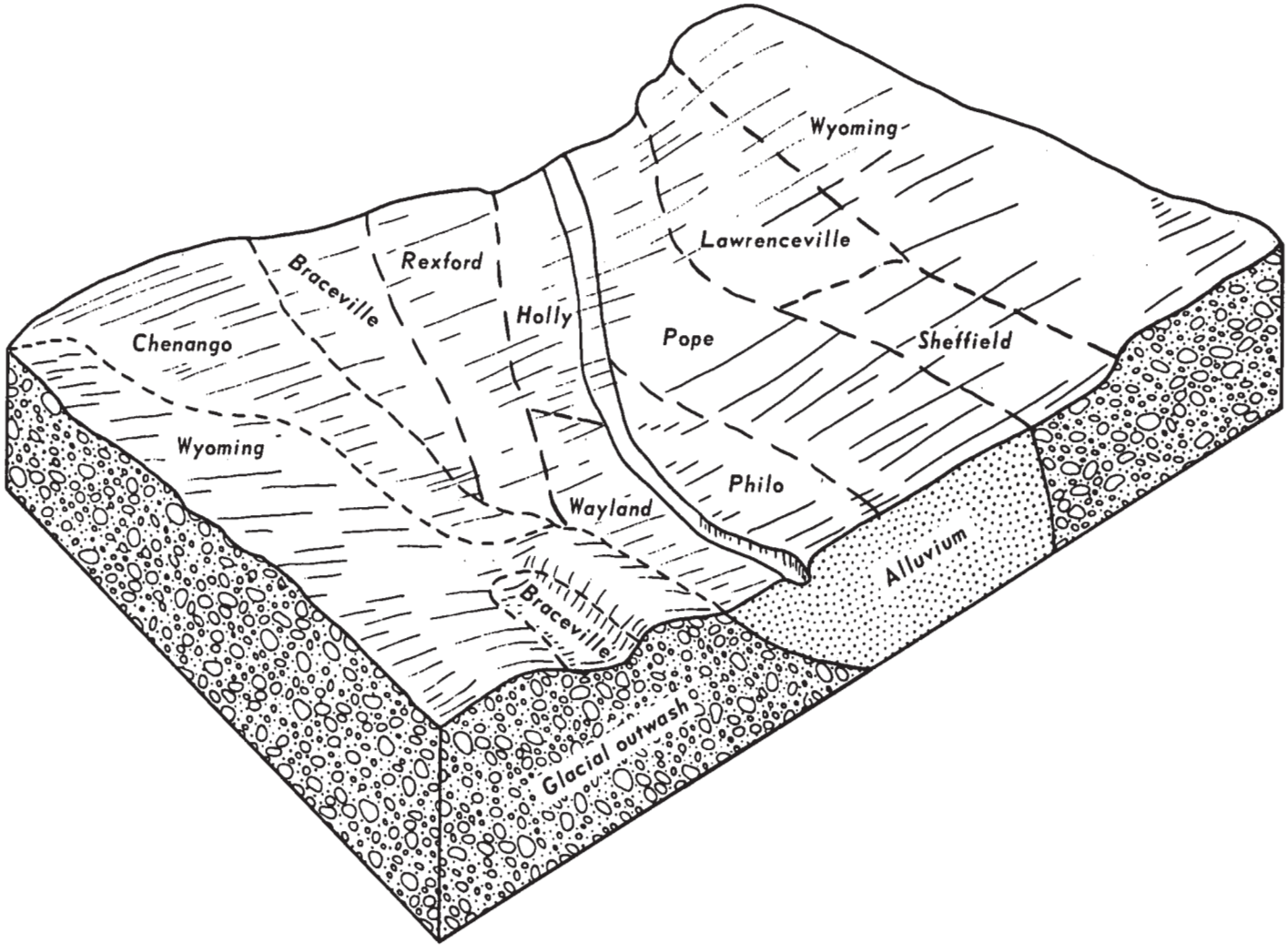

Figure 6.—Typical pattern of soils and underlying material in the Wyoming-Chenango-Pope map unit.

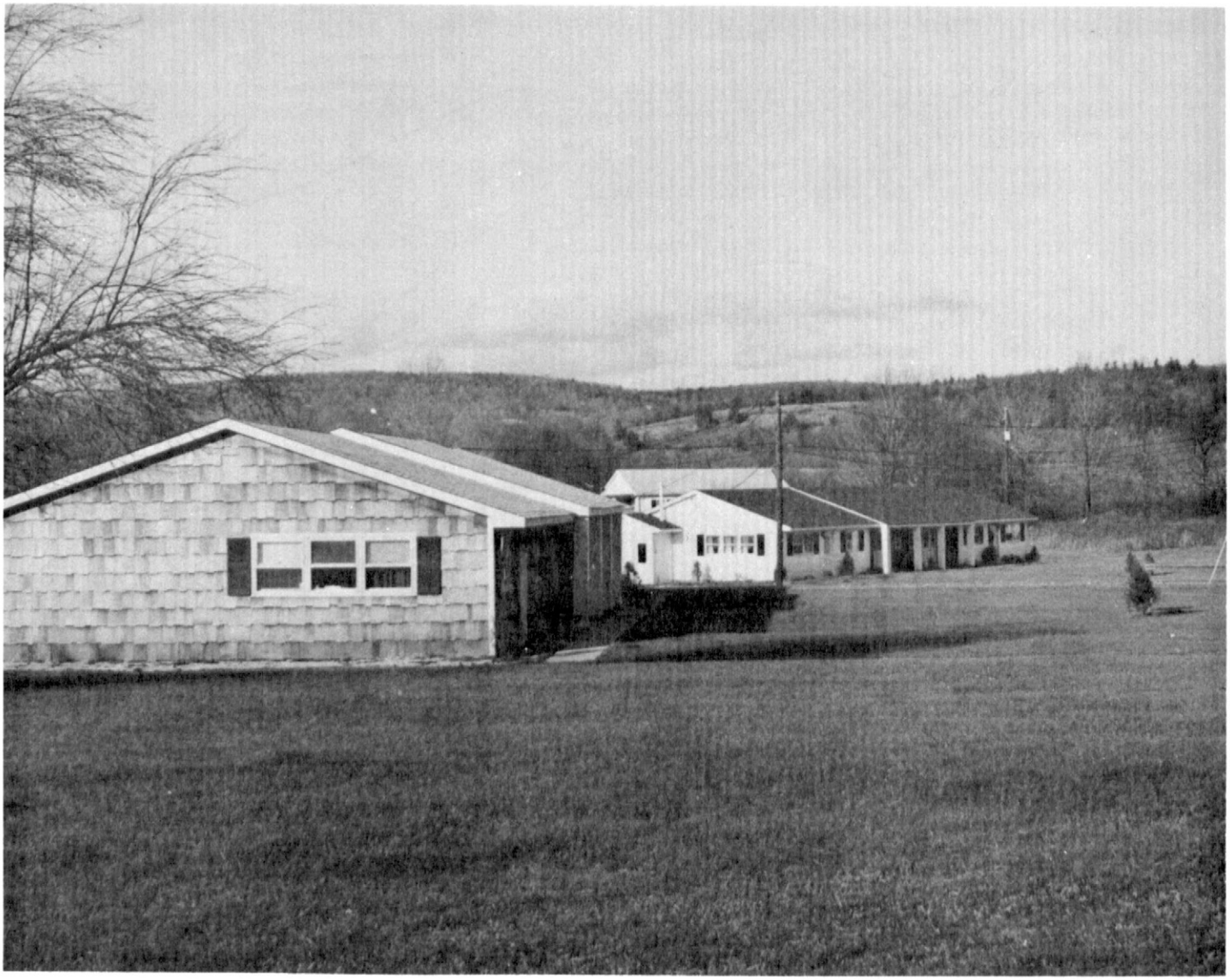

Figure 7.—Homesites on the Leck Kill-Klinesville map unit.

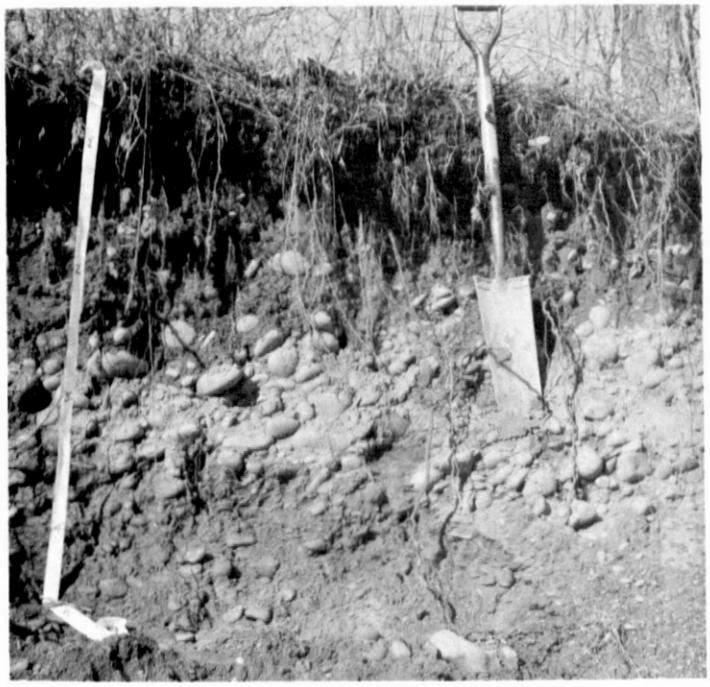

Figure 8.—Profile of Chenango gravelly loam, 0 to 3 percent slopes.

Figure 9.—Profile of Lordstown channery silt loam, 3 to 8 percent slopes, in an old road cut.

Figure 10.—Profile of Weikert channery silt loam, 15 to 25 percent slopes, eroded, in a borrow pit.

Tables

TABLE 1--TEMPERATURE AND PRECIPITATION

[Data are from Mt. Pocono and Tobyhanna, Pennsylvania, 1941-70]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with--		Average total	One year in 10 will have--		Days with snow cover	Average depth of snow on days with snow cover
			Maximum equal to or higher than--	Minimum equal to or lower than--		Less than--	More than--		
	°F	°F	°F	°F	In	In	In		In
January---	31.2	14.5	47.0	-3.0	3.22	1.29	5.29	18	7
February--	32.7	14.8	47.0	-2.0	2.97	2.00	4.09	18	8
March-----	41.5	22.7	60.0	6.0	3.92	2.60	5.16	14	8
April-----	56.0	33.7	74.0	21.0	4.20	2.37	6.11	2	2
May-------	66.7	43.3	80.0	30.0	4.38	1.54	6.74	0	0
June------	74.5	51.8	85.0	41.0	3.86	2.19	5.70	0	0
July------	78.6	56.2	87.0	45.0	5.12	1.88	11.70	0	0
August----	76.2	54.6	86.0	42.0	4.64	1.26	6.75	0	0
September-	69.5	47.7	79.0	34.0	3.79	2.06	5.79	0	0
October---	60.5	39.1	75.0	26.0	4.20	1.47	6.54	(1)	3
November--	46.1	29.3	61.0	15.0	4.89	3.03	6.63	3	3
December--	33.6	18.0	53.0	1.0	4.15	2.53	5.82	13	5
Year----	55.6	35.5	89.0	10.0	49.34	40.78	57.33	68	5

[1]Less than one-half.

TABLE 2--FREEZE DATES IN SPRING AND FALL

[Data are from Mt. Pocono and Tobyhanna, Pennsylvania, 1941-70]

Probability	Dates for given probability and temperature				
	16° F or lower	20° F or lower	24° F or lower	28° F or lower	32° F or lower
Spring:					
1 year in 10 later than--	April 9	April 17	April 28	May 13	May 28
2 years in 10 later than--	April 4	April 12	April 22	May 8	May 24
5 years in 10 later than--	March 25	April 3	April 12	April 28	May 15
Fall:					
1 year in 10 earlier than--	November 9	October 24	October 9	September 24	September 12
2 years in 10 earlier than--	November 13	October 30	October 16	September 29	September 17
5 years in 10 earlier than--	November 22	November 11	October 27	October 10	September 28

TABLE 3--POTENTIALS AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP FOR SPECIFIED USES

Map unit	Extent of area	Cultivated farm crops	Specialty crops	Woodland	Urban uses	Intensive recreation areas	Extensive recreation areas
	Pct						
1. Lackawanna-Wellsboro-Oquaga	18	Poor: large stones.	Poor: large stones.	Good------	Poor: large stones, percs slowly, wetness.	Poor: large stones.	Fair: large stones.
2. Wurtsboro-Swartswood-Volusia	11	Poor: large stones.	Poor: large stones.	Good-------	Poor: large stones, wetness, percs slowly.	Poor: large stones, wetness.	Fair: large stones, wetness.
3. Chippewa-Norwich-Mucky peat	6	Poor: large stones, wetness.	Poor: large stones, wetness.	Fair: wetness, organic material.	Poor: wetness, large stones, percs slowly.	Poor: wetness, large stones.	Poor: wetness.
4. Clymer-Buchanan	5	Fair: large stones.	Fair: large stones.	Good-------	Fair: large stones, wetness.	Fair: large stones.	Good.
5. Wellsboro-Morris-Lackawanna	4	Poor: large stones.	Poor: large stones.	Good-------	Poor: large stones, wetness, percs slowly.	Poor: large stones, wetness.	Fair: large stones, wetness.
6. Empeyville-Worth	4	Poor: large stones.	Poor: large stones.	Good-------	Poor: large stones, wetness, percs slowly.	Poor: large stones, wetness.	Fair: large stones, wetness.
7. Wyoming-Swartswood-Norwich	3	Poor: large stones.	Poor: large stones.	Good-------	Poor: large stones, percs slowly, wetness.	Poor: large stones.	Fair: large stones.
8. Lordstown-Oquaga	11	Poor: large stones, slope.	Poor: large stones, slope.	Fair: low available water.	Poor: large stones, depth to rock, slope.	Poor: large stones, depth to rock, slope.	Poor: large stones, slope.
9. Mardin-Bath-Volusia	5	Fair: large stones.	Fair: large stones.	Good-------	Fair: percs slowly, wetness.	Fair: large stones, wetness.	Fair: large stones, wetness.
10. Meckesville-Kedron	4	Good-------	Good-------	Good-------	Fair: percs slowly, wetness.	Good--------	Good.

TABLE 3--POTENTIALS AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP FOR SPECIFIED USES--Continued

Map unit	Extent of area	Cultivated farm crops	Specialty crops	Woodland	Urban uses	Intensive recreation areas	Extensive recreation areas
	Pct						
11. Leck Kill-Klinesville	2	Good	Good	Good	Good	Good	Good.
12. Dekalb-Hazleton-Laidig	6	Poor: large stones, slope.	Poor: large stones, slope.	Fair: low available water.	Poor: depth to rock, percs slowly, large stones, slope.	Poor: large stones, small stones, slope.	Fair: large stones, slope.
13. Weikert-Hartleton	6	Fair: low available water, small stones.	Fair: low available water, small stones.	Fair: low available water.	Fair: depth to rock, seepage.	Poor: depth to rock, small stones.	Good.
14. Benson-Rock outcrop	5	Poor: large stones, rock outcrops, slope.	Poor: large stones, rock outcrops, slope.	Poor: rock outcrops, low available water.	Poor: large stones, rock outcrops, depth to rock, slope.	Poor: depth to rock, large stones, rock outcrops, slope.	Poor: rock outcrops, slope.
15. Wyoming-Chenango-Pope	10	Fair: low available water, small stones.	Fair: low available water, small stones.	Fair: low available water.	Fair: seepage, flooding.	Fair: small stones, flooding.	Good.

TABLE 4--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
Ad	Alden mucky silt loam	799	0.2
AnA	Allenwood gravelly silt loam, 0 to 3 percent slopes	444	0.1
AnB	Allenwood gravelly silt loam, 3 to 8 percent slopes	670	0.2
AnC	Allenwood gravelly silt loam, 8 to 20 percent slopes	197	0.1
As	Alluvial land	2,771	0.7
AvB	Alvira gravelly silt loam, 3 to 8 percent slopes	348	0.1
AwB	Alvira and Watson very stony loams, 0 to 12 percent slopes	784	0.2
BaB	Bath channery silt loam, 3 to 8 percent slopes	817	0.2
BaC	Bath channery silt loam, 8 to 15 percent slopes	866	0.2
BaD	Bath channery silt loam, 15 to 25 percent slopes	279	0.1
BbB	Bath very stony silt loam, 0 to 8 percent slopes	518	0.1
BbC	Bath very stony silt loam, 8 to 25 percent slopes	402	0.1
BeB	Benson-Rock outcrop complex, 0 to 8 percent slopes	1,763	0.5
BeC	Benson-Rock outcrop complex, 8 to 25 percent slopes	5,761	1.5
BeF	Benson-Rock outcrop complex, 25 to 70 percent slopes	5,600	1.4
BrA	Braceville gravelly loam, 0 to 3 percent slopes	1,066	0.3
BrB	Braceville gravelly loam, 3 to 8 percent slopes	1,404	0.4
BuB	Buchanan loam, 3 to 8 percent slopes	822	0.2
BxB	Buchanan extremely stony loam, 0 to 8 percent slopes	3,242	0.8
BxC	Buchanan extremely stony loam, 8 to 25 percent slopes	407	0.1
ChA	Chenango gravelly loam, 0 to 3 percent slopes	1,273	0.3
ChB	Chenango gravelly loam, 3 to 8 percent slopes	1,539	0.4
ChC	Chenango gravelly loam, 8 to 15 percent slopes	775	0.2
CmA	Chippewa and Norwich silt loams, 0 to 5 percent slopes	850	0.2
CnB	Chippewa and Norwich extremely stony soils, 0 to 8 percent slopes	18,797	4.8
CpA	Clymer loam, 0 to 3 percent slopes	1,491	0.4
CpB	Clymer loam, 3 to 8 percent slopes	1,048	0.3
CpC	Clymer loam, 8 to 15 percent slopes	653	0.2
CxB	Clymer extremely stony loam, 0 to 8 percent slopes	8,372	2.1
CxC	Clymer extremely stony loam, 8 to 25 percent slopes	1,251	0.3
Cy	Cut and fill land	4,248	1.1
DxB	Dekalb extremely stony loam, 0 to 8 percent slopes	3,110	0.8
DxC	Dekalb extremely stony loam, 8 to 25 percent slopes	3,293	0.8
DxE	Dekalb extremely stony loam, 25 to 80 percent slopes	3,634	0.9
ExB	Empeyville extremely stony sandy loam, 0 to 8 percent slopes	5,668	1.4
HaB	Hartleton channery silt loam, 2 to 8 percent slopes	2,680	0.7
HaC	Hartleton channery silt loam, 8 to 20 percent slopes	1,232	0.3
HxB	Hazleton extremely stony sandy loam, 0 to 8 percent slopes	775	0.2
HxC	Hazleton extremely stony sandy loam, 8 to 25 percent slopes	2,366	0.6
Hy	Holly silt loam	3,220	0.8
KaB	Kedron silt loam, 2 to 8 percent slopes	1,203	0.3
KaC	Kedron silt loam, 8 to 15 percent slopes	192	(1)
KdB	Kedron very stony loam, 0 to 8 percent slopes	1,375	0.4
KvB	Klinesville channery silt loam, 3 to 8 percent slopes	688	0.2
KvC	Klinesville channery silt loam, 8 to 15 percent slopes	712	0.2
KvD	Klinesville channery silt loam, 15 to 25 percent slopes	488	0.1
LaB	Lackawanna channery loam, 2 to 8 percent slopes	2,921	0.7
LaC	Lackawanna channery loam, 8 to 15 percent slopes	1,527	0.4
LaD	Lackawanna channery loam, 15 to 25 percent slopes	698	0.2
LbB	Lackawanna extremely stony loam, 0 to 8 percent slopes	13,291	3.4
LbC	Lackawanna extremely stony loam, 8 to 25 percent slopes	8,252	2.1
LBE	Lackawanna and Bath extremely stony soils, steep	2,077	0.5
LgB	Laidig extremely stony loam, 0 to 8 percent slopes	1,891	0.5
LgC	Laidig extremely stony loam, 8 to 25 percent slopes	648	0.2
Lh	Lawrenceville silt loam	590	0.2
LkB	Leck Kill channery silt loam, 2 to 8 percent slopes	2,573	0.7
LkC	Leck Kill channery silt loam, 8 to 15 percent slopes	2,021	0.5
LkD	Leck Kill channery silt loam, 15 to 25 percent slopes	741	0.2
LsB	Lordstown channery silt loam, 3 to 8 percent slopes	1,318	0.3
LsC	Lordstown channery silt loam, 8 to 15 percent slopes	2,333	0.6
LsD	Lordstown channery silt loam, 15 to 25 percent slopes	1,569	0.4
LxB	Lordstown extremely stony silt loam, 0 to 8 percent slopes	3,559	0.9
LxC	Lordstown extremely stony silt loam, 8 to 25 percent slopes	10,009	2.6
LyE	Lordstown and Oquaga extremely stony soils, 25 to 70 percent slopes	15,396	3.9
MaB	Mardin channery silt loam, 2 to 8 percent slopes	1,838	0.5
MaC	Mardin channery silt loam, 8 to 15 percent slopes	818	0.2
MbB	Mardin very stony silt loam, 0 to 8 percent slopes	1,497	0.4
MbC	Mardin very stony silt loam, 8 to 25 percent slopes	484	0.1
MeA	Meckesville gravelly loam, 0 to 3 percent slopes	645	0.2

See footnote at end of table.

TABLE 4--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
MeB	Meckesville gravelly loam, 3 to 8 percent slopes	2,059	0.5
MeC	Meckesville gravelly loam, 8 to 15 percent slopes	791	0.2
MfB	Meckesville very stony loam, 0 to 8 percent slopes	2,230	0.6
MfC	Meckesville very stony loam, 8 to 25 percent slopes	1,427	0.4
MgB	Morris channery silt loam, 2 to 10 percent slopes	1,413	0.4
MoB	Morris extremely stony silt loam, 0 to 8 percent slopes	13,875	3.5
MoC	Morris extremely stony silt loam, 8 to 20 percent slopes	758	0.2
Mp	Mucky peat, deep	4,322	1.1
Ms	Mucky peat, shallow	5,630	1.4
OkB	Oquaga-Lackawanna channery loams, 3 to 8 percent slopes	1,904	0.5
OkC	Oquaga-Lackawanna channery loams, 8 to 15 percent slopes	2,226	0.6
OkD	Oquaga-Lackawanna channery loams, 15 to 25 percent slopes	995	0.3
OxB	Oquaga-Lackawanna extremely stony loams, 0 to 8 percent slopes	9,068	2.3
OxC	Oquaga-Lackawanna extremely stony loams, 8 to 25 percent slopes	17,143	4.3
Ph	Philo silt loam	1,936	0.5
Po	Pope silt loam	1,871	0.5
Pp	Pope silt loam, high bottom	1,770	0.5
ReA	Rexford gravelly silt loam, 0 to 3 percent slopes	1,454	0.4
ReB	Rexford gravelly silt loam, 3 to 8 percent slopes	311	0.1
RuC	Rushtown shaly silt loam, 5 to 15 percent slopes	672	0.2
RuD	Rushtown shaly silt loam, 15 to 30 percent slopes	270	0.1
Sh	Sheffield silt loam	1,530	0.4
SmA	Shelmadine silt loam, 0 to 3 percent slopes	460	0.1
SpB	Shelmadine very stony silt loam, 0 to 8 percent slopes	732	0.2
SwB	Swartswood channery sandy loam, 3 to 8 percent slopes	757	0.2
SwC	Swartswood channery sandy loam, 8 to 15 percent slopes	481	0.1
SxB	Swartswood extremely stony sandy loam, 0 to 8 percent slopes	12,803	3.3
SxC	Swartswood extremely stony sandy loam, 8 to 25 percent slopes	4,837	1.2
VaC	Very stony land and Rock outcrops, sloping	2,757	0.7
VaE	Very stony land and Rock outcrops, steep	2,631	0.7
VoA	Volusia gravelly silt loam, 0 to 3 percent slopes	287	0.1
VoB	Volusia gravelly silt loam, 3 to 8 percent slopes	824	0.2
VxB	Volusia extremely stony silt loam, 0 to 8 percent slopes	27,097	6.8
WaB	Watson silt loam, 2 to 8 percent slopes	1,099	0.3
Wb	Wayland silty clay loam	2,241	0.6
WeB3	Weikert channery silt loam, 3 to 8 percent slopes, eroded	476	0.1
WeC3	Weikert channery silt loam, 8 to 15 percent slopes, eroded	649	0.2
WeD3	Weikert channery silt loam, 15 to 25 percent slopes, eroded	888	0.2
WhB	Weikert-Hartleton channery silt loams, 3 to 8 percent slopes	2,795	0.7
WhC	Weikert-Hartleton channery silt loams, 8 to 15 percent slopes	2,855	0.7
WhD	Weikert-Hartleton channery silt loams, 15 to 25 percent slopes	983	0.3
WKE	Weikert and Klinesville soils, steep	4,235	1.1
WmB	Wellsboro channery loam, 3 to 8 percent slopes	3,265	0.8
WmC	Wellsboro channery loam, 8 to 15 percent slopes	1,057	0.3
WpB	Wellsboro extremely stony loam, 0 to 8 percent slopes	19,422	4.9
WpC	Wellsboro extremely stony loam, 8 to 25 percent slopes	5,015	1.3
WrB	Worth extremely stony sandy loam, 0 to 8 percent slopes	2,240	0.6
WrC	Worth extremely stony sandy loam, 8 to 25 percent slopes	1,322	0.3
WsB	Wurtsboro channery loam, 2 to 12 percent slopes	903	0.2
WxB	Wurtsboro extremely stony loam, 0 to 8 percent slopes	17,202	4.3
WxC	Wurtsboro extremely stony loam, 8 to 25 percent slopes	2,573	0.7
WyA	Wyoming gravelly sandy loam, 0 to 3 percent slopes	1,833	0.5
WyB	Wyoming gravelly sandy loam, 3 to 8 percent slopes	4,157	1.1
WyC	Wyoming gravelly sandy loam, 8 to 15 percent slopes	5,196	1.3
WyD	Wyoming gravelly sandy loam, 15 to 25 percent slopes	2,002	0.5
WyE	Wyoming gravelly sandy loam, 25 to 70 percent slopes	2,607	0.7
	Gravel pit	778	0.2
	Water	1,337	0.3
	Total	391,040	100.0

[1]Less than 0.1 percent.

TABLE 5--YIELDS PER ACRE OF CROPS AND PASTURE

[All yields were estimated for a high level of management in 1975. Absence of a yield figure indicates the crop is seldom grown or is not suited]

Soil name and map symbol	Corn	Corn silage	Oats	Wheat	Alfalfa hay	Grass-legume hay	Pasture
	Bu	Ton	Bu	Bu	Ton	Ton	AUM[1]
Alden:							
Ad	---	---	---	---	---	2.5	5.0
Allenwood:							
AnA	135	27	80	50	5.5	4.5	10.5
AnB	135	27	80	50	5.5	4.5	10.5
AnC	125	25	75	45	5.0	4.5	9.5
Alluvial land:							
As.							
Alvira:							
AvB	95	19	60	---	---	3.0	6.0
[2]AwB	---	---	---	---	---	---	---
Bath:							
BaB	100	20	75	45	4.0	4.0	7.5
BaC	95	19	75	45	4.0	4.0	7.5
BaD	90	18	70	40	3.5	3.5	6.5
BbB, BbC	---	---	---	---	---	---	5.5
Benson:							
[2]BeB	---	---	---	---	---	---	---
[2]BeC	---	---	---	---	---	---	---
[2]BeF	---	---	---	---	---	---	---
Braceville:							
BrA	110	22	85	45	4.5	3.5	8.5
BrB	105	21	80	40	4.5	3.5	8.5
Buchanan:							
BuB	100	20	65	40	3.5	3.0	7.0
BxB	---	---	---	---	---	---	---
BxC	---	---	---	---	---	---	---
Chenango:							
ChA	100	20	80	45	4.5	3.5	8.5
ChB	100	20	80	45	4.5	3.5	8.5
ChC	90	18	75	40	4.5	3.5	8.5
Chippewa:							
[2]CmA	80	16	60	---	---	2.5	4.5
[2]CnB	---	---	---	---	---	---	---
Clymer:							
CpA	120	24	75	45	4.5	3.5	8.5
CpB	120	24	75	45	4.5	3.5	8.5
CpC	110	22	70	40	4.0	3.0	8.0

See footnotes at end of table.

TABLE 5--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Oats	Wheat	Alfalfa hay	Grass-legume hay	Pasture
	Bu	Ton	Bu	Bu	Ton	Ton	AUM[1]
Clymer:							
CxB, CxC	---	---	---	---	---	---	---
Cut and fill land:							
Cy.							
Dekalb:							
DxB, DxC	---	---	---	---	---	---	---
DxE	---	---	---	---	---	---	---
Empeyville:							
ExB	---	---	---	---	---	---	---
Hartleton:							
HaB	90	18	70	40	3.5	3.0	6.5
HaC	85	17	65	40	3.0	2.5	6.0
Hazleton:							
HxB, HxC	---	---	---	---	---	---	---
Holly:							
Hy	100	20	70	---	---	3.5	6.5
Kedron:							
KaB	100	20	70	40	3.5	3.0	7.0
KaC	90	18	65	40	3.5	3.0	7.0
KdB	---	---	---	---	---	---	4.0
Klinesville:							
KvB	60	12	55	25	2.5	2.0	5.0
KvC	---	---	50	20	2.5	2.0	5.0
KvD	---	---	---	---	---	---	4.0
Lackawanna:							
LaB	100	20	75	45	4.0	4.0	8.0
LaC	95	19	75	45	4.0	4.0	8.0
LaD	90	18	70	40	3.5	3.5	7.5
LbB, LbC	---	---	---	---	---	---	---
[2]LBE	---	---	---	---	---	---	---
Laidig:							
LgB, LgC	---	---	---	---	---	---	---
Lawrenceville:							
Lh	105	21	70	45	3.5	3.0	7.0
Leck Kill:							
LkB	125	25	75	50	5.0	3.0	9.0
LkC	120	24	70	50	4.5	3.0	8.5
LkD	105	21	65	45	4.0	2.5	8.0
Lordstown:							
LsB	85	17	75	45	3.5	3.0	6.5
LsC	85	17	70	40	3.5	3.0	6.5
LsD	80	16	65	35	3.0	3.0	5.5

See footnotes at end of table.

TABLE 5--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Oats	Wheat	Alfalfa hay	Grass-legume hay	Pasture
	Bu	Ton	Bu	Bu	Ton	Ton	AUM[1]
Lordstown:							
LxB, LxC	---	---	---	---	---	---	---
[2]LyE	---	---	---	---	---	---	---
Mardin:							
MaB	90	18	70	40	4.0	3.0	7.5
MaC	85	17	65	40	4.0	3.0	7.5
MbB, MbC	---	---	---	---	---	---	---
Meckesville:							
MeA	110	22	75	45	5.0	4.5	9.0
MeB	110	22	75	45	5.0	4.5	9.0
MeC	105	21	70	40	4.5	4.0	8.5
MfB, MfC	---	---	---	---	---	---	---
Morris:							
MgB	80	18	65	35	3.0	3.0	6.0
MoB, MoC	---	---	---	---	---	---	---
Mucky peat:							
Mp, Ms.							
Oquaga:							
[2]OkB	85	17	75	45	3.5	3.0	6.5
[2]OkC	85	17	72	42	3.5	3.0	6.5
[2]OkD	80	16	66	37	3.0	3.0	5.5
[2]OxB	---	---	---	---	---	---	---
[2]OxC	---	---	---	---	---	---	---
Philo:							
Ph	130	26	80	45	4.5	3.5	8.5
Pope:							
Po, Pp	135	27	80	50	5.0	3.5	9.5
Rexford:							
ReA	90	18	65	35	3.0	3.0	6.0
ReB	90	18	65	35	3.0	3.0	6.0
Rushtown:							
RuC	70	14	55	25	2.5	2.5	5.0
RuD	---	---	---	---	---	---	4.0
Sheffield:							
Sh	75	15	55	---	---	2.5	4.5
Shelmadine:							
SmA	85	17	60	---	---	2.5	5.0
SpB	---	---	---	---	---	---	3.0
Swartswood:							
SwB	100	20	80	45	4.0	4.5	8.5
SwC	90	18	75	40	4.0	4.5	8.5

See footnotes at end of table.

TABLE 5--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Oats	Wheat	Alfalfa hay	Grass-legume hay	Pasture
	Bu	Ton	Bu	Bu	Ton	Ton	AUM[1]
Swartswood:							
SxB, SxC	---	---	---	---	---	---	---
Very stony land:							
[2]VaC, [2]VaE	---	---	---	---	---	---	---
Volusia:							
VoA	80	16	65	35	3.0	3.0	5.5
VoB	80	16	65	35	3.0	3.0	5.5
VxB	---	---	---	---	---	---	---
Watson:							
WaB	100	20	70	40	3.5	3.0	7.0
Wayland:							
Wb	100	20	70	---	---	3.5	6.5
Weikert:							
WeB3	60	12	55	25	2.5	2.0	5.0
WeC3	---	---	50	20	2.0	2.0	5.0
WeD3	---	---	---	---	---	---	4.0
[2]WhB	60	12	55	25	2.5	2.0	5.0
[2]WhC	---	---	50	20	2.0	2.0	5.0
[2]WhD	---	---	---	---	---	---	4.0
[2]WKE	---	---	---	---	---	---	---
Wellsboro:							
WmB, WmC	90	18	70	40	4.0	3.0	7.5
WpB, WpC	---	---	---	---	---	---	---
Worth:							
WrB, WrC	---	---	---	---	---	---	---
Wurtsboro:							
WsB	90	18	70	40	4.0	3.0	7.5
WxB, WxC	---	---	---	---	---	---	---
Wyoming:							
WyA, WyB	90	18	75	45	4.0	3.0	7.5
WyC	75	15	70	40	3.5	2.5	6.5
WyD	---	---	50	30	3.0	2.0	5.5
WyE	---	---	---	---	---	---	---

[1]Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for a period of 30 days.

[2]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior characteristics of the map unit.

TABLE 6--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas excluded. Absence of an entry means no acreage]

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	6,221	---	---	---
II	33,685	23,779	4,697	3,209
III	35,355	19,128	10,237	5,990
IV	19,868	11,172	3,500	5,196
V	---	---	---	---
VI	18,870	2,629	---	16,241
VII	262,519	6,842	9,952	245,725
VIII	8,159	---	---	8,159

TABLE 7--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed in this table. Absence of an entry in a column means the information was not available]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Alden:								
Ad	5w	Slight	Severe	Severe	Severe	Red maple	50	Eastern white pine, White spruce.
Allenwood:								
AnA, AnB, AnC	3o	Slight	Slight	Slight	Slight	Northern red oak	70	Eastern white pine, European larch, yellow-poplar, Norway spruce, Virginia pine.
						Yellow-poplar	75	
						Black cherry	70	
						Sugar maple	70	
Alvira:								
AvB	3w	Slight	Moderate	Moderate	Slight	Northern red oak	70	Eastern white pine, yellow-poplar, Norway spruce, European larch, white spruce.
						Yellow-poplar	75	
						White ash	70	
[1]AwB:								
Alvira part	3w	Slight	Moderate	Moderate	Moderate	Northern red oak	70	Eastern white pine, yellow-poplar, Norway spruce, European larch, white spruce.
						Yellow-poplar	75	
						White ash	70	
Watson part	3o	Slight	Slight	Slight	Slight	Northern red oak	70	Eastern white pine, yellow-poplar, European larch, Norway spruce, black cherry.
						Sugar maple	70	
						Yellow-poplar	80	
Bath:								
BaB, BaC, BbB, BbC	3o	Slight	Slight	Slight	Slight	Northern red oak	65	Eastern white pine, red pine, Norway spruce, European larch.
						Black cherry	75	
						Sugar maple	70	
BaD	3r	Slight	Moderate	Slight	Slight	Northern red oak	65	Eastern white pine, red pine, Norway spruce, European larch.
						Black cherry	75	
						Sugar maple	70	
Benson:								
[1]BeB:								
Benson part	5d	Slight	Moderate	Severe	Moderate	Sugar maple	50	Eastern white pine.
						Eastern white pine	55	
Rock outcrop part.								
[1]BeC:								
Benson part	5d	Moderate	Moderate	Severe	Moderate	Sugar maple	50	Eastern white pine.
						Eastern white pine	55	
Rock outcrop part.								
[1]BeF:								
Benson part	5d	Severe	Severe	Severe	Moderate	Sugar maple	50	Eastern white pine.
						Eastern white pine	55	
Rock outcrop part.								

See footnote at end of table.

TABLE 7--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Braceville:								
BrA, BrB	2o	Slight	Slight	Slight	Slight	Northern red oak White ash Sugar maple Black cherry Yellow-poplar	80 80 80 80 90	Yellow-poplar, European larch, Norway spruce, eastern white pine, black cherry.
Buchanan:								
BuB	3o	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar	66 91	Northern red oak, yellow-poplar, sugar maple, eastern white pine, European larch, Norway spruce.
BxB	3x	Slight	Moderate	Slight	Slight	Northern red oak Yellow-poplar	66 91	Northern red oak, yellow-poplar, sugar maple, eastern white pine, European larch, Norway spruce.
BxC	3r	Moderate	Moderate	Slight	Slight	Northern red oak Yellow-poplar	66 91	Northern red oak, yellow-poplar, sugar maple, eastern white pine, European larch, Norway spruce.
Chenango:								
ChA, ChB, ChC	1o	Slight	Slight	Slight	Slight	Sugar maple Northern red oak Black cherry Yellow poplar	86 86 87 87	Eastern white pine, red pine, European larch.
Chippewa:								
[1]CmA:								
Chippewa part	5w	Slight	Severe	Severe	Severe	Red maple	50	Eastern white pine, white spruce.
Norwich part	5w	Slight	Severe	Severe	Severe	Red maple	50	Eastern white pine, white spruce.
[1]CnB:								
Chippewa part	5x	Slight	Severe	Severe	Severe	Red maple	50	Eastern white pine, white spruce.
Norwich part	5x	Slight	Severe	Severe	Severe	Red maple	50	Eastern white pine, white spruce.
Clymer:								
CpA, CpB, CpC	2o	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar Eastern white pine	77 90 90	Eastern white pine, Virginia pine, black cherry, yellow-poplar.
CxB, CxC	2x	Slight	Moderate	Slight	Slight	Northern red oak Yellow-poplar Eastern white pine	77 90 90	Yellow-poplar, Virginia pine, eastern white pine, black cherry.
Dekalb:								
DxB	4x	Slight	Moderate	Moderate	Slight	Northern red oak Chestnut oak Virginia pine	57 55 60	Eastern white pine, red pine.
DxC	4x	Slight	Moderate	Moderate	Moderate	Northern red oak Chestnut oak Virginia pine	57 55 60	Eastern white pine, Virginia pine.

See footnote at end of table.

TABLE 7--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Dekalb:								
DxE	4x	Moderate	Severe	Moderate	Moderate	Northern red oak Chestnut oak Virginia pine	57 55 60	Eastern white pine, Virginia pine.
Empeyville:								
ExB	4x	Slight	Moderate	Slight	Slight	Eastern white pine Northern red oak Sugar maple	65 60 60	Eastern white pine, red pine, white spruce, European larch.
Hartleton:								
HaB	3f	Slight	Slight	Slight	Slight	Northern red oak Chestnut oak Eastern white pine Virginia pine	70 70 70 70	Virginia pine, eastern white pine, European larch, Norway spruce, red pine.
HaC	3f	Slight	Slight	Slight	Slight	Northern red oak Chestnut oak Eastern white pine Virginia pine	70 70 70 70	Virginia pine, eastern white pine, European larch, Norway spruce, red pine.
Hazleton:								
HxB	3o	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar	70 80	European larch, eastern white pine, Norway spruce, Austrian pine, black cherry.
HxC	3r	Slight	Moderate	Slight	Slight	Northern red oak Yellow-poplar	70 80	European larch, eastern white pine, Norway spruce, Austrian pine, black cherry.
Holly:								
Hy	5w	Slight	Severe	Severe	Moderate	Pin oak Swamp white oak Red maple White ash	90 50 50 50	Eastern white pine, White spruce.
Kedron:								
KaB, KaC, KdB	3w	Slight	Slight	Slight	Slight	Northern red oak White ash Sugar maple Red maple Yellow-poplar	70 70 70 70 80	Yellow-poplar, European larch, eastern white pine, Norway spruce.
Klinesville:								
KvB, KvC	4d	Slight	Slight	Severe	Slight	Northern red oak Virginia pine	60 60	Virginia pine, eastern white pine, red pine, pitch pine.
KvD	4d	Slight	Moderate	Severe	Slight	Northern red oak Virginia pine	60 60	Virginia pine, eastern white pine, red pine, pitch pine.
Lackawanna:								
LaB, LaC	3o	Slight	Slight	Slight	Slight	Northern red oak Black cherry Sugar maple White ash	70 75 70 70	Eastern white pine, red pine, Norway spruce, European larch.

See footnote at end of table.

TABLE 7--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
LaD	3r	Slight	Moderate	Slight	Slight	Northern red oak Black cherry Sugar maple White ash	70 75 70 70	Eastern white pine, red pine, Norway spruce, European larch.
LbB, LbC	3x	Slight	Moderate	Slight	Slight	Northern red oak Black cherry Sugar maple White ash	70 75 70 70	Eastern white pine, red pine, Norway spruce, European larch.
[1]LBE:								
Lackawanna part	3x	Moderate	Severe	Slight	Slight	Northern red oak Black cherry Sugar maple White ash	70 75 70 70	Eastern white pine, red pine, Norway spruce, European larch.
Bath part	3x	Moderate	Severe	Slight	Slight	Northern red oak Black cherry Sugar maple	65 75 70	Eastern white pine, red pine, Norway spruce, European larch.
Laidig:								
LgB	3x	Slight	Moderate	Slight	Slight	Northern red oak Yellow-poplar Eastern white pine Virginia pine	69 75 80 70	Eastern white pine, yellow-poplar, black walnut, Virginia pine, Norway spruce, black locust.
LgC	3x	Slight	Moderate	Slight	Slight	Northern red oak Yellow-poplar Eastern white pine Virginia pine	69 75 80 70	Eastern white pine, yellow-poplar, black walnut, Virginia pine, Norway spruce, black locust.
Lawrenceville:								
Lh	2o	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar	80 90	Eastern white pine, European larch, Norway spruce, yellow-poplar.
Leck Kill:								
LkB, LkC	3o	Slight	Slight	Slight	Slight	Northern red oak Eastern white pine Virginia pine	70 80 70	Eastern white pine, Virginia pine.
LkD	3r	Slight	Moderate	Slight	Slight	Northern red oak Eastern white pine Virginia pine	70 80 70	Eastern white pine, Virginia pine.
Lordstown:								
LsB, LsC	4f	Slight	Slight	Moderate	Slight	Northern red oak Sugar maple White ash	60 73 75	Eastern white pine, European larch, black cherry, red pine, Norway spruce.
LsD	4r	Slight	Moderate	Moderate	Slight	Northern red oak Sugar maple White ash	60 73 75	Eastern white pine, European larch, black cherry, red pine, Norway spruce.
LxB, LxC	4x	Slight	Moderate	Slight	Slight	Sugar maple Northern red oak White ash	73 60 75	Eastern white pine, red pine, European larch, Norway spruce.

See footnote at end of table.

TABLE 7--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
[1]LyE:								
Lordstown part--	4x	Moderate	Severe	Slight	Slight	Sugar maple--------- Northern red oak---- White ash----------	73 60 75	Eastern white pine, red pine, European larch, Norway spruce.
Oquaga part-----	3x	Moderate	Severe	Slight	Slight	Sugar maple--------- Northern red oak---- White ash----------	73 71 75	Eastern white pine, red pine, European larch, Norway spruce.
Mardin:								
MaB, MaC, MbB-----	3o	Slight	Slight	Slight	Slight	Sugar maple--------- Northern red oak---- Black cherry--------	60 65 75	Red pine, European larch, Norway spruce, eastern white pine.
MbC----------	3r	Slight	Moderate	Slight	Slight	Sugar maple--------- Northern red oak---- Black cherry--------	60 65 75	Red pine, European larch, Norway spruce, eastern white pine.
Meckesville:								
MeA, MeB, MeC, MfB	2o	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 90	Eastern white pine, European larch, yellow-poplar, black cherry, Norway spruce.
MfC----------	2r	Slight	Moderate	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 90	Eastern white pine, European larch, yellow-poplar, black cherry, Norway spruce.
Morris:								
MgB----------	3w	Slight	Moderate	Moderate	Moderate	Northern red oak---- Sugar maple--------- Black cherry-------- White ash----------	65 79 69 71	Eastern white pine, Norway spruce, white spruce, European larch.
MoB, MoC----------	3x	Slight	Moderate	Moderate	Moderate	White ash---------- Northern red oak---- Sugar maple--------- Black cherry--------	71 65 79 69	European larch, eastern white pine, Norway spruce, white pine.
Oquaga:								
[1]OkB:								
Oquaga part-----	3o	Slight	Slight	Slight	Slight	Sugar maple--------- Northern red oak---- Black cherry-------- Eastern white pine--	69 71 72 75	Eastern white pine, red pine, European larch, Norway spruce, black cherry.
Lackawanna part-	3o	Slight	Slight	Slight	Slight	Northern red oak---- Black cherry-------- Sugar maple--------- White ash----------	70 75 70 70	Eastern white pine, red pine, Norway spruce, European larch.
[1]OkC:								
Oquaga part-----	3o	Slight	Slight	Slight	Slight	Sugar maple--------- Northern red oak---- Black cherry-------- Eastern white pine--	69 71 72 75	Eastern white pine, red pine, European larch, Norway spruce, black cherry.
Lackawanna part-	3o	Slight	Slight	Slight	Slight	Northern red oak---- Black cherry-------- Sugar maple--------- White ash----------	70 75 70 70	Eastern white pine, red pine, Norway spruce, European larch.

See footnote at end of table.

TABLE 7--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
[1]OkD:								
Oquaga part-----	3r	Slight	Moderate	Slight	Slight	Sugar maple----------	69	Eastern white pine, red pine, European larch, Norway spruce, black cherry.
						Northern red oak----	71	
						Black cherry---------	72	
						Eastern white pine--	75	
Lackawanna part-	3r	Slight	Moderate	Slight	Slight	Northern red oak----	70	Eastern white pine, red pine, Norway spruce, European larch.
						Black cherry---------	75	
						Sugar maple----------	70	
						White ash------------	70	
[1]OxB:								
Oquaga part-----	3x	Slight	Moderate	Slight	Slight	Sugar maple----------	73	Eastern white pine, red pine, European larch, Norway spruce.
						Northern red oak----	71	
						White ash------------	75	
Lackawanna part-	3x	Slight	Moderate	Slight	Slight	Northern red oak----	70	Eastern white pine, red pine, Norway spruce, European larch.
						Black cherry---------	75	
						Sugar maple----------	70	
						White ash------------	70	
[1]OxC:								
Oquaga part-----	3x	Slight	Moderate	Slight	Slight	Sugar maple----------	73	Eastern white pine, red pine, European larch, Norway spruce.
						Northern red oak----	71	
						White ash------------	75	
Lackawanna part-	3x	Slight	Moderate	Slight	Slight	Northern red oak----	70	Eastern white pine, red pine, Norway spruce, European larch.
						Black cherry---------	75	
						Sugar maple----------	70	
						White ash------------	70	
Philo:								
Ph------------------	2w	Slight	Moderate	Slight	Slight	Virginia pine--------	74	Eastern white pine, yellow-poplar, loblolly pine.
						Northern red oak----	79	
						Yellow-poplar--------	102	
						Shortleaf pine-------	80	
						Loblolly pine--------	85	
						Sweetgum-------------	90	
Pope:								
Po, Pp-------------	2o	Slight	Slight	Slight	Slight	Northern red oak----	80	Eastern white pine, yellow-poplar, loblolly pine, black walnut, black cherry, Norway spruce, European larch.
						Yellow-poplar--------	102	
						Eastern white pine--	89	
						Virginia pine--------	74	
Rexford:								
ReA, ReB-----------	3w	Slight	Moderate	Moderate	Moderate	Northern red oak----	70	Black cherry, European larch, Norway spruce, white spruce, eastern white pine.
						White ash------------	70	
						Sugar maple----------	70	
						Black cherry---------	70	
Rushtown:								
RuC----------------	3f	Slight	Slight	Moderate	Slight	Northern red oak----	70	Eastern white pine, Virginia pine.
						Virginia pine--------	70	
						Black oak------------	70	
						Chestnut oak---------	70	
						Eastern white pine--	80	
RuD----------------	3f	Slight	Moderate	Moderate	Slight	Northern red oak----	70	Eastern white pine, Virginia pine.
						Virginia pine--------	70	
						Black oak------------	70	
						Chestnut oak---------	70	
						Eastern white pine--	80	

See footnote at end of table.

TABLE 7--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Sheffield:								
Sh	3w	Slight	Severe	Severe	Moderate	Pin oak Sugar maple White ash Yellow-poplar	85 65 65 88	Norway spruce, white spruce, red maple, eastern white pine.
Shelmadine:								
SmA	3w	Slight	Severe	Severe	Moderate	Northern red oak Black cherry	70 70	Eastern white pine, red maple, Norway spruce.
SpB	3w	Slight	Severe	Severe	Severe	Northern red oak Black cherry	70 70	Eastern white pine, red maple, Norway spruce.
Swartswood:								
SwB, SwC	3o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple White ash	70 70 70	Red pine, eastern white pine, European larch, Norway spruce.
SxB, SxC	3x	Slight	Moderate	Slight	Slight	Northern red oak Sugar maple White ash	70 70 70	Red pine, eastern white pine, European larch, Norway spruce.
Volusia:								
VoA, VoB, VxB	3w	Slight	Moderate	Moderate	Moderate	Northern red oak Sugar maple White ash	65 64 75	Eastern white pine, Norway spruce, European larch, white spruce, black cherry.
Watson:								
WaB	3o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple Yellow-poplar	70 70 80	Eastern white pine, yellow-poplar, European larch, Norway spruce, black cherry.
Wayland:								
Wb	4w	Slight	Severe	Severe	Severe	Red maple Pin oak	59 98	Eastern white pine, white spruce.
Weikert:								
WeB3, WeC3	4d	Slight	Slight	Severe	Slight	Northern red oak Virginia pine	64 60	Eastern white pine, short leaf pine, Virginia pine.
WeD3	4d	Slight	Moderate	Severe	Slight	Northern red oak Virginia pine	64 60	Eastern white pine, shortleaf pine, Virginia pine.
[1]WhB:								
Weikert part	4d	Slight	Slight	Severe	Slight	Northern red oak Virginia pine	64 60	Eastern white pine, short leaf pine, Virginia pine.
Hartleton part	3f	Slight	Slight	Slight	Slight	Northern red oak Chestnut oak Eastern white pine Virginia pine	70 70 70 70	Virginia pine, eastern white pine, European larch, Norway spruce, red pine.

See footnote at end of table.

TABLE 7--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
[1]WhC:								
Weikert part----	4d	Slight	Slight	Severe	Slight	Northern red oak---- Virginia pine-------	64 60	Eastern white pine, shortleaf pine, Virginia pine.
Hartleton part--	3f	Slight	Slight	Slight	Slight	Northern red oak---- Chestnut oak-------- Eastern white pine-- Virginia pine-------	70 70 70 70	Virginia pine, eastern white pine, European larch, Norway spruce, red pine.
[1]WhD:								
Weikert part----	4d	Slight	Moderate	Severe	Slight	Northern red oak---- Virginia pine-------	64 60	Eastern white pine, shortleaf pine, Virginia pine.
Hartleton part--	3r	Slight	Moderate	Slight	Slight	Northern red oak---- Chestnut oak-------- Eastern white pine-- Virginia pine-------	70 70 70 70	Virginia pine, eastern white pine, European larch, Norway spruce, red pine.
[1]WKE:								
Weikert part----	4d	Moderate	Severe	Severe	Slight	Northern red oak---- Virginia pine-------	64 60	Eastern white pine, shortleaf pine, Virginia pine.
Klinesville part	4d	Moderate	Severe	Severe	Slight	Northern red oak---- Virginia pine-------	60 60	Virginia pine, eastern white pine, red pine, pitch pine.
Wellsboro:								
WmB, WmC----------	2o	Slight	Slight	Slight	Slight	Northern red oak---- Sugar maple---------	78 70	Norway spruce, eastern white pine, red pine, black cherry, European larch.
WpB, WpC----------	2x	Slight	Moderate	Slight	Slight	Northern red oak---- Sugar maple---------	78 70	European larch, Norway spruce, red pine, eastern white pine, black cherry.
Worth:								
WrB, WrC----------	3x	Slight	Moderate	Slight	Slight	Sugar maple--------- Northern red oak---- Black cherry-------- Yellow-poplar-------	70 70 70 80	Eastern white pine, red pine, black cherry, European larch, Norway spruce.
Wurtsboro:								
WsB----------	3o	Slight	Slight	Slight	Slight	Northern red oak---- Sugar maple---------	70 70	Norway spruce, eastern white pine, red pine, black cherry, European larch.
WxB, WxC----------	3x	Slight	Moderate	Slight	Slight	Northern red oak---- Sugar maple---------	70 70	European larch, Norway spruce, eastern white pine, black cherry.

See footnote at end of table.

TABLE 7--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Important trees	Site index	
Wyoming:								
WyA, WyB, WyC-----	4f	Slight	Slight	Severe	Slight	Northern red oak----	55	Eastern white pine, red pine, Virginia pine.
WyD-----------	4f	Slight	Moderate	Severe	Slight	Northern red oak----	55	Eastern white pine, red pine, Virginia pine.
WyE-----------	4f	Moderate	Severe	Severe	Slight	Northern red oak----	55	Eastern white pine, red pine, Virginia pine.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior characteristics of the map unit.

TABLE 8--BUILDING SITE DEVELOPMENT

["Depth to rock" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Alden:					
Ad	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
Allenwood:					
AnA	Slight	Moderate: frost action.	Slight	Moderate: frost action.	Moderate: frost action, low strength.
AnB	Slight	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action, low strength.
AnC	Moderate: slope.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action, low strength.
Alluvial land:					
As	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
Alvira:					
AvB	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.
[1]AwB:					
Alvira part	Severe: wetness.	Severe: frost action, large stones.	Severe: wetness.	Severe: wetness, frost action.	Severe: frost action.
Watson part	Severe: wetness.	Moderate: large stones, frost action.	Moderate: wetness, large stones.	Moderate: slope, large stones, frost action.	Moderate: frost action, low strength.
Bath:					
BaB	Moderate: wetness, small stones.	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action.
BaC	Moderate: slope, wetness, small stones.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.
BaD	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
BbB	Moderate: large stones, wetness, small stones.	Moderate: large stones, frost action.	Moderate: large stones.	Moderate: slope, large stones, frost action.	Moderate: frost action.
BbC	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Benson:					
[1]BeB:					
Benson part	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.

See footnote at end of table.

TABLE 8--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Rock outcrop part.					
[1]BeC:					
Benson part----	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock.
Rock outcrop part.					
[1]BeF:					
Benson part----	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock.
Rock outcrop part.					
Braceville:					
BrA, BrB----------	Severe: wetness.	Moderate: frost action.	Moderate: wetness.	Severe: floods, wetness.	Moderate: frost action, low strength.
Buchanan:					
BuB----------	Severe: wetness.	Moderate: wetness, frost action.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action, low strength.
BxB----------	Severe: wetness, large stones.	Severe: large stones.	Severe: wetness, large stones.	Severe: wetness, large stones.	Moderate: wetness, frost action, low strength.
BxC----------	Severe: slope, wetness, large stones.	Severe: slope, large stones.	Severe: slope, wetness, large stones.	Severe: slope, wetness, large stones.	Severe: slope.
Chenango:					
ChA----------	Severe: small stones.	Slight----------	Slight----------	Slight----------	Slight.
ChB----------	Severe: small stones.	Slight----------	Slight----------	Moderate: slope.	Slight.
ChC----------	Severe: small stones.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Chippewa:					
[1]CmA:					
Chippewa part--	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Norwich part---	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
[1]CnB:					
Chippewa part--	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness.
Norwich part---	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness.

See footnote at end of table.

TABLE 8--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Clymer:					
CpA	Slight	Moderate: frost action.	Slight	Moderate: frost action.	Moderate: frost action.
CpB	Slight	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action.
CpC	Moderate: slope.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.
CxB	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Moderate: frost action, large stones.
CxC	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.
Cut and fill land: Cy.					
Dekalb:					
DxB	Severe: depth to rock, large stones.	Severe: large stones.	Severe: depth to rock, large stones.	Severe: large stones.	Moderate: depth to rock, large stones.
DxC, DxE	Severe: slope, depth to rock, large stones.	Severe: slope, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, large stones.	Severe: slope.
Empeyville:					
ExB	Severe: wetness.	Severe: large stones.	Severe: wetness, large stones.	Severe: large stones.	Moderate: wetness, frost action.
Hartleton:					
HaB	Moderate: small stones.	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action.
HaC	Moderate: slope, small stones.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.
Hazleton:					
HxB	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Moderate: frost action, large stones.
HxC	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.
Holly:					
Hy	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
Kedron:					
KaB	Severe: wetness.	Moderate: frost action.	Moderate: wetness.	Moderate: frost action, slope.	Moderate: frost action, low strength.

See footnote at end of table.

TABLE 8--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
KaC	Severe: wetness.	Moderate: slope, frost action.	Moderate: slope, wetness.	Severe: slope.	Moderate: slope, low strength, frost action.
KdB	Severe: wetness.	Moderate: slope, frost action, large stones.	Moderate: slope, wetness, large stones.	Moderate: slope, frost action, large stones.	Moderate: frost action, low strength.
Klinesville:					
KvB	Moderate: depth to rock, small stones.	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action.
KvC	Moderate: slope, depth to rock, small stones.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.
KvD	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lackawanna:					
LaB	Moderate: wetness, small stones.	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action.
LaC	Moderate: slope, wetness, small stones.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.
LaD	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
LbB	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Moderate: frost action, large stones.
LbC	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.
[1]LBE:					
Lackawanna part	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.
Bath part	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.
Laidig:					
LgB	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Moderate: large stones.
LgC	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.
Lawrenceville:					
Lh	Severe: wetness.	Moderate: frost action.	Moderate: wetness.	Moderate: frost action.	Moderate: frost action, low strength.

See footnote at end of table.

TABLE 8--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Leck Kill:					
LkB	Moderate: depth to rock.	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action.
LkC	Moderate: slope, depth to rock.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.
LkD	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lordstown:					
LsB	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.
LsC	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock.
LsD	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
LxB	Severe: large stones, depth to rock.	Severe: large stones.	Severe: large stones, depth to rock.	Severe: large stones.	Moderate: large stones, depth to rock.
LxC	Severe: slope, large stones, depth to rock.	Severe: slope, large stones.	Severe: slope, large stones, depth to rock.	Severe: slope, large stones.	Severe: slope.
[1]LyE:					
Lordstown part	Severe: slope, large stones, depth to rock.	Severe: slope, large stones.	Severe: slope, large stones, depth to rock.	Severe: slope, large stones.	Severe: slope.
Oquaga part	Severe: slope, large stones, depth to rock.	Severe: slope, large stones.	Severe: slope, large stones, depth to rock.	Severe: slope, large stones.	Severe: slope.
Mardin:					
MaB	Severe: wetness.	Moderate: frost action.	Moderate: wetness.	Moderate: slope, frost action.	Moderate: frost action.
MaC	Severe: wetness.	Moderate: frost action.	Moderate: slope, wetness.	Severe: slope.	Moderate: frost action.
MbB	Severe: wetness.	Severe: frost action.	Moderate: wetness, large stones.	Moderate: frost action, slope, large stones.	Severe: frost action.
MbC	Severe: slope, wetness.	Severe: slope, frost action.	Severe: slope.	Severe: slope.	Severe: slope, frost action.
Meckesville:					
MeA	Moderate: small stones.	Moderate: frost action.	Slight	Moderate: frost action.	Moderate: frost action.

See footnote at end of table.

TABLE 8--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
MeB	Moderate: small stones.	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action.
MeC	Moderate: slope, small stones.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.
MfB	Moderate: large stones, small stones.	Moderate: large stones. frost action.	Moderate: large stones.	Moderate: slope, large stones, frost action.	Moderate: low strength, frost action.
MfC	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Morris:					
MgB	Severe: wetness.	Severe: frost action.	Severe: wetness.	Severe: frost action.	Severe: frost action.
MoB	Severe: wetness, large stones.	Severe: large stones, frost action.	Severe: wetness, large stones.	Severe: frost action.	Severe: frost action.
MoC	Severe: slope, wetness, large stones.	Severe: slope, large stones, frost action.	Severe: slope, wetness, large stones.	Severe: slope, frost action.	Severe: slope, frost action.
Mucky peat:					
Mp, Ms	Severe: floods, wetness, excess humus.	Severe: floods, excess humus, low strength.	Severe: floods, wetness, excess humus.	Severe: floods, wetness, excess humus.	Severe: floods, excess humus, wetness.
Oquaga:					
[1]OkB:					
Oquaga part	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.
Lackawanna part	Moderate: wetness, small stones.	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action.
[1]OkC:					
Oquaga part	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock.
Lackawanna part	Moderate: slope, wetness, small stones.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.
[1]OkD:					
Oquaga part	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.
Lackawanna part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]OxB:					
Oquaga part	Severe: large stones, depth to rock.	Severe: large stones.	Severe: large stones, depth to rock.	Severe: large stones.	Moderate: large stones, depth to rock.

See footnote at end of table.

TABLE 8--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Lackawanna part	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Moderate: frost action, large stones.
[1]OxC:					
Oquaga part	Severe: slope, large stones, depth to rock.	Severe: slope, large stones.	Severe: slope, large stones, depth to rock.	Severe: slope, large stones.	Severe: slope.
Lackawanna part	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.
Philo:					
Ph	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods.
Pope:					
Po	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Slight.
Pp	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Slight.
Rexford:					
ReA, ReB	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
Rushtown:					
RuC	Severe: small stones.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
RuD	Severe: slope, small stones.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Sheffield:					
Sh	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
Shelmadine:					
SmA, SpB	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, frost action.
Swartswood:					
SwB	Moderate: wetness, small stones.	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action.
SwC	Moderate: slope, wetness, small stones.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.
SxB	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Moderate: large stones, frost action.
SxC	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.

See footnote at end of table.

TABLE 8--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Very stony land:					
[1]VaC	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: slope, large stones.	Severe: slope, large stones.
[1]VaE	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Volusia:					
VoA, VoB	Severe: wetness.	Moderate: wetness, frost action.	Severe: wetness.	Moderate: frost action, wetness.	Moderate: frost action, wetness.
VxB	Severe: wetness, large stones.	Severe: large stones.	Severe: wetness, large stones.	Severe: large stones.	Moderate: frost action, large stones, wetness.
Watson:					
WaB	Severe: wetness.	Moderate: frost action.	Moderate: wetness.	Moderate: slope, frost action.	Moderate: frost action, low strength.
Wayland:					
Wb	Severe: wetness, floods.	Severe: floods, wetness, frost action.	Severe: floods, wetness.	Severe: floods, wetness, frost action.	Severe: wetness, floods, frost action.
Weikert:					
WeB3	Moderate: depth to rock, small stones.	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action.
WeC3	Moderate: slope, depth to rock, small stones.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.
WeD3	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
[1]WhB:					
Weikert part	Moderate: depth to rock, small stones.	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action.
Hartleton part	Moderate: small stones.	Moderate: frost action.	Slight	Moderate: slope, frost action.	Moderate: frost action.
[1]WhC:					
Weikert part	Moderate: slope, depth to rock, small stones.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.
Hartleton part	Moderate: slope, small stones.	Moderate: slope, frost action.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.
[1]WhD:					
Weikert part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hartleton part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
[1]WKE:					
Weikert part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Klinesville part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wellsboro:					
WmB	Severe: wetness.	Severe: frost action.	Moderate: wetness.	Severe: frost action.	Severe: frost action.
WmC	Severe: wetness.	Severe: frost action.	Moderate: slope, wetness.	Severe: slope, frost action.	Severe: frost action.
WpB	Severe: wetness, large stones.	Severe: large stones, frost action.	Severe: large stones.	Severe: large stones, frost action.	Severe: frost action.
WpC	Severe: slope, wetness, large stones.	Severe: slope, large stones, frost action.	Severe: slope, large stones.	Severe: slope, large stones, frost action.	Severe: slope, frost action.
Worth:					
WrB	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Moderate: frost action, large stones.
WrC	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.
Wurtsboro:					
WsB	Severe: wetness.	Severe: frost action.	Moderate: wetness.	Severe: frost action.	Severe: frost action.
WxB	Severe: wetness.	Severe: frost action, large stones.	Severe: large stones.	Severe: frost action, large stones.	Severe: frost action.
WxC	Severe: slope, wetness.	Severe: slope, frost action, large stones.	Severe: slope, large stones.	Severe: slope, frost action, large stones.	Severe: slope, frost action.
Wyoming:					
WyA	Severe: small stones.	Slight	Slight	Slight	Slight.
WyB	Severe: small stones.	Slight	Slight	Moderate: slope.	Slight.
WyC	Severe: small stones.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
WyD, WyE	Severe: slope, small stones.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior characteristics of the map unit.

TABLE 9--SANITARY FACILITIES

["Depth to rock" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms used to rate soils. Absence of an entry means soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Alden:					
Ad	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness.
Allenwood:					
AnA	Severe: percs slowly.	Moderate: seepage, small stones.	Moderate: too clayey.	Slight	Fair: too clayey, small stones.
AnB	Severe: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey, small stones.
AnC	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey, small stones.
Alluvial land:					
As	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: floods, wetness.
Alvira:					
AvB	Severe: percs slowly, wetness.	Moderate: slope, depth to rock, small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones.
[1]AwB:					
Alvira part	Severe: percs slowly, wetness.	Moderate: slope, depth to rock, small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones, large stones.
Watson part	Severe: percs slowly, wetness.	Moderate: slope, large stones.	Severe: wetness.	Severe: wetness.	Fair: large stones, too clayey.
Bath:					
BaB	Severe: percs slowly.	Moderate: slope, small stones.	Moderate: depth to rock.	Slight	Fair: small stones.
BaC	Severe: percs slowly.	Severe: slope.	Moderate: depth to rock.	Moderate: slope.	Fair: slope, small stones.
BaD	Severe: slope, percs slowly.	Severe: slope.	Moderate: slope, depth to rock.	Severe: slope.	Poor: slope.
BbB	Severe: percs slowly.	Moderate: slope, large stones.	Moderate: large stones, depth to rock.	Slight	Fair: large stones, small stones.
BbC	Severe: percs slowly.	Severe: slope.	Moderate: slope, large stones, depth to rock.	Severe: slope.	

See footnote at end of table.

TABLE 9--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Benson:					
[1]BeB:					
Benson part	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Slight	Poor: thin layer, large stones.
Rock outcrop part.					
[1]BeC:					
Benson part	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: slope.	Poor: slope, thin layer, large stones.
Rock outcrop part.					
[1]BeF:					
Benson part	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope.	Poor: slope, thin layer, large stones.
Rock outcrop part.					
Braceville:					
BrA, BrB	Severe: percs slowly, wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: wetness.	Fair: small stones.
Buchanan:					
BuB	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Fair: small stones, thin layer.
BxB	Severe: wetness, large stones, percs slowly.	Severe: large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: large stones.
BxC	Severe: slope, wetness, large stones.	Severe: slope, large stones.	Severe: wetness, large stones.	Severe: slope, wetness.	Poor: slope, large stones.
Chenango:					
ChA, ChB	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones, thin layer.
ChC	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope, small stones, thin layer.
Chippewa:					
[1]CmA:					
Chippewa part	Severe: wetness, percs slowly.	Moderate: small stones.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Norwich part	Severe: wetness, percs slowly.	Moderate: small stones.	Severe: wetness.	Severe: wetness.	Poor: wetness.

See footnote at end of table.

TABLE 9--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
[1]CnB:					
Chippewa part	Severe: wetness, percs slowly, large stones.	Severe: large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: wetness, large stones.
Norwich part	Severe: wetness, percs slowly, large stones.	Severe: large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: wetness.
Clymer:					
CpA, CpB	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
CpC	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope.
CxB	Severe: large stones.	Severe: seepage, large stones.	Severe: large stones, seepage.	Severe: seepage.	Poor: large stones.
CxC	Severe: slope, large stones.	Severe: slope, large stones, seepage.	Severe: large stones, seepage.	Severe: slope, seepage.	Poor: slope, large stones.
Cut and fill land: Cy.					
Dekalb:					
DxB	Severe: depth to rock.	Severe: depth to rock, seepage, small stones.	Severe: depth to rock, seepage, large stones.	Severe: seepage.	Poor: large stones, small stones.
DxC	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage, large stones.	Severe: slope, seepage.	Poor: slope, large stones, small stones.
DxE	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage, large stones.	Severe: slope, seepage.	Poor: slope, large stones, small stones.
Empeyville:					
ExB	Severe: percs slowly, wetness.	Severe: large stones.	Severe: wetness.	Severe: wetness.	Poor: large stones.
Hartleton:					
HaB	Moderate: depth to rock.	Moderate: slope, seepage, small stones.	Severe: seepage, depth to rock.	Severe: seepage.	Poor: small stones.
HaC	Moderate: slope, depth to rock.	Severe: slope.	Severe: seepage, depth to rock.	Severe: seepage.	Poor: small stones.
Hazleton:					
HxB	Severe: large stones.	Severe: seepage, large stones.	Severe: seepage, large stones.	Severe: seepage.	Poor: small stones, large stones.

See footnote at end of table.

TABLE 9--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
HxC	Severe: slope, large stones.	Severe: slope, seepage, large stones.	Severe: seepage, large stones.	Severe: slope, seepage.	Poor: slope, small stones, large stones.
Holly:					
Hy	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, wetness.	Poor: wetness.
Kedron:					
KaB	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Fair: thin layer.
KaC	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Severe: wetness.	Fair: slope, thin layer.
KdB	Severe: percs slowly, wetness.	Moderate: slope, large stones.	Severe: wetness.	Severe: wetness.	Fair: thin layer, large stones.
Klinesville:					
KvB	Severe: depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: thin layer, small stones.
KvC	Severe: depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: thin layer, small stones.
KvD	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer, small stones.
Lackawanna:					
LaB	Severe: percs slowly.	Moderate: slope, small stones.	Moderate: depth to rock.	Slight	Fair: small stones, thin layer.
LaC	Severe: percs slowly.	Severe: slope.	Moderate: depth to rock.	Slight	Fair: slope, small stones, thin layer.
LaD	Severe: slope, percs slowly.	Severe: slope.	Moderate: slope, depth to rock.	Severe: slope.	Poor: slope.
LbB	Severe: percs slowly, large stones.	Severe: large stones.	Severe: large stones.	Slight	Poor: large stones.
LbC	Severe: slope, percs slowly, large stones.	Severe: slope, large stones.	Severe: large stones.	Severe: slope.	Poor: slope, large stones.
[1]LBE:					
Lackawanna part	Severe: slope, percs slowly, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.	Poor: slope, large stones.

See footnote at end of table.

TABLE 9--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Bath part---------	Severe: slope, large stones, percs slowly.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.	Poor: slope, large stones.
Laidig:					
LgB----------	Severe: percs slowly, large stones.	Severe: large stones.	Severe: large stones.	Slight----------	Poor: slope, large stones.
LgC----------	Severe: slope, percs slowly, large stones.	Severe: slope, large stones.	Severe: large stones.	Severe: slope.	Poor: slope, large stones.
Lawrenceville:					
Lh----------	Severe: percs slowly, wetness.	Slight----------	Severe: wetness.	Severe: wetness.	Fair: thin layer, too clayey.
Leck Kill:					
LkB----------	Moderate: depth to rock.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
LkC----------	Moderate: slope, depth to rock.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair. slope, small stones.
LkD----------	Severe: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope.
Lordstown:					
LsB----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight----------	Poor: small stones.
LsC----------	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Poor: small stones.
LsD----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope,	Poor: slope, small stones.
LxB----------	Severe: large stones, depth to rock.	Severe: depth to rock, large stones.	Severe: large stones, depth to rock.	Slight----------	Poor: large stones, small stones.
LxC----------	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: large stones, depth to rock.	Severe: slope.	Poor: slope, large stones, small stones.
[1]LyE:					
Lordstown part---	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, large stones, depth to rock.	Severe: slope.	Poor: slope, large stones, small stones.
Oquaga part------	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, large stones, depth to rock.	Severe: slope.	Poor: slope, large stones, small stones.
Mardin:					
MaB----------	Severe: percs slowly, wetness.	Moderate: small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones, thin layer.

See footnote at end of table.

TABLE 9--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MaC	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Severe: wetness.	Fair: small stones, thin layer.
MbB	Severe: percs slowly, wetness.	Moderate: small stones, large stones.	Severe: wetness.	Severe: wetness.	Fair: large stones, small stones, thin layer.
Meckesville:					
MeA	Severe: percs slowly.	Moderate: small stones.	Slight	Slight	Fair: small stones, too clayey.
MeB	Severe: percs slowly.	Moderate: slope, small stones.	Slight	Slight	Fair: small stones, too clayey.
MeC	Severe: percs slowly.	Severe: slope.	Slight	Moderate: slope.	Fair: slope, small stones, too clayey.
MfB	Severe: percs slowly.	Moderate: slope, large stones.	Moderate: large stones.	Slight	Fair: large stones, small stones, too clayey.
MfC	Severe: slope, percs slowly.	Severe: slope.	Moderate: slope, large stones.	Severe: slope.	Poor: slope.
Morris:					
MgB	Severe: percs slowly, wetness.	Moderate: slope, small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones, thin layer.
MoB	Severe: percs slowly, wetness, large stones.	Severe: large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: large stones.
MoC	Severe: percs slowly, wetness, large stones.	Severe: slope, large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: large stones.
Mucky peat:					
Mp, Ms	Severe: floods, wetness.	Severe: floods, wetness, excess humus.	Severe: floods, excess humus, wetness.	Severe: floods, wetness, seepage.	Poor: excess humus, wetness.
Oquaga:					
[1]OkB:					
Oquaga part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: thin layer, small stones.
Lackawanna part	Severe: percs slowly.	Moderate: slope, small stones.	Moderate: depth to rock.	Slight	Fair: small stones, thin layer.
[1]OkC:					
Oquaga part	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Fair: slope, thin layer, small stones.

See footnote at end of table.

TABLE 9--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Lackawanna part--	Severe: percs slowly.	Severe: slope.	Moderate: depth to rock.	Moderate: slope.	Fair: slope, small stones, thin layer.
[1]OkD: Oquaga part-------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope.
Lackawanna part--	Severe: slope, percs slowly.	Severe: slope.	Moderate: slope, depth to rock.	Severe: slope.	Poor: slope.
[1]OxB: Oquaga part-------	Severe: large stones, depth to rock.	Severe: depth to rock, large stones.	Severe: large stones, depth to rock.	Slight------------	Poor: large stones.
Lackawanna part--	Severe: percs slowly, large stones.	Severe: large stones.	Severe: large stones.	Slight------------	Poor: large stones.
[1]OxC: Oquaga part-------	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: large stones, depth to rock.	Severe: slope.	Poor: slope, large stones.
Lackawanna part--	Severe: slope, percs slowly, large stones.	Severe: slope, large stones.	Severe: large stones.	Severe: slope.	Poor: slope, large stones.
Philo: Ph----------	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, seepage.	Severe: floods.	Good.
Pope: Po, Pp----------	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: slope, seepage.	Good.
Rexford: ReA, ReB----------	Severe: percs slowly, wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: wetness.	Fair: small stones, thin layer.
Rushtown: RuC----------	Moderate: slope.	Severe: slope, seepage, small stones.	Severe: seepage, small stones.	Severe: seepage.	Poor: small stones.
RuD----------	Severe: slope.	Severe: slope, seepage, small stones.	Severe: seepage, small stones.	Severe: slope, seepage.	Poor: slope, small stones.
Sheffield: Sh----------	Severe: percs slowly, wetness.	Moderate: seepage.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Shelmadine: SmA----------	Severe: wetness, percs slowly.	Moderate: small stones.	Severe: wetness.	Severe: wetness.	Poor: wetness.

See footnote at end of table.

TABLE 9--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
SpB	Severe: wetness, percs slowly.	Moderate: slope, large stones.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Swartswood:					
SwB	Severe: percs slowly.	Moderate: slope, small stones.	Moderate: depth to rock.	Slight	Fair: small stones, thin layer.
SwC	Severe: percs slowly.	Severe: slope.	Moderate: depth to rock.	Moderate: slope.	Fair: small stones, thin layer.
SxB	Severe: percs slowly, large stones.	Severe: large stones.	Severe: large stones.	Slight	Poor: large stones.
SxC	Severe: slope, percs slowly, large stones.	Severe: slope, large stones.	Severe: large stones.	Severe: slope.	Poor: slope, large stones.
Very stony land:					
[1]VaC	Severe: large stones.	Severe: slope, large stones.	Severe: large stones.	Severe: large stones.	Poor: large stones.
[1]VaE	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Poor: slope, large stones.
Volusia:					
VoA	Severe: wetness, percs slowly.	Moderate: small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones, thin layer.
VoB	Severe: wetness, percs slowly.	Moderate: slope, small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones, thin layer.
VxB	Severe: wetness, percs slowly, large stones.	Severe: large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: large stones.
Watson:					
WaB	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Fair: thin layer, too clayey.
Wayland:					
Wb	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
Weikert:					
WeB3	Severe: depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: thin layer, small stones.
WeC3	Severe: depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: thin layer, small stones.
WeD3	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer, small stones.

See footnote at end of table.

TABLE 9--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
[1]WhB:					
Weikert part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: thin layer, small stones.
Hartleton part	Moderate: depth to rock.	Moderate: slope, seepage, small stones.	Severe: seepage, depth to rock.	Severe: seepage.	Poor: small stones.
[1]WhC:					
Weikert part	Severe: depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: thin layer, small stones.
Hartleton part	Moderate: slope, depth to rock.	Severe: slope.	Severe: seepage, depth to rock.	Severe: seepage.	Poor: small stones.
[1]WhD:					
Weikert part	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer, small stones.
Hartleton part	Severe: slope.	Severe: slope.	Severe: seepage, depth to rock.	Severe: slope, seepage.	Poor: slope, small stones.
[1]WKE:					
Weikert part	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer, small stones.
Klinesville part	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer, small stones.
Wellsboro:					
WmB	Severe: percs slowly, wetness.	Moderate: slope, small stones.	Severe: wetness.	Severe: wetness.	Fair: small stones, thin layer.
WmC	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Severe: wetness.	Fair: small stones, thin layer.
WpB	Severe: wetness, percs slowly, large stones.	Severe: large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: large stones.
WpC	Severe: slope, wetness, percs slowly, large stones.	Severe: slope, large stones.	Severe: wetness, large stones.	Severe: slope, wetness.	Poor: slope, large stones.
Worth:					
WrB	Severe: large stones, percs slowly.	Severe: large stones.	Severe: large stones.	Slight	Poor: large stones.
WrC	Severe: slope, percs slowly, large stones.	Severe: slope, large stones.	Severe: large stones.	Moderate: slope.	Poor: large stones, slope.

See footnote at end of table.

TABLE 9--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Wurtsboro:					
WsB	Severe: percs slowly, wetness.	Severe: large stones.	Severe: wetness.	Severe: wetness.	Fair: small stones, thin layer.
WxB	Severe: percs slowly, wetness, large stones.	Severe: large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: large stones.
WxC	Severe: slope, percs slowly, wetness, large stones.	Severe: slope, large stones.	Severe: wetness, large stones.	Severe: slope, wetness.	Poor: slope, large stones.
Wyoming:					
WyA, WyB	Slight	Severe: seepage, small stones.	Severe: seepage.	Severe: seepage.	Poor: small stones.
WyC	Moderate: slope, percs rapidly.	Severe: slope, seepage, small stones.	Severe: seepage.	Severe: seepage.	Poor: small stones.
WyD	Severe: slope, percs rapidly.	Severe: slope, seepage, small stones.	Severe: seepage.	Severe: slope, seepage.	Poor: slope, small stones.
WyE	Severe: slope, percs rapidly.	Severe: slope, seepage, small stones.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, small stones.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior characteristics of the map unit.

TABLE 10--CONSTRUCTION MATERIALS

["Frost action" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," and "unsuited." Absence of an entry means soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Alden:				
Ad	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Allenwood:				
AnA, AnB, AnC	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
Alluvial land:				
As	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, small stones.
Alvira:				
AvB	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
[1]AwB:				
Alvira part	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
Watson part	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
Bath:				
BaB, BaC	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
BaD	Fair: slope, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
BbB	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
BbC	Fair: frost action, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.
Benson:				
[1]BeB:				
Benson part	Fair: frost action, large stones.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, large stones.
Rock outcrop part.				
[1]BeC:				
Benson part	Fair: slope, frost action, large stones.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, thin layer, large stones.
Rock outcrop part.				
[1]BeF:				
Benson part	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, thin layer, large stones.
Rock outcrop part.				

See footnote at end of table.

TABLE 10--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Braceville:				
BrA, BrB	Fair: frost action, low strength.	Poor: excess fines.	Poor: excess fines.	Poor: small stones.
Buchanan:				
BuB	Fair: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones.
BxB	Fair: wetness, large stones, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
BxC	Fair: slope, wetness, large stones.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.
Chenango:				
ChA, ChB, ChC	Good	Fair: excess fines.	Good	Poor: small stones.
Chippewa:				
[1]CmA:				
Chippewa part	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Norwich part	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
[1]CnB:				
Chippewa part	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, large stones.
Norwich part	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness, large stones.
Clymer:				
CpA, CpB	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
CpC	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
CxB	Fair: frost action, large stones.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
CxC	Fair: slope, frost action, large stones.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.
Cut and fill land:				
Cy.				
Dekalb:				
DxB	Poor: thin layer.	Poor: excess fines.	Poor: excess fines.	Poor: small stones, large stones, area reclaim.
DxC	Poor: thin layer.	Poor: excess fines.	Poor: excess fines.	Poor: slope, large stones, area reclaim.

See footnote at end of table.

TABLE 10--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
DxE	Poor: slope, thin layer.	Poor: excess fines.	Poor: excess fines.	Poor: slope, large stones, area reclaim.
Empeyville:				
ExB	Fair: frost action, large stones.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
Hartleton:				
HaB, HaC	Fair: thin layer, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
Hazleton:				
HxB	Fair: frost action, large stones.	Poor: excess fines.	Poor: excess fines.	Poor: large stones.
HxC	Fair: slope, frost action, large stones.	Poor: excess fines.	Poor: excess fines.	Poor: slope, large stones.
Holly:				
Hy	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Kedron:				
KaB	Fair: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones.
KaC	Fair: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, small stones.
KdB	Fair: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
Klinesville:				
KvB, KvC	Fair: frost action, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
KvD	Fair: slope, frost action, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
Lackawanna:				
LaB, LaC	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
LaD	Fair: slope, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
LbB	Fair: frost action, large stones.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
LbC	Fair: slope, frost action, large stones.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.

See footnote at end of table.

TABLE 10--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
[1]LBE:				
Lackawanna part----	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.
Bath part----------	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.
Laidig:				
LgB----------	Fair: large stones.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
LgC----------	Fair: slope, large stones.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.
Lawrenceville:				
Lh----------	Fair: low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Leck Kill:				
LkB, LkC----------	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
LkD----------	Fair: slope, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
Lordstown:				
LsB, LsC----------	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
LsD----------	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
LxB----------	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
LxC----------	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.
[1]LyE:				
Lordstown part-----	Poor: slope, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.
Oquaga part--------	Poor: slope, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.
Mardin:				
MaB, MaC----------	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
MbB----------	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
MbC----------	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.
Meckesville:				
MeA, MeB, MeC--------	Fair: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.

See footnote at end of table.

TABLE 10--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
MfB	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
MfC	Fair: slope, frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.
Morris:				
MgB	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
MoB, MoC	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
Mucky peat:				
Mp, Ms	Poor: excess humus, wetness, area reclaim.	Unsuited: excess humus.	Unsuited: excess humus.	Poor: wetness, excess humus.
Oquaga:				
[1]OkB:				
Oquaga part	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
Lackawanna part	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
[1]OkC:				
Oquaga part	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
Lackawanna part	Fair: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
[1]OkD:				
Oquaga part	Poor: slope, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
Lackawanna part	Fair: slope, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
[1]OxB:				
Oquaga part	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
Lackawanna part	Fair: frost action, large stones.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
[1]OxC:				
Oquaga part	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.
Lackawanna part	Fair: slope, frost action, large stones.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.
Philo:				
Ph	Fair: low strength, frost action.	Poor: excess fines.	Unsuited: excess fines.	Good.

See footnote at end of table.

TABLE 10--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Pope:				
Po, Pp	Fair: frost action.	Poor: excess fines.	Unsuited: excess fines.	Good.
Rexford:				
ReA, ReB	Poor: wetness, frost action.	Poor: excess fines.	Poor: excess fines.	Poor: wetness, small stones.
Rushtown:				
RuC	Good	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
RuD	Fair: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
Sheffield:				
Sh	Poor: wetness, low strength, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Shelmadine:				
SmA, SpB	Poor: wetness, frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
Swartswood:				
SwB, SwC	Fair: frost action.	Poor: excess fines.	Poor: excess fines.	Poor: small stones.
SxB	Fair: frost action, large stones.	Poor: excess fines.	Poor: excess fines.	Poor: large stones.
SxC	Fair: large stones, slope, frost action.	Poor: excess fines.	Poor: excess fines.	Poor: slope, large stones.
Very stony land:				
[1]VaC	Poor: large stones.	Unsuited: large stones.	Unsuited: large stones.	Poor: large stones.
[1]VaE	Poor: large stones, slope.	Unsuited: large stones.	Unsuited: large stones.	Poor: slope, large stones.
Volusia:				
VoA, VoB	Fair: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
VxB	Fair: wetness, large stones, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
Watson:				
WaB	Fair: frost action, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: small stones.
Wayland:				
Wb	Poor: wetness, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.

See footnote at end of table.

TABLE 10--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Weikert:				
WeB3, WeC3	Fair: frost action, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones, thin layer.
WeD3	Fair: slope, frost action, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones, thin layer.
[1]WhB:				
Weikert part	Fair: frost action, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones, thin layer.
Hartleton part	Fair: thin layer, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
[1]WhC:				
Weikert part	Fair: frost action, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones, thin layer.
Hartleton part	Fair: thin layer, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
[1]WhD:				
Weikert part	Fair: slope, frost action, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones, thin layer.
Hartleton part	Fair: slope, frost action, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
[1]WKE:				
Weikert part	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones, thin layer.
Klinesville part	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones, thin layer.
Wellsboro:				
WmB, WmC	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
WpB	Poor: frost action.	Unsuited: excess fines.	Unsuited: exces fines.	Poor: large stones.
WpC	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.
Worth:				
WrB	Fair: large stones, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
WrC	Fair: slope, large stones, frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.

See footnote at end of table.

TABLE 10--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Wurtsboro:				
WsB	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
WxB	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: large stones.
WxC	Poor: frost action.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, large stones.
Wyoming:				
WyA, WyB, WyC	Good	Good	Good	Poor: small stones.
WyD	Fair: slope.	Good	Good	Poor: slope, small stones.
WyE	Poor: slope.	Good	Good	Poor: slope, small stones.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior characteristics of the map unit.

TABLE 11--WATER MANAGEMENT

["Seepage" and some of the other terms that describe restrictive soil features are defined in the Glossary. Absence of an entry means soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Alden:						
Ad	Favorable	Excess humus	Favorable	Wetness, percs slowly, poor outlets.	Percs slowly, poor outlets, wetness.	Not needed.
Allenwood:						
AnA, AnB, AnC	Seepage, slope.	Low strength, compressible, piping.	No water	Not needed	Complex slope	Favorable.
Alluvial land:						
As	Seepage	Unstable fill	Large stones, deep to water.	Floods, wetness.	Wetness	Wetness.
Alvira:						
AvB	Depth to rock, slope.	Low strength, compressible, piping.	Slow refill.	Percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, erodes easily, wetness.
[1]AwB:						
Alvira part	Depth to rock, slope.	Low strength, piping, large stones.	Slow refill, large stones.	Percs slowly, wetness.	Percs slowly, large stones, wetness.	Percs slowly, large stones, wetness.
Watson part	Slope	Large stones, piping, low strength.	Large stones, deep to water.	Percs slowly, wetness.	Percs slowly, wetness, large stones.	Percs slowly, erodes easily, large stones.
Bath:						
BaB, BaC, BaD	Favorable, slope.	Favorable	No water	Not needed	Percs slowly, erodes easily.	Percs slowly, slope, erodes easily.
BbB, BbC	Slope	Large stones	Large stones, no water.	Not needed	Large stones, slope.	Large stones, slope, percs slowly.
Benson:						
[1]BeB:						
Benson part	Depth to rock, slope.	Thin layer, large stones.	Deep to water, depth to rock, large stones.	Not needed	Depth to rock, rooting depth, large stones.	Rooting depth, complex slopes, large stones.
Rock outcrop part.						
[1]BeC:						
Benson part	Depth to rock, slope.	Thin layer, large stones.	Deep to water, depth to rock, large stones.	Not needed	Depth to rock, slope, rooting depth.	Rooting depth, complex slope, large stones.
Rock outcrop part.						
[1]BeF:						
Benson part	Depth to rock, slope.	Thin layer, large stones.	Deep to water, depth to rock, large stones.	Not needed	Depth to rock, slope, rooting depth.	Rooting depth, slope, large stones.
Rock outcrop part.						
Braceville:						
BrA, BrB	Seepage	Low strength, piping.	Slow refill, deep to water.	Percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, wetness.
Buchanan:						
BuB	Slope	Piping, low strength.	Deep to water, slow refill.	Percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, wetness.

See footnote at end of table.

TABLE 11--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Buchanan:						
BxB, BxC	Slope	Large stones, piping, low strength.	Deep to water, large stones.	Percs slowly, slope, wetness	Wetness, large stones, percs slowly.	Large stones, percs slowly, wetness.
Chenango:						
ChA, ChB, ChC	Seepage	Seepage, piping.	No water	Not needed	Complex slope, piping.	Droughty, complex slope.
Chippewa:						
[1]CmA:						
Chippewa part	Favorable	Favorable	Favorable	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
Norwich part	Favorable	Favorable	Favorable	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
[1]CnB:						
Chippewa part	Favorable, slope.	Large stones	Large stones	Wetness, percs slowly.	Large stones, wetness, percs slowly.	Large stones, wetness, percs slowly.
Norwich part	Favorable, slope.	Large stones	Large stones	Wetness, percs slowly.	Large stones, wetness, percs slowly.	Large stones, wetness, percs slowly.
Clymer:						
CpA, CpB, CpC	Seepage, slope.	Piping	No water	Not needed	Erodes easily.	Erodes easily.
CxB, CxC	Seepage, slope.	Piping, large stones.	No water	Not needed	Large stones, erodes easily.	Large stones.
Cut and fill land: Cy.						
Dekalb:						
DxB, DxC, DxE	Depth to rock, seepage, slope.	Piping, seepage, large stones.	No water, large stones, depth to rock.	Not needed	Depth to rock, large stones.	Droughty, rooting depth, large stones.
Empeyville:						
ExB	Slope	Large stones, piping.	Deep to water, large stones.	Percs slowly, large stones.	Percs slowly, large stones, wetness.	Percs slowly, wetness, large stones.
Hartleton:						
HaB, HaC	Slope, seepage, depth to rock.	Low strength	No water, depth to rock.	Not needed	Depth to rock	Droughty.
Hazleton:						
HxB, HxC	Depth to rock, seepage, slope	Low strength, piping.	No water	Not needed	Large stones	Large stones.
Holly:						
Hy	Seepage	Piping	Favorable	Wetness, poor outlets.	Wetness, poor outlets.	Wetness.
Kedron:						
KaB, KaC	Slope	Piping, hard to pack.	Slow refill	Percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, wetness, erodes easily.
KdB	Slope	Piping, hard to pack.	Slow refill	Percs slowly, wetness.	Percs slowly, wetness, large stones.	Wetness, erodes easily, large stones.

See footnote at end of table.

TABLE 11--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Klinesville:						
KvB, KvC, KvD-----	Seepage, slope.	Seepage, thin layer.	No water, depth to rock.	Not needed-----	Depth to rock, rooting depth.	Rooting depth, droughty.
Lackawanna:						
LaB, LaC, LaD-----	Slope----------	Piping---------	No water-------	Not needed-----	Percs slowly, erodes easily.	Percs slowly, erodes easily.
LbB, LbC----------	Slope----------	Large stones, piping.	No water, large stones.	Not needed-----	Large stones, percs slowly, erodes easily.	Large stones, percs slowly.
[1]LBE:						
Lackawanna part	Slope----------	Large stones, piping.	No water, large stones.	Not needed-----	Large stones, percs slowly, erodes easily.	Large stones, percs slowly, slope.
Bath part------	Slope----------	Large stones---	Large stones, no water.	Not needed-----	Large stones, percs slowly, erodes easily.	Large stones, slope, percs slowly.
Laidig:						
LgB, LgC----------	Seepage, slope.	Large stones---	No water, large stones.	Not needed-----	Large stones, percs slowly.	Large stones, percs slowly.
Lawrenceville:						
Lh----------	Favorable------	Low strength, piping.	Deep to water--	Percs slowly, wetness.	Erodes easily, percs slowly, wetness.	Percs slowly, erodes easily.
Leck Kill:						
LkB, LkC, LkD-----	Seepage, slope.	Low strength, compressible, piping.	No water-------	Not needed-----	Piping, erodes easily.	Slope.
Lordstown:						
LsB, LsC, LsD-----	Depth to rock, slope, seepage.	Thin layer, low strength.	No water, depth to rock.	Not needed-----	Depth to rock, rooting depth.	Droughty, rooting depth.
LxB, LxC----------	Slope, depth to rock, seepage.	Thin layer, large stones, low strength.	Depth to rock, no water, large stones.	Not needed-----	Depth to rock, large stones, rooting depth.	Droughty, rooting depth, large stones.
[1]LyE:						
Lordstown part-	Slope, depth to rock, seepage.	Thin layer, large stones, low strength.	Depth to rock, no water, large stones.	Not needed-----	Depth to rock, large stones, rooting depth.	Rooting depth, large stones.
Oquaga part-----	Slope, depth to rock, seepage.	Thin layer, large stones.	Depth to rock, large stones, no water.	Not needed-----	Depth to rock, large stones, rooting depth.	Depth to rock, rooting depth, large stones.
Mardin:						
MaB, MaC----------	Slope----------	Favorable------	Deep to water--	Percs slowly, slope, wetness	Percs slowly, wetness.	Percs slowly,
MbB, MbC----------	Slope----------	Large stones---	Deep to water, large stones.	Percs slowly, slope, wetness	Percs slowly, wetness, large stones.	Percs slowly, large stones.
Meckesville:						
MeA, MeB, MeC-----	Slope, seepage	Piping---------	No water-------	Not needed-----	Piping---------	Percs slowly.
MfB, MfC----------	Slope, seepage	Large stones, piping.	No water, large stones.	Not needed-----	Large stones, piping, percs slowly.	Percs slowly, large stones.

See footnote at end of table.

TABLE 11--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Morris:						
MgB	Favorable, slope.	Favorable	Favorable, slope.	Percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, wetness.
MoB, MoC	Favorable, slope.	Large stones	Large stones, slope.	Percs slowly, wetness.	Percs slowly, wetness, large stones.	Percs slowly, wetness, large stones.
Mucky peat:						
Mp, Ms	Seepage, excess humus.	Excess humus, unstable fill.	Favorable	Wetness, poor outlets.	Poor outlets, wetness.	Wetness.
Oquaga:						
[1]OkB:						
Oquaga part	Depth to rock, slope, seepage	Piping, thin layer.	No water, depth to rock.	Not needed	Depth to rock, rooting depth.	Droughty, rooting depth.
Lackawanna part	Slope	Piping	No water	Not needed	Percs slowly, erodes easily.	Percs slowly, erodes easily.
[1]OkC:						
Oquaga part	Depth to rock, slope, seepage	Piping, thin layer.	No water, depth to rock.	Not needed	Depth to rock, rooting depth.	Droughty, rooting depth.
Lackawanna part	Slope	Piping	No water	Not needed	Percs slowly, erodes easily.	Percs slowly, erodes easily.
[1]OkD:						
Oquaga part	Depth to rock, slope seepage.	Piping, thin layer.	No water, depth to rock.	Not needed	Depth to rock, rooting depth.	Droughty, rooting depth.
Lackawanna part	Slope	Piping	No water	Not needed	Percs slowly, erodes easily, slope.	Percs slowly, erodes easily.
[1]OxB:						
Oquaga part	Slope, depth to rock, seepage.	Thin layer, large stones, piping.	Depth to rock, large stones, no water.	Not needed	Depth to rock, large stones, rooting depth.	Rooting to depth, large stones.
Lackawanna part	Slope	Large stones, piping.	No water, large stones.	Not needed	Large stones, percs slowly.	Large stones, percs slowly.
[1]OxC:						
Oquaga part	Slope, depth to rock, seepage.	Thin layer, large stones, piping.	Depth to rock, large stones, no water.	Not needed	Depth to rock, large stones, rooting depth.	Rooting depth, large stones.
Lackawanna part	Slope	Large stones, piping.	No water, large stones.	Not needed	Large stones, percs slowly, slope.	Large stones, percs slowly.
Philo:						
Ph	Seepage	Piping	Deep to water	Wetness, poor outlets.	Wetness, poor outlets.	Not needed.
Pope:						
Po, Pp	Seepage	Piping	No water	Not needed	Not needed	Not needed.
Rexford:						
ReA, ReB	Seepage	Piping, low strength.	Slow refill	Percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, wetness.
Rushtown:						
RuC, RuD	Seepage, slope.	Seepage, piping.	No water	Not needed	Complete slopes piping.	Droughty, slope.
Sheffield:						
Sh	Favorable	Piping, low strength.	Favorable	Percs slowly, wetness.	Wetness, percs slowly.	Wetness, percs slowly.

See footnote at end of table.

TABLE 11--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Shelmadine:						
SmA, SpB	Favorable, slope.	Piping, low strength.	Favorable	Wetness, percs slowly.	Percs slowly, erodes easily, wetness.	Percs slowly, erodes easily, wetness.
Swartswood:						
SwB, SwC	Slope	Piping	No water	Not needed	Percs slowly, erodes easily.	Percs slowly, erodes easily.
SxB, SxC	Slope	Large stones, piping.	No water	Not needed	Large stones, percs slowly, erodes easily.	Large stones, percs slowly. erodes easily.
Very stony land:						
[1]VaC, [1]VaE	Slope, seepage.	Large stones, seepage.	Large stones, no water, depth to rock.	Not needed	Large stones, slope.	Large stones, slope.
Volusia:						
VoA, VoB	Favorable, slope.	Favorable	Slow refill	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
VxB	Favorable, slope.	Large stones	Large stones, slow refill.	Wetness, percs slowly.	Wetness, large stones, percs slowly.	Wetness, large stones, percs slowly.
Watson:						
WaB	Slope	Piping, low strength.	Deep to water	Percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, erodes easily.
Wayland:						
Wb	Favorable	Piping	Favorable	Wetness, poor outlets.	Wetness, poor outlets.	Wetness.
Weikert:						
WeB3, WeC3, WeD3	Seepage, slope, depth to rock.	Thin layer, low strength, seepage.	No water, depth to rock.	Not needed	Depth to rock, rooting depth.	Rooting depth, droughty.
[1]WhB:						
Weikert part	Seepage, slope, depth to rock.	Thin layer, low strength, seepage.	No water, depth to rock.	Not needed	Depth to rock, rooting depth.	Rooting depth, droughty.
Hartleton part	Slope, seepage, depth to rock.	Low strength	No water, depth to rock.	Not needed	Depth to rock	Slope, droughty.
[1]WhC:						
Weikert part	Seepage, slope, depth to rock.	Thin layer, low strength, seepage.	No water, depth to rock.	Not needed	Depth to rock, rooting depth.	Rooting depth, droughty.
Hartleton part	Slope, seepage, depth to rock.	Low strength	No water, depth to rock.	Not needed	Depth to rock	Droughty.
[1]WhD:						
Weikert part	Seepage, slope, depth to rock.	Thin layer, low strength, seepage.	No water, depth to rock.	Not needed	Depth to rock, rooting depth, slope.	Rooting depth, droughty, slope.
Hartleton part	Slope, seepage, depth to rock.	Low strength	No water, depth to rock.	Not needed	Slope, depth to rock.	Slope, droughty
[1]WKE:						
Weikert part	Seepage, slope, depth to rock.	Thin layer, low strength, seepage.	No water, depth to rock.	Not needed	Depth to rock, rooting depth, slope.	Rooting depth, droughty, slope.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Klinesville part----------	Seepage, slope, depth to rock.	Seepage, thin layer.	No water, depth to rock.	Not needed-----	Depth to rock, rooting depth, slope.	Rooting depth, droughty, slope.
Wellsboro:						
WmB, WmC----------	Favorable, slope.	Favorable-------	Deep to water--	Percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, wetness.
WpB, WpC----------	Favorable, slope.	Large stones----	Deep to water, large stones.	Percs slowly, wetness.	Percs slowly, large stones, wetness.	Percs slowly, wetness, large stones.
Worth:						
WrB, WrC----------	Favorable, slope.	Large stones, piping.	No water, large stones.	Not needed-----	Percs slowly, large stones.	Percs slowly, large stones.
Wurtsboro:						
WsB----------	Slope----------	Piping----------	Deep to water	Percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, wetness.
WxB, WxC----------	Slope----------	Large stones----	Deep to water, large stones.	Percs slowly, wetness.	Percs slowly, wetness, large stones.	Percs slowly, slope, large stones.
Wyoming:						
WyA, WyB, WyC, WyD, WyE----------	Seepage, slope.	Seepage, piping.	No water--------	Not needed-----	Complex slope, piping.	Droughty, slope.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior characteristics of the map unit.

TABLE 12--RECREATIONAL DEVELOPMENT

["Percs slowly" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Alden:				
Ad	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Allenwood:				
AnA, AnB	Moderate: small stones, percs slowly.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
AnC	Moderate: slope, small stones, percs slowly.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
Alluvial land:				
As	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
Alvira:				
AvB	Moderate: wetness, small stones, percs slowly.	Moderate: wetness, small stones.	Severe: wetness, small stones.	Moderate: wetness, small stones.
[1]AwB:				
Alvira part	Moderate: wetness, large stones, percs slowly.	Moderate: wetness, small stones.	Severe: slope, wetness, small stones.	Moderate: wetness, large stones.
Watson part	Moderate: percs slowly, large stones, wetness.	Slight	Moderate: slope.	Moderate: large stones.
Bath:				
BaB	Moderate: small stones, percs slowly.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
BaC	Moderate: slope, small stones, percs slowly.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
BaD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
BbB	Moderate: large stones.	Moderate: small stones.	Severe: small stones.	Moderate: large stones.
BbC	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, large stones.
Benson:				
[1]BeB:				
Benson part	Severe: large stones.	Moderate: small stones, large stones.	Severe: depth to rock, small stones, large stones.	Severe: large stones.
Rock outcrop part.				

See footnote at end of table.

TABLE 12--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
[1]BeC:				
Benson part	Severe: slope, large stones.	Severe: slope.	Severe: slope, depth to rock, large stones.	Severe: large stones.
Rock outcrop part.				
[1]BeF:				
Benson part	Severe: slope, large stones.	Severe: slope.	Severe: slope, depth to rock, large stones.	Severe: slope, large stones.
Rock outcrop part.				
Braceville:				
BrA, BrB	Moderate: wetness, small stones, percs slowly.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
Buchanan:				
BuB	Moderate: wetness, percs slowly.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
BxB	Severe: large stones.	Moderate: wetness, large stones.	Severe: large stones, wetness.	Severe: large stones.
BxC	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, wetness.	Severe: large stones.
Chenango:				
ChA, ChB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
ChC	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
Chippewa:				
[1]CmA:				
Chippewa part	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Norwich part	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.
[1]CnB:				
Chippewa part	Severe: wetness, large stones.	Severe: wetness.	Severe: wetness, large stones.	Severe: wetness, large stones.
Norwich part	Severe: wetness, large stones, percs slowly.	Severe: wetness.	Severe: wetness, large stones, percs slowly.	Severe: wetness, large stones.
Clymer:				
CpA	Slight	Slight	Slight	Slight.
CpB	Slight	Slight	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 12--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
CpC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
CxB	Severe: large stones.	Moderate: large stones.	Severe: large stones.	Severe: large stones.
CxC	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones.	Severe: large stones.
Cut and fill land: Cy.				
Dekalb:				
DxB	Severe: large stones.	Moderate: small stones, large stones.	Severe: small stones, large stones.	Severe: large stones.
DxC	Severe: slope, large stones.	Severe: slope.	Severe: slope, small stones, large stones.	Severe: large stones.
DxE	Severe: slope, large stones.	Severe: slope.	Severe: slope, small stones, large stones.	Severe: slope, large stones.
Empeyville:				
ExB	Severe: large stones.	Moderate: large stones, wetness.	Severe: large stones, wetness.	Severe: large stones.
Hartleton:				
HaB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
HaC	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
Hazleton:				
HxB	Severe: large stones.	Moderate: large stones, small stones.	Severe: small stones, large stones.	Severe: large stones.
HxC	Severe: slope, large stones.	Severe: slope.	Severe: slope, small stones, large stones.	Severe: large stones.
Holly:				
Hy	Severe: wetness, floods.	Severe: wetness.	Severe: wetness, floods.	Severe: wetness, floods.
Kedron:				
KaB	Moderate: wetness, percs slowly.	Slight	Moderate: slopes, wetness, percs slowly.	Slight.
KaC	Moderate: slope, wetness, percs slowly.	Moderate: slope.	Severe: slope.	Slight.

See footnote at end of table.

TABLE 12--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
KdB	Moderate: wetness, small stones, large stones.	Slight	Moderate: slope, wetness, percs slowly.	Moderate: large stones.
Klinesville:				
KvB	Moderate: small stones.	Moderate: small stones.	Severe: depth to rock, small stones.	Moderate: small stones.
KvC	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones, depth to rock.	Moderate: small stones.
KvD	Severe: slope.	Severe: slope.	Severe: slope, small stones, depth to rock.	Moderate: slope, small stones.
Lackawanna:				
LaB	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
LaC	Moderate: slope, percs slowly, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
LaD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
LbB	Severe: large stones.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones.
LbC	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: large stones.
[1]LBE:				
Lackawanna part	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: slope, large stones.
Bath part	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: slope, large stones.
Laidig:				
LgB	Severe: large stones.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones.
LgC	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: large stones.
Lawrenceville:				
Lh	Moderate: percs slowly, wetness.	Slight	Moderate: percs slowly, wetness.	Slight.

See footnote at end of table.

TABLE 12--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Leck Kill:				
LkB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
LkC	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
LkD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
Lordstown:				
LsB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
LsC	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
LsD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
LxB	Severe: large stones.	Moderate: large stones.	Severe: large stones, small stones.	Severe: large stones.
LxC	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: large stones.
[1]LyE:				
Lordstown part	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: slope, large stones.
Oquaga part	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones, small stones.	Severe: slope, large stones.
Mardin:				
MaB	Moderate: percs slowly, wetness, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
MaC	Moderate: slope, percs slowly, small stones.	Moderate: small stones.	Severe: slope, small stones.	Moderate: small stones.
MbB	Moderate: percs slowly, wetness, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: large stones.
MbC	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, large stones.
Meckesville:				
MeA, MeB	Moderate: small stones, percs slowly.	Moderate: slope, small stones.	Severe: small stones.	Moderate: small stones.
MeC	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.

See footnote at end of table.

TABLE 12--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
MfB	Moderate: large stones, percs slowly.	Moderate: small stones.	Severe: small stones.	Moderate: large stones.
MfC	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, large stones.
Morris:				
MgB	Severe: percs slowly.	Moderate: wetness, small stones.	Severe: small stones, wetness, percs slowly.	Moderate: wetness, small stones.
MoB	Severe: large stones, percs slowly.	Moderate: large stones, wetness.	Severe: large stones, wetness, percs slowly.	Severe: large stones.
MoC	Severe: large stones, percs slowly.	Moderate: slope, wetness, large stones.	Severe: slope, large stones, wetness.	Severe: large stones.
Mucky peat:				
Mp, Ms	Severe: floods, excess humus, wetness.	Severe: floods, excess humus, wetness.	Severe: floods, excess humus, wetness.	Severe: floods, excess humus, wetness.
Oquaga:				
[1]OkB:				
Oquaga part	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
Lackawanna part	Moderate: percs slowly, small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
[1]OkC:				
Oquaga part	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
Lackawanna part	Moderate: slope, percs slowly, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
[1]OkD:				
Oquaga part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
Lackawanna part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
[1]OxB:				
Oquaga part	Severe: large stones.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones.
Lackawanna part	Severe: large stones.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones.

See footnote at end of table.

TABLE 12--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
[1]OxC:				
Oquaga part	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: large stones.
Lackawanna part	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: large stones.
Philo:				
Ph	Severe: floods.	Moderate: floods.	Moderate: floods, wetness.	Slight.
Pope:				
Po	Severe: floods.	Moderate: floods.	Moderate: floods.	Slight.
Pp	Severe: floods.	Slight	Slight	Slight.
Rexford:				
ReA, ReB	Severe: wetness.	Severe: wetness.	Severe: wetness, small stones.	Severe: wetness.
Rushtown:				
RuC	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
RuD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
Sheffield:				
Sh	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, percs slowly.	Severe: wetness.
Shelmadine:				
SmA, SpB	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Swartswood:				
SwB	Moderate: small stones, percs slowly.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
SwC	Moderate: slope, small stones, percs slowly.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
SxB	Severe: large stones.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones.
SxC	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: large stones.
Very stony land:				
[1]VaC	Severe: large stones.	Severe: large stones.	Severe: slope, large stones.	Severe: large stones.

See footnote at end of table.

TABLE 12--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Volusia:				
VoA, VoB	Severe: percs slowly.	Moderate: wetness, small stones.	Severe: small stones, wetness, percs slowly.	Moderate: wetness, small stones.
VxB	Severe: large stones, percs slowly.	Moderate: wetness, large stones, small stones.	Severe: large stones, wetness, percs slowly.	Severe: large stones.
Watson:				
WaB	Moderate: percs slowly, wetness.	Slight	Moderate: slope, percs slowly, wetness.	Slight.
Wayland:				
Wb	Severe: wetness, floods, percs slowly.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Weikert:				
WeB3	Moderate: small stones.	Moderate: small stones.	Severe: depth to rock, small stones.	Moderate: small stones.
WeC3	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, depth to rock, small stones.	Moderate: small stones.
WeD3	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, small stones.	Moderate: slope, small stones.
[1]WhB:				
Weikert part	Moderate: small stones.	Moderate: small stones.	Severe: depth to rock, small stones.	Moderate: small stones.
Hartleton part	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
[1]WhC:				
Weikert part	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, depth to rock, small stones.	Moderate: small stones.
Hartleton part	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
[1]WhD:				
Weikert part	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, small stones.	Moderate: slope, small stones.
Hartleton part	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.

See footnote at end of table.

TABLE 12--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
[1]WKE:				
Weikert part	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, small stones.	Severe: slope.
Klinesville part	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, small stones.	Severe: slope.
Wellsboro:				
WmB	Moderate: percs slowly, small stones, wetness.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
WmC	Moderate: slope, percs slowly, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
WpB	Severe: large stones.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones.
WpC	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: large stones.
Worth:				
WrB	Severe: large stones.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones.
WrC	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: large stones.
Wurtsboro:				
WsB	Moderate: percs slowly, small stones, wetness.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
WxB	Severe: large stones.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Severe: large stones.
WxC	Severe: slope, large stones.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: large stones.
Wyoming:				
WyA, WyB	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
WyC	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
WyD	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
WyE	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior characteristics of the map unit.

TABLE 13--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Alden:										
Ad	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Allenwood:										
AnA	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AnB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AnC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Alluvial land:										
As	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Alvira:										
AvB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
[1]AwB:										
Alvira part	Very poor.	Poor	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
Watson part	Very poor.	Poor	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
Bath:										
BaB	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
BaC	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
BaD	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
BbB	Very poor.	Poor	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
BbC	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Benson:										
[1]BeB:										
Benson part	Very poor.	Very poor.	Fair	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.
Rock outcrop part.										
[1]BeC:										
Benson part	Very poor.	Very poor.	Fair	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Rock outcrop part.										
[1]BeF:										
Benson part	Very poor.	Very poor.	Fair	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Rock outcrop part.										

See footnote at end of table.

TABLE 13--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Braceville:										
BrA	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor.
BrB	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
Buchanan:										
BuB	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
BxB	Very poor.	Very poor.	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
BxC	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Chenango:										
ChA, ChB, ChC	Fair	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
Chippewa:										
[1]CmA:										
Chippewa part	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Norwich part	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
[1]CnB:										
Chippewa part	Very poor.	Very poor.	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
Norwich part	Very poor.	Very poor.	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
Clymer:										
CpA	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CpB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CpC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CxB	Very poor.	Very poor.	Good	Good	Good	Poor	Very poor.	Poor	Fair	Very poor.
CxC	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Cut and fill land: Cy.										
Dekalb:										
DxB, DxC, DxE	Very poor.	Very poor.	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Empeyville:										
ExB	Very poor.	Very poor.	Good	Fair	Fair	Poor	Very poor.	Very poor.	Fair	Very poor.
Hartleton:										
HaB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HaC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 13--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Hazleton:										
HxB	Very poor.	Very poor.	Good	Good	Good	Poor	Very poor.	Poor	Fair	Very poor.
HxC	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Holly:										
Hy	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Kedron:										
KaB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KaC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
KdB	Very poor.	Poor	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Klinesville:										
KvB, KvC, KvD	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Lackawanna:										
LaB	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
LaC	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
LaD	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
LbB	Very poor.	Very poor.	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
LbC	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
[1]LBE:										
Lackawanna part	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Bath part	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Laidig:										
LgB	Very poor.	Very poor.	Good	Good	Good	Poor	Very poor.	Poor	Fair	Very poor.
LgC	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Lawrenceville:										
Lh	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Leck Kill:										
LkB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LkC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LkD	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 13--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Lordstown:										
LsB	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
LsC	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
LsD	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
LxB	Very poor.	Very poor.	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
LxC	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
[1]LyE:										
Lordstown part	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Oquaga part	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Mardin:										
MaB	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
MaC	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
MbB	Very poor.	Poor	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
MbC	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Meckesville:										
MeA	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MeB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MeC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MfB	Very poor.	Poor	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
MfC	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Morris:										
MgB	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
MoB	Very poor.	Very poor.	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
MoC	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Mucky peat:										
Mp, Ms	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.

See footnote at end of table.

TABLE 13--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Oquaga:										
[1]OkB:										
Oquaga part-----	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Very poor.
Lackawanna part-	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
[1]OkC:										
Oquaga part-----	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Good	Very poor.
Lackawanna part-	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
[1]OkD:										
Oquaga part-----	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Lackawanna part-	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
[1]OxB:										
Oquaga part-----	Very poor.	Very poor.	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
Lackawanna part-	Very poor.	Very poor.	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
[1]OxC:										
Oquaga part-----	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Lackawanna part-	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Philo:										
Ph----------	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Pope:										
Po, Pp----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Rexford:										
ReA----------	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
ReB----------	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Rushtown:										
RuC, RuD----------	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
Sheffield:										
Sh----------	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Shelmadine:										
SmA----------	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
SpB----------	Very poor.	Poor	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
Swartswood:										
SwB----------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 13--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
SwC	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
SxB	Very poor.	Very poor.	Good	Good	Good	Poor	Very poor.	Poor	Fair	Very poor.
SxC	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Very stony land: [1]VaC, [1]VaE	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Volusia: VoA	Fair	Fair	Good	Poor	Poor	Fair	Fair	Fair	Fair	Fair.
VoB	Fair	Fair	Good	Poor	Poor	Fair	Very poor.	Fair	Fair	Very poor.
VxB	Very poor.	Very poor.	Good	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.
Watson: WaB	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Wayland: Wb	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Weikert: WeB3, WeC3, WeD3	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
[1]WhB: Weikert part	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Hartleton part	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
[1]WhC: Weikert part	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Hartleton part	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
[1]WhD: Weikert part	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Hartleton part	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
[1]WKE: Weikert part	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Klinesville part	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Wellsboro: WmB	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.

See footnote at end of table.

TABLE 13--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
WmC	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
WpB	Very poor.	Very poor.	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
WpC	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Worth:										
WrB	Very poor.	Very poor.	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
WrC	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Wurtsboro:										
WsB	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
WxB	Very poor.	Very poor.	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
WxC	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Wyoming:										
WyA, WyB, WyC, WyD	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
WyE	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior characteristics of the map unit.

TABLE 14--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means greater than. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Alden:											
Ad	0-9	Mucky silt loam	ML, OL	A-5, A-7	0	95-100	85-100	70-95	50-85	40-50	5-15
	9-35	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	85-100	70-95	55-85	20-35	5-15
	35-60	Gravelly loam, loam.	CL, GC, SC, CL-ML	A-2, A-4, A-6	0-5	60-95	50-80	45-80	30-75	20-35	5-15
Allenwood:											
AnA, AnB, AnC	0-9	Gravelly silt loam.	ML, CL, GM, SM	A-4, A-6, A-7	0-10	60-85	60-85	50-85	40-80	---	---
	9-59	Gravelly silty clay loam, gravelly loam, gravelly clay loam.	ML, GM, SM, MH	A-4, A-5 A-6, A-7	0-15	60-95	45-90	45-90	35-75	25-55	5-23
	59-72	Gravelly clay loam, gravelly silty clay loam, gravelly loam.	CL, SM, GM, MH	A-1, A-2 A-4, A-7	0-20	25-100	25-80	20-80	15-75	5-55	NP-23
Alluvial land:											
As	0-60	Variable	---	---	---	---	---	---	---	---	---
Alvira:											
AvB	0-10	Gravelly silt loam.	ML, GM, SM	A-4	0-10	60-85	55-85	50-75	35-65	---	---
	10-17	Gravelly silt loam, gravelly silty clay loam, gravelly loam.	CL, CL-ML, SM-SC, GM-GC, GM-GC	A-4, A-6	0-10	65-100	55-90	50-90	35-85	25-40	5-15
	17-60	Gravelly silt loam, gravelly loam, gravelly silty clay loam.	CL, CL-ML, GM-GC, SM-SC	A-4, A-6, A-2	0-20	65-95	45-90	40-90	30-85	25-40	5-15
[1]AwB:											
Alvira part	0-10	Very stony loam	ML,SM,GM	A-4	3-10	70-100	60-85	55-70	40-60	---	---
	10-17	Gravelly silt loam, gravelly silty clay loam, gravelly loam.	CL, CL-ML, SM-SC, GM-GC	A-4, A-6	0-10	65-100	55-90	50-90	35-85	25-40	5-15
	17-60	Gravelly silt loam, gravelly loam, gravelly silty clay loam.	CL, CL-ML, GM-GL, SM-SC	A-4, A-6, A-2	0-20	65-95	45-90	40-90	30-85	25-40	5-15
Watson part	0-10	Very stony loam	ML, CL	A-4	3-10	70-90	70-90	60-85	55-80	---	---
	10-27	Gravelly silty clay loam, silt loam, gravelly loam.	ML, CL, SC, SM	A-4, A-6, A-7	0-10	70-100	55-90	50-90	45-90	25-45	8-20

See footnote at end of table.

TABLE 14--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Watson part-----	27-60	Gravelly clay loam, silt loam, gravelly loam.	ML, CL, GC, GM	A-4, A-6, A-2	0-15	55-100	45-95	40-90	30-85	25-40	4-15
Bath:											
BaB, BaC, BaD-----	0-10	Channery silt loam.	ML, SM, GM	A-2, A-4	5-10	60-95	50-85	40-85	30-80	30-40	6-10
	10-26	Channery loam, channery silt loam.	SM, GM	A-1, A-2, A-4	5-10	65-85	50-85	40-65	20-50	20-35	NP-7
	26-68	Channery loam, channery silt loam, very channery sandy loam.	SM-SC, GM-GC, CL-ML, GW-GM	A-1, A-2, A-4	10-15	40-90	30-85	20-80	10-60	20-25	4-6
	68-79	Channery loam, channery silt loam, very channery sandy loam.	GM-GC, CL-ML, GM, SM	A-1, A-2, A-4	10-15	40-90	30-85	20-80	15-60	20-25	NP-6
BbB, BbC-----	0-10	Very stony silt loam.	ML, GM, SM	A-1, A-2, A-4	10-15	60-95	50-85	40-85	25-80	30-35	6-10
	10-26	Channery loam, channery silt loam.	SM, GM	A-1, A-2, A-4	5-10	65-95	50-85	40-75	25-50	20-25	2-4
	26-68	Channery loam, channery silt loam, very channery sandy loam.	SM-SC GM-GC, CL-ML	A-1, A-2, A-4	10-15	40-90	30-85	20-65	10-55	20-25	4-6
	68-79	Channery loam, channery silt loam, channery sandy loam.	GM-GC CL-ML, GM, SM	A-1, A-2, A-4	10-15	40-90	30-85	20-65	10-55	20-25	4-6
Benson:											
[1]BeB:											
Benson part-----	0-8	Channery silt loam, shaly silt loam, very shaly silt loam.	ML, SM	A-2, A-4	15-20	80-95	70-80	55-75	35-70	---	NP
	8-18		ML, SM, GM	A-2, A-4	5-50	60-95	50-90	45-85	30-75	---	NP
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
[1]BeC:											
Benson part-----	0-8	Channery silt loam.	ML, SM	A-2, A-4	15-20	80-95	70-80	55-75	35-70	---	NP
	8-18	Shaly silt loam, channery silt loam, very shaly silt loam	ML, SM, GM	A-2, A-4	5-50	60-95	50-90	45-85	30-75	---	NP
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
[1]BeF:											
Benson part-----	0-8	Channery loam---	ML, SM	A-2, A-4	15-20	80-95	70-80	55-75	35-70	---	NP

See footnote at end of table.

TABLE 14--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Benson part-----	8-18	Shaly silt loam, channery silt loam, very shaly silt loam	ML, SM, GM	A-2, A-4	5-50	60-95	50-90	45-85	30-75	---	NP
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop part.											
Braceville:											
BrA, BrB----------	0-10	Gravelly loam---	ML, CL, SM, GM	A-4, A-2, A-1	0-10	65-90	60-80	40-70	20-55	---	---
	10-21	Gravelly sandy loam, gravelly silt loam, gravelly sandy loam.	ML, CL, SM, GM	A-2, A-4, A-1	0-10	65-90	60-80	40-70	20-55	15-40	NP-10
	21-36	Gravelly sandy loam, gravelly loam, gravelly silt loam.	ML, CL, SM, SC	A-2, A-4, A-1	0-10	65-85	40-65	25-60	15-65	15-40	NP-10
	36-60	Stratified sand and gravel.	GM, GC, SM, GW-GM	A-1, A-3 A-2, A-4	0-15	40-100	35-100	25-90	10-50	<30	NP-5
Buchanan:											
BuB----------	0-10	Loam----------	ML, CL	A-4	0-10	90-100	80-95	75-90	65-85	---	---
	10-29	Gravelly loam, silt loam, gravelly sandy clay loam.	GM, ML, CL, SM	A-4, A-1 A-2	0-20	60-100	60-90	40-90	20-80	20-35	NP-11
	29-65	Gravelly loam, loam, channery clay loam.	GM, ML, CL, SM	A-4, A-1 A-2, A-6	0-20	50-100	30-80	30-75	20-60	18-35	NP-12
BxB, BxC----------	0-10	Extremely stony loam.	ML, CL	A-4	5-20	75-90	70-90	65-80	55-75	---	---
	10-29	Gravelly loam, silt loam, gravelly sandy clay loam.	GM, ML, CL, SM	A-2, A-1 A-4	0-20	60-100	60-90	40-90	20-80	20-35	NP-11
	29-65	Gravelly loam, loam, channery clay loam.	GM, ML, CL, SM	A-2, A-1 A-4, A-6	0-20	50-100	30-80	30-75	20-60	18-35	NP-12
Chenango:											
ChA, ChB, ChC-----	0-8	Gravelly loam---	ML, SM, GM	A-2, A-4, A-1	5-15	60-85	55-80	35-80	15-70	<40	NP-10
	8-32	Gravelly fine sandy loam, gravelly loam, gravelly silt loam.	ML, GM, SM, CL	A-2, A-4, A-1	5-10	30-75	30-75	25-75	15-65	<35	NP-10
	32-60	Very gravelly loamy coarse sand, very gravelly sand, gravelly loamy fine sand.	GW, GP, GM	A-1	5-20	25-35	20-30	10-25	1-20	---	NP
Chippewa:											
[1]CmA:											
Chippewa part---	0-7	Silt loam--------	ML	A-4, A-5 A-7, A-6	0-5	80-100	70-95	65-95	55-85	40-50	5-15

See footnote at end of table.

TABLE 14--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Chippewa part---	7-19	Channery silt loam, channery loam.	GM, ML, CL, GC	A-2, A-4	5-10	65-100	60-95	45-85	35-75	25-35	5-10
	19-60	Gravelly silt loam, gravelly loam.	GM, ML, CL, GC	A-2, A-4	10-25	60-80	50-70	45-70	30-65	15-25	5-10
Norwich part----	0-8	Silt loam-------	ML	A-4, A-5 A-7, A-6	0-5	80-100	60-95	55-90	55-85	40-50	5-15
	8-16	Channery silt loam, channery loam, loam.	GM, ML, CL, GC	A-4	0-15	65-95	65-90	60-85	40-80	25-35	5-10
	16-60	Channery silt loam, channery loam, channery sandy loam.	GM, ML, CL, GC	A-4	10-20	65-90	50-80	45-75	40-65	15-25	5-10
[1]CnB:											
Chippewa part---	0-7	Extremely stony silt loam.	ML	A-7, A-5 A-6	5-15	75-90	70-85	65-80	55-75	40-50	5-15
	7-19	Channery silt loam, channery loam.	GM, ML, CL, GC	A-4, A-2	5-10	65-95	60-85	45-85	35-65	25-35	5-10
	19-60	Gravelly silt loam, gravelly loam.	CL, GC, GM, ML	A-2, A-4	10-25	60-80	50-70	45-70	30-65	15-25	5-10
Norwich part----	0-8	Extremely stony silt loam.	ML	A-4, A-5 A-7, A-6	15-25	70-90	65-85	55-80	55-75	40-50	5-15
	8-16	Channery silt loam, channery loam, loam.	GM, ML, CL, GC	A-4	0-15	65-95	65-90	60-85	40-80	25-35	5-10
	16-60	Channery silt loam, channery loam, channery sandy loam.	GM, ML, CL, GC	A-4	10-25	65-90	50-80	45-75	40-65	15-25	5-10
Clymer:											
CpA, CpB, CpC-----	0-9	Loam----------	ML, SM	A-4	0-5	85-100	75-95	60-90	35-85	---	---
	9-49	Loam, channery loam, channery clay loam.	GM, SM, GC, ML	A-2, A-4	0-20	60-95	40-95	35-85	30-60	14-32	NP-9
	49-60	Channery loam, very channery loam, channery sandy loam.	GM, GP, GC, SM	A-1, A-3 A-2, A-4	10-30	30-75	25-70	20-60	5-40	14-32	NP-9
CxB, CxC----------	0-9	Extremely stony loam.	ML, SM, GM	A-4, A-2	5-30	60-100	50-95	45-90	30-85	---	---
	9-49	Loam, channery loam, channery clay loam.	GM, SM, GC, ML	A-2, A-4	0-20	60-95	40-95	45-85	30-60	14-32	NP-9
	49-60	Channery loam, very channery loam, channery sandy loam.	GM, GP, GC, SM	A-1, A-3 A-2, A-4	10-30	30-75	25-70	20-60	5-40	14-32	NP-9
Cut and fill land:											
Cy----------	0-60	Variable---------	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Dekalb:											
DxB, DxC, DxE-----	0-7	Extremely stony loam.	SM, GM, ML, CL-ML	A-2, A-4 A-1	10-30	50-90	45-80	40-75	20-55	10-32	NP-7
	7-24	Channery sandy loam, shaly loam, very channery sandy loam.	SM, GM, ML, CL-ML	A-2, A-4 A-1	5-40	50-85	40-75	40-75	20-55	15-32	NP-7
	24-32	Channery sandy loam, shaly sandy loam, very channery sandy loam.	SM, GM, SC, GC	A-2, A-4 A-1	10-50	45-85	30-75	25-65	15-40	15-32	NP-9
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Empeyville:											
ExB-----	0-8	Extremely stony sandy loam.	SM	A-2, A-4 A-1	10-20	85-95	65-90	45-75	20-50	20-30	NP-3
	8-22	Loam, gravelly loam, gravelly loamy sand.	ML, SM, GM, SM-SC	A-2, A-4 A-1	0-5	60-95	55-90	35-85	15-65	15-25	NP-5
	22-60	Gravelly loam, gravelly sandy loam, gravelly loamy sand.	SM, ML, GM, SM-SC	A-2, A-4 A-1	5-10	50-85	35-75	25-70	15-55	15-25	NP-5
Hartleton:											
HaB, HaC-----	0-8	Channery silt loam.	SM, ML	A-4	10-30	80-95	70-90	60-90	45-80	---	---
	8-37	Channery silt loam, very channery loam, channery silty clay loam.	GM, ML, GC, CL-ML	A-2, A-4	25-65	60-90	45-80	40-80	30-75	20-30	NP-7
	37-47	Very channery loam, very shaly silt loam.	SM, GM, GC, CL-ML	A-1, A-2, A-4	55-85	40-80	25-70	20-70	15-60	20-30	NP-7
	47	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Hazleton:											
HxB, HxC-----	0-5	Extremely stony sandy loam.	GM, SM, ML	A-4, A-2	15-25	40-95	35-90	30-80	25-65	---	---
	5-31	Channery sandy loam, channery loam, loam.	GM, SM, ML, GM-GC	A-2, A-4, A-1	15-25	40-95	35-90	30-70	20-55	<30	NP-8
	31-60	Channery sandy loam, very channery sandy loam, very channery loamy sand.	GM, SM, GM-GC, SM-SC	A-2, A-1, A-4	5-30	55-80	35-75	30-65	15-50	<30	NP-8
Holly:											
Hy-----	0-8	Silt loam-------	ML, ML-CL	A-4	0	90-100	75-100	70-100	60-90	25-35	NP-10
	8-41	Silt loam, loam, sandy loam, silty clay loam	ML, CL-ML, SM, SM-SC	A-4, A-6	0	85-100	75-100	70-95	45-85	20-40	NP-14
	41-60	Gravelly loam, gravelly silt loam, sandy loam.	ML, SM, SM-SC, CL	A-2, A-4	0-5	70-100	55-100	50-90	35-70	20-40	NP-10

See footnote at end of table.

TABLE 14--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Kedron:											
KaB, KaC----------	0-10	Silt loam-------	ML, CL	A-4	0-10	90-100	65-95	60-95	55-85	---	---
	10-24	Silt loam, clay loam, gravelly silt loam.	ML, CL, SM, SC	A-4, A-6	0-30	80-100	65-95	65-95	40-90	25-40	3-15
	24-60	Silt loam, gravelly loam, gravelly clay loam.	CL, ML, SC, SM	A-4, A-6	15-40	80-100	60-95	55-95	45-85	20-40	3-15
KdB---------------	0-10	Very stony silt loam.	ML, CL	A-4	10-25	75-100	70-95	55-95	55-85	---	---
	10-24	Silt loam, loam, clay loam.	ML, CL, SM, SC	A-4, A-6	0-30	80-100	65-95	65-95	40-90	25-40	3-15
	24-60	Gravelly silt loam, gravelly clay loam.	CL, ML, SM, SC	A-4, A-6	15-40	80-100	65-95	60-95	45-85	20-40	3-15
Klinesville:											
KvB, KvC, KvD------	0-6	Channery silt loam.	GM, SM	A-2, A-4 A-1	10-20	25-85	25-60	15-50	6-40	---	---
	6-15	Shaly silt loam, very shaly silt loam, channery loam.	GM, GP, SM, SP	A-2, A-1, A-4	10-20	25-75	25-55	15-50	4-40	20-35	NP-9
	15-48	Very shaly silt loam, fractured silt and shale fragments.	GM, GP, GW-GM, GM-GC	A-2, A-1	20-40	2-50	2-30	2-25	2-20	20-35	NP-7
	48	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lackawanna:											
LaB, LaC, LaD------	0-12	Channery loam---	GM, ML, CL, SM	A-2, A-4 A-1	0-15	60-80	55-75	35-70	20-60	---	---
	12-33	Channery loam, channery silt loam, channery sandy loam.	GM, ML, CL, SM	A-2, A-1 A-4, A-6	0-20	60-80	55-75	35-70	20-60	20-35	1-14
	33-75	Channery loam, channery silt loam, channery sandy loam.	GM, SM, ML, CL	A-2, A-1 A-4, A-6	0-20	60-85	55-80	35-75	20-55	15-35	1-12
LbB, LbC----------	0-12	Extremely stony loam.	ML, CL, GM, SM	A-4, A-2 A-1	10-25	60-80	55-75	35-70	20-60	---	---
	12-33	Channery loam, channery silt loam, channery sandy loam.	GM, ML, CL, SM	A-2, A-1 A-4, A-6	0-20	60-80	55-75	35-70	20-60	20-35	1-14
	33-75	Channery loam, channery silt loam, channery sandy loam.	GM, SM, ML, CL	A-2, A-1 A-4	0-20	60-85	55-80	35-75	20-55	15-35	<12
[1]LBE:											
Lackawanna part-	0-12	Extremely stony loam.	ML, CL, GM, SM	A-4, A-2 A-1	10-25	60-80	55-75	35-70	20-60	---	---
	12-33	Channery loam, channery silt loam, channery sandy loam.	GM, ML, CL, SM	A-2, A-1 A-4, A-6	0-20	60-80	55-75	35-70	20-60	20-35	1-14
	33-75	Channery loam, channery silt loam.	GM, SM, ML, CL	A-2, A-1 A-4	0-20	60-85	55-80	35-75	20-55	15-35	<12

See footnote at end of table.

TABLE 14--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Lackawanna:											
Bath part--------	0-10	Extremely stony silt loam.	ML, GM, SM	A-1, A-2, A-4	10-15	60-95	50-85	40-85	25-80	30-35	6-10
	10-26	Channery loam, channery silt loam.	SM, GM, ML	A-1, A-2, A-4	5-10	65-95	50-85	40-75	25-55	20-25	2-4
	26-68	Channery loam, channery silt loam, gravelly sandy loam.	SM-SC, GM-GC, CL-ML	A-1, A-2, A-4	10-15	40-90	30-85	20-65	10-55	20-25	4-6
	68-79	Channery loam, channery silt loam, channery sandy loam.	GM, GM-GC, ML, SM	A-1, A-2, A-4	10-15	40-90	30-85	20-65	10-55	20-25	4-6
Laidig:											
LgB, LgC----------	0-6	Extremely stony loam.	SM, ML	A-2, A-4	10-30	80-90	35-90	45-75	25-60	15-30	NP-5
	6-31	Gravelly loam, gravelly sandy clay loam, channery sandy loam.	SM, GM, SC, SM-SC	A-1, A-2, A-4, A-6	5-10	70-95	60-85	40-75	20-45	15-35	NP-20
	31-60	Gravelly loam, gravelly silt loam, gravelly sandy loam.	GC, SC, SM-SC, GM-GC	A-1, A-2, A-4, A-6	5-25	50-85	35-80	30-70	15-40	10-35	5-20
Lawrenceville:											
Lh----------	0-10	Silt loam-------	ML	A-4	0	95-100	85-100	80-100	75-95	---	---
	10-25	Silt loam, silty clay loam.	ML, CL	A-4, A-6	0	85-100	80-100	85-100	70-95	25-40	2-11
	25-37	Silt loam, silty clay loam.	ML, CL	A-4	0	80-100	75-90	60-85	55-80	20-35	2-9
	37-60	Silt loam, shaly loam, shaly silt loam.	ML, CL, GM	A-4	0-20	55-100	40-90	35-90	30-85	20-35	2-9
Leck Kill:											
LkB, LkC, LkD------	0-7	Channery silt loam.	SM, ML, GM	A-2, A-4	5-10	70-85	60-80	50-80	35-70	---	---
	7-40	Channery silt loam, channery loam, shaly silty clay loam.	GM, SC, GC, CL	A-4, A-2, A-6	0-10	60-90	50-80	40-80	30-70	25-40	2-17
	40-60	Very channery silt loam, very channery clay loam, very shaly loam.	GC, SM, SC, GP-GM	A-2, A-1	0-30	30-70	10-30	8-30	6-25	25-40	2-13
Lordstown:											
LsB, LsC, LsD------	0-7	Channery silt loam.	ML, GM, SM	A-4	5-20	65-85	60-75	50-75	40-65	<30	NP-4
	7-26	Channery silt loam, channery loam.	ML, GM, SM	A-4	5-20	65-85	50-75	45-75	40-65	<30	NP-4
	26-32	Very channery loam, channery silt loam, very channery fine sandy loam.	SM, GM	A-2, A-4 A-1	5-25	40-75	30-60	25-55	15-50	<30	NP-4
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Lordstown:											
LxB, LxC	0-7	Extremely stony silt loam.	ML, GM, SM	A-4	10-25	65-85	60-75	50-75	40-65	<30	NP-4
	7-26	Channery silt loam, channery loam.	ML, GM, SM	A-4	5-20	65-85	40-75	45-75	40-65	<30	NP-4
	26-32	Very channery loam, channery silt loam, very channery fine sandy loam.	GM, SM	A-2, A-4 A-1	5-25	40-75	30-60	25-55	15-50	<30	NP-4
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1]LyE:											
Lordstown part--	0-7	Extremely stony silt loam.	ML, GM, SM	A-4	10-25	65-85	60-75	50-75	40-65	<30	NP-4
	7-26	Channery silt loam, channery loam.	ML, GM, SM	A-4	5-10	65-85	50-75	45-75	40-65	<30	NP-4
	26-32	Very channery loam, channery silt loam, very channery fine sandy loam.	GM, SM	A-2, A-4 A-1	5-25	40-75	30-60	25-55	15-50	<30	NP-4
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Oquaga part-----	0-3	Extremely stony loam.	ML, GM, SM	A-4, A-2 A-1	10-25	50-85	60-75	45-70	25-65	<25	NP-5
	3-26	Channery loam, channery silt loam, very channery loam.	GM, ML, SM	A-1, A-2, A-4	10-25	35-70	25-75	20-60	15-55	<25	NP-5
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Mardin:											
MaB, MaC	0-9	Channery silt loam.	GM, ML, CL, GC	A-4, A-2	5-10	65-75	60-90	50-70	35-60	25-35	5-10
	9-24	Channery silt loam, channery loam, gravelly loam.	GM, ML, CL, GM-GC	A-4, A-2	5-10	60-95	55-85	45-70	35-65	15-25	5-10
	24-70	Gravelly loam, channery silt loam, very channery loam.	GM, ML, CL, GM-GC	A-2, A-4	10-25	55-75	40-70	35-70	30-65	20-30	5-10
	70-99	Very gravelly silt loam, gravelly silt loam, gravelly loam.	GM, ML, CL, GM-GC	A-2, A-4	10-25	55-75	40-70	35-70	30-65	20-30	5-10
MbB, MbC	0-9	Very stony silt loam.	GM, ML, CL, GC	A-4, A-2	10-20	65-95	60-90	50-70	35-60	25-35	5-10
	9-24	Channery silt loam, channery loam, gravelly loam.	GM, ML, CL, GM-GC	A-4, A-2	5-10	60-95	55-85	45-70	35-65	15-25	5-10
	24-70	Gravelly loam, channery silt loam, very channery loam.	GM, ML, CL, GM-GC	A-2, A-4	10-25	55-75	40-70	35-70	30-65	20-30	5-10

See footnote at end of table.

TABLE 14--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Mardin:											
	70-99	Channery loam, channery silt loam, very channery silt loam.	GM, ML, CL	A-2, A-4	10-25	55-75	40-70	35-70	30-65	20-30	5-10
Meckesville:											
MeA, MeB, MeC-----	0-9	Gravelly loam.	ML	A-4	0-15	80-100	60-80	60-75	50-65	---	---
	9-32	Gravelly loam, channery silt loam, gravelly silty clay loam.	ML, CL	A-4, A-6	0-20	60-100	60-90	60-85	55-70	25-40	2-13
	32-60	Channery loam, channery silt loam, gravelly clay loam.	ML, CL, GM, SC	A-4, A-2	0-30	45-95	30-75	30-85	25-65	25-30	2-9
MfB, MfC----------	0-9	Very stony loam	ML	A-4	3-20	80-100	70-80	65-75	50-65	---	---
	9-32	Gravelly loam, channery silt loam, gravelly silty clay loam.	ML, CL, ML-CL	A-4, A-6	0-20	60-100	60-90	60-85	55-70	25-40	2-13
	32-60	Channery loam, channery silt loam, gravelly clay loam.	ML, CL, GM, SC	A-4, A-2	0-30	45-95	30-75	30-85	25-65	23-30	2-9
Morris:											
MgB----------	0-15	Channery silt loam, gravelly loam.	GM, ML, CL, SM	A-4, A-2	0-15	60-95	55-85	40-75	35-65	20-30	1-10
	15-60	Channery silt loam, channery loam.	GM, CL, SM, GM-GC	A-2, A-4	0-20	60-95	45-80	40-80	25-75	15-25	NP-9
MoB, MoC----------	0-15	Extremely stony silt loam, gravelly loam.	GM, ML, CL, SM	A-4, A-2	10-20	60-95	55-85	40-80	35-70	20-30	1-10
	15-60	Channery loam, channery silt loam.	GM, CL, SM, GM-GC	A-2, A-4	0-20	60-95	45-80	40-80	25-75	15-25	NP-9
Mucky peat:											
Mp, Ms----------	0-84	Mucky peat------	Pt	A-8	0	---	---	---	---	---	---
	84-99	Silty clay loam, silt loam, channery loam.	ML, CL, ML-CL	A-4, A-6	0	100	70-100	65-95	60-85	5-25	5-20
Oquaga:											
†OkB:											
Oquaga part-----	0-3	Channery loam---	ML, GM, SM	A-4, A-1 A-2	5-20	50-85	45-70	35-70	25-65	<25	NP-5
	3-26	Channery loam, very channery loam, channery silt loam.	GM, ML, SM	A-1, A-2, A-4	10-25	25-75	25-70	20-60	15-55	<25	NP-5
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Oquaga:											
Lackawanna part-	0-12	Channery loam---	GM, ML, CL, SM	A-2, A-4	0-15	60-80	55-75	35-70	20-60	---	---
	12-33	Channery loam, channery silt loam, channery sandy loam.	GM, ML, CL, SM	A-2, A-1, A-4, A-6	0-20	60-80	55-75	35-70	20-60	20-35	1-14
	33-75	Channery loam, channery silt loam, channery sandy loam.	GM, SM, ML, CL	A-2, A-1, A-4, A-6	0-20	60-85	55-80	35-75	20-55	15-35	1-12
[1]OkC:											
Oquaga part-----	0-3	Channery loam---	ML, GM	A-4, A-2	5-20	50-85	45-70	35-70	25-65	<25	NP-5
	3-26	Channery loam, very channery loam, channery silt loam.	GM, ML, SM	A-2, A-1, A-2, A-4	10-25	25-75	25-70	20-60	15-55	<25	NP-5
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lackawanna part-	0-12	Channery loam---	GM, ML, CL, SM	A-2, A-4	0-15	60-80	55-75	35-70	20-60	---	---
	12-33	Channery loam, channery silt loam, channery sandy loam.	GM, ML, CL, SM	A-2, A-1, A-4, A-6	0-20	60-80	55-75	35-70	20-60	20-35	1-14
	33-75	Channery loam, channery silt loam, channery sandy loam.	GM, SM, ML, CL	A-2, A-1, A-4, A-6	0-20	60-85	55-80	35-75	20-55	15-35	1-12
[1]OkD:											
Oquaga part-----	0-3	Channery loam---	ML, GM	A-4, A-1, A-2	5-20	50-85	45-70	35-70	25-65	<25	NP-5
	3-26	Channery loam, very channery loam, channery silt loam.	GM, ML, SM	A-1, A-2, A-4	10-25	25-75	25-75	20-60	15-55	<25	NP-5
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lackawanna part-	0-12	Channery loam---	GM, ML, CL, SM	A-2, A-4	0-15	60-80	55-75	35-70	20-60	---	---
	12-33	Channery loam, channery silt loam, channery sandy loam.	GM, ML, CL, SM	A-2, A-1, A-4, A-6	0-20	60-80	55-75	35-70	20-60	20-35	1-14
	33-75	Channery loam, channery silt loam, channery sandy loam.	GM, SM, ML, CL	A-2, A-1, A-4, A-6	0-20	60-85	55-80	35-75	20-55	15-35	1-12
[1]OxB:											
Oquaga part-----	0-3	Extremely stony loam.	ML, GM	A-4, A-1, A-2	10-20	60-80	55-75	35-70	25-65	<25	NP-5
	3-26	Channery loam, channery silt loam, very channery loam.	GM, ML, SM	A-1, A-2, A-4	10-25	25-75	25-70	20-60	15-55	<25	NP-5
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Oquaga:											
Lackawanna part-	0-12	Extremely stony loam.	ML, CL, GM, SM	A-4, A-2	10-25	60-80	55-75	35-70	20-65	---	---
	12-33	Channery loam, channery silt loam, channery sandy loam.	GM, ML, CL, SM	A-2, A-1 A-4, A-6	0-20	60-80	55-75	35-70	20-60	20-35	1-14
	33-75	Channery loam, channery silt loam, channery sandy loam.	GM, SM, ML, CL	A-2, A-1 A-4, A-6	0-20	60-85	55-80	35-75	20-55	15-35	<12
[1]OxC:											
Oquaga part-----	0-3	Extremely stony loam.	ML, GM	A-4, A-1	10-20	60-80	55-75	35-70	25-65	<25	NP-5
	3-26	Channery loam, channery silt loam, very channery loam.	GM, ML	A-1, A-2 A-4	10-25	25-75	25-70	20-60	15-55	<25	NP-5
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lackawanna part-	0-12	Extremely stony loam.	ML, CL, GM, SM	A-4, A-2	10-25	60-80	55-75	35-70	20-65	---	---
	12-33	Channery loam, channery silt loam, channery sandy loam.	GM, ML, CL, SM	A-2, A-1 A-4, A-6	0-20	60-80	55-75	35-70	20-60	20-35	1-14
	33-75	Channery loam, channery silt loam, channery sandy loam.	GM, SM, ML, CL	A-2, A-1 A-4, A-6	0-20	60-85	55-80	35-75	20-55	15-35	<12
Philo:											
Ph-----------	0-40	Silt loam, fine sandy loam, loam.	ML, SM	A-4	0	95-100	70-100	65-90	45-80	20-40	1-10
	40-60	Stratified sand to silt loam.	GM, SM, ML, CL	A-2, A-4 A-1	0	60-95	35-90	30-85	25-85	20-40	1-10
Pope:											
Po, Pp----------	0-10	Silt loam--------	ML, CL, SM, ML-CL	A-4	0-5	75-100	70-100	55-95	40-90	<30	NP-10
	10-60	Silt loam, fine sandy loam, gravelly sandy loam.	SM, SM-SC, ML, GM	A-2, A-1, A-4	0-5	55-100	35-100	30-95	15-70	<30	NP-7
Rexford:											
ReA, ReB----------	0-16	Gravelly silt loam.	ML, CL, SM, GM	A-2, A-4	0-10	65-90	50-85	40-70	25-55	15-35	NP-10
	16-29	Gravelly loam, sandy loam, gravelly silt loam.	ML, CL, SM, GM	A-2, A-4	0-10	60-95	50-90	40-85	25-70	15-35	NP-5
	29-36	Gravelly sandy loam, loam, gravelly silt loam.	ML, CL, SM, GM	A-2, A-4	0-15	60-90	50-80	35-65	25-55	<30	NP
	36-60	Stratified sand to gravel.	GP-GM, SP-SM, GW, SP	A-1	0-20	40-55	30-50	10-40	4-12	<10	NP
Rushtown:											
RuC, RuD----------	0-9	Shaly silt loam	GM, SM	A-2, A-4, A-1	0	40-75	35-45	30-40	20-35	25-40	1-10

See footnote at end of table.

TABLE 14--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Rushtown:											
	9-20	Very shaly silt loam, shaly silt loam, shaly loam, very shaly loam	GM	A-1, A-2, A-4	0	30-60	25-45	25-45	20-40	25-40	1-10
	20-60	Very shaly silt loam, very shaly loam.	GM, GP	A-1, A-2	0	10-40	5-35	5-30	3-25	25-40	1-10
Sheffield:											
Sh	0-7	Silt loam	ML, CL-ML	A-4	0-5	95-100	85-100	85-100	80-95	25-35	4-10
	7-19	Silty clay loam, silt loam.	CL, ML, ML-CL	A-4, A-6	0-5	95-100	85-100	85-100	80-95	20-40	4-20
	19-38	Silty clay loam, silt loam.	ML, CL, ML-CL	A-4, A-6	0-5	85-100	95-100	85-95	70-90	20-40	4-20
	38-66	Shaly silty clay, silt loam	ML, CL, SM	A-4, A-6	0-5	85-95	50-95	45-90	40-85	20-40	4-20
Shelmadine:											
SmA	0-6	Silt loam	ML	A-4	0-5	80-100	65-95	60-90	55-85	---	---
	6-20	Shaly silt loam, channery silty clay loam, loam.	ML, CL	A-4, A-6	0-10	80-100	65-95	50-90	50-80	25-40	3-15
	20-48	Shaly loam, channery clay loam, silty clay loam.	ML, CL	A-4, A-6	0-15	80-100	75-95	60-90	50-80	25-40	3-15
	48-60	Very channery loam, channery silty clay loam shaly loam.	GM, SM, ML, CL	A-2, A-4 A-1	0-15	50-80	30-75	25-70	20-65	25-35	3-10
SpB	0-6	Very stony silt loam.	ML	A-4	3-10	70-100	65-95	60-90	50-85	---	---
	6-20	Shaly silt loam, channery silty clay loam, shaly silt loam.	ML, CL	A-4, A-6	0-10	80-100	65-95	60-90	50-80	25-40	3-15
	20-48	Shaly loam, channery clay loam, silty clay loam.	ML, CL	A-4, A-6	0-10	80-100	75-95	60-90	50-80	25-40	3-15
	48-60	Very channery loam, channery silty clay loam, shaly loam.	GM, SM, ML, CL	A-4, A-2 A-1	0-15	50-80	30-75	25-70	25-65	25-35	3-10
Swartswood:											
SwB, SwC	0-15	Channery sandy loam.	SM, ML	A-2, A-4	0-5	90-95	50-80	45-70	25-60	---	---
	15-34	Gravelly sandy loam, channery fine sandy loam, channery loam.	SM, ML, GM	A-1, A-2, A-4	0-25	60-90	50-90	30-85	15-65	<25	NP-3
	34-60	Gravelly fine sandy loam, flaggy sandy loam, channery loam.	GM, SM, ML, GW-GM	A-1, A-2, A-4	5-25	50-85	35-80	20-75	10-60	<20	NP-3

See footnote at end of table.

TABLE 14--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Swartswood:											
SxB, SxC	0-15	Extremely stony sandy loam.	SM, ML, GM	A-2, A-4, A-1	5-20	60-90	50-85	30-80	15-65		
	15-34	Gravelly sandy channery loam, gravelly fine sandy loam.	SM, ML, GM	A-2, A-4, A-1	0-25	60-90	50-90	30-85	15-65	<25	NP-3
	34-60	Gravelly fine sandy loam, flaggy sandy loam, channery loam.	GM, SM, ML, GW-GM	A-2, A-1, A-4	5-25	50-80	35-80	20-70	10-60	<20	NP-3
Very stony land:											
[1]VaC, [1]VaE	0-60	Variable	---	---		---	---		---	---	---
Volusia:											
VoA, VoB	0-10	Gravelly silt loam.	GM, ML, SM	A-4	0-5	65-80	55-80	45-70	35-65	30-40	5-10
	10-16	Gravelly loam, channery silt loam.	CL-ML, CL, GM-GC, SM-SC	A-4	5-10	70-80	60-80	45-70	35-65	15-25	5-10
	16-60	Gravelly loam, channery silt loam.	GM-GC, CL, GC, SM-SC	A-2, A-4	10-25	55-80	50-80	40-65	30-60	20-30	5-10
VxB	0-10	Extremely stony silt loam.	SM, ML, GM	A-4	10-20	65-80	55-80-	45-70	35-65	30-40	5-10
	10-16	Gravelly loam, channery silt loam,	CL-ML, CL, GM-GC SM-SC	A-4	5-10	70-80	60-80	45-70	35-65	15-25	5-10
	16-60	Gravelly loam, channery silt loam.	GM-GC, CL, GC, SM-SC	A-4, A-2	10-25	55-80	50-80	40-75	30-60	20-30	5-10
Watson:											
WaB	0-10	Silt loam	ML, CL	A-4	0-5	70-90	70-90	60-85	60-95	---	---
	10-27	Gravelly silty clay loam, silt loam, gravelly loam.	ML, CL, SC, SM	A-4, A-6, A-7	0-10	70-100	55-90	50-90	45-90	25-45	8-20
	27-60	Gravelly clay loam, silt loam, gravelly loam.	ML, CL, GC, GM	A-4, A-6, A-2	0-15	55-100	45-95	40-90	30-85	25-40	4-15
Wayland:											
Wb	0-9	Silty clay loam	ML, CL	A-7, A-5 A-4, A-6	0	100	95-100	90-100	70-95	40-50	5-15
	9-41	Silty clay loam, silt loam.	ML, CL	A-6, A-4	0	100	95-100	90-100	70-95	25-40	5-15
	41-60	Stratified silt loam to gravelly fine sandy loam.	ML-CL, CL, SC, SM-SC	A-4, A-2	0	100	35-100	35-95	30-90	15-25	5-10
Weikert:											
WeB3, WeC3, WeD3	0-6	Channery silt loam.	GM, ML	A-1, A-2, A-4	0-10	35-70	35-70	25-65	20-55	30-40	4-10

See footnote at end of table.

TABLE 14--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Weikert:											
	6-40	Very shaly loam, shaly silt loam, very channery loam.	GM, GP, GW-GM	A-1, A-2	0-20	15-60	10-45	5-35	5-35	28-36	3-9
	40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
[1]WhB:											
Weikert part----	0-6	Channery silt loam.	GM, ML	A-1, A-2, A-4	0-10	35-70	35-70	25-65	20-55	30-40	4-10
	6-40	Very shaly loam, shaly silt loam, cherty loam.	GM, GP, GW-GM	A-1, A-2	0-20	15-60	10-45	5-35	5-35	28-36	3-9
	40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Hartleton part--	0-8	Channery silt loam.	SM, ML	A-4	10-30	80-95	70-90	60-90	45-80	---	---
	8-37	Channery silt loam, very channery loam, channery silty clay loam.	GM, ML, GC, CL-ML	A-2, A-4	25-65	60-90	45-80	40-80	30-75	20-30	NP-7
	37-47	Very channery loam, very shaly silt loam.	SM, GM, GC, ML-CL	A-1, A-2, A-4	55-85	40-80	25-70	20-70	15-60	20-30	NP-7
	47	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1]WhC:											
Weikert part----	0-6	Channery silt loam.	GM, ML	A-1, A-2, A-4	0-10	35-70	35-70	25-65	20-55	30-40	4-10
	6-40	Very shaly loam, shaly silt loam, very channery loam.	GM, GP, GW-GM	A-1, A-2	0-20	15-60	10-45	5-35	5-35	28-36	3-9
	40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Hartleton part--	0-8	Channery silt loam.	SM, ML	A-4	10-30	80-95	70-90	60-90	45-80	---	---
	8-37	Channery silt loam, very channery loam, channery silty clay loam.	GM, ML, GC, CL-ML	A-2, A-4	25-65	60-90	45-80	40-80	30-75	20-30	NP-7
	37-47	Very channery loam, very shaly silt loam.	SM, GM, GC, CL-ML	A-1, A-2, A-4	55-85	40-80	25-70	20-70	15-60	20-30	NP-7
	47	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1]WhD:											
Weikert part----	0-6	Channery silt loam.	GM, ML, SM	A-1, A-2, A-4	0-10	35-70	35-70	25-65	20-55	30-40	4-10

See footnote at end of table.

TABLE 14--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Weikert:											
	6-40	Very shaly loam, shaly silt loam, very channery loam.	GM, GP, GW-GM	A-1, A-2	0-20	15-60	10-45	5-35	5-35	28-36	3-9
	40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Hartleton part--	0-8	Channery silt loam.	SM, ML	A-4	10-30	80-95	70-90	60-90	45-80	---	---
	8-37	Channery silt loam, very channery loam, channery silty clay loam.	GM, ML, GC, CL-ML	A-2, A-4	25-65	60-90	45-80	40-80	30-75	20-30	NP-7
	37-47	Very channery loam, very shaly silt loam.	SM, GM, GC, CL-ML	A-1, A-2, A-4	55-85	40-80	25-70	20-70	15-60	20-30	NP-7
	47	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1]WKE:											
Weikert part----	0-6	Channery silt loam.	GM, ML	A-1, A-2, A-4	0-10	35-70	35-70	25-65	20-55	30-40	4-10
	6-40	Very shaly loam, shaly silt loam, very channery loam.	GM, GP, GW-GM	A-1, A-2	0-20	15-60	10-45	5-35	5-35	28-36	3-9
	40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Klinesville part	0-6	Channery silt loam.	GM, SM	A-2, A-4 A-1	10-20	25-85	25-60	15-50	6-40	---	---
	6-15	Shaly silt loam, very shaly silt loam.	GM, GP, SM, SP	A-2, A-1, A-4	10-20	25-75	25-55	15-50	4-40	20-35	NP-9
	15-48	Very shaly silt loam, fractured silt and shale fragments.	GM, GP, GW-GM, GM-GC	A-2, A-1	20-40	2-50	2-30	2-25	2-20	20-35	NP-7
	48	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Wellsboro:											
WmB, WmC----------	0-10	Channery loam---	ML, CL, SM, GM	A-2, A-4	0-15	70-90	60-85	55-80	30-60	---	---
	10-23	Gravelly loam, silt loam, loam	ML, CL, SM, GC	A-2, A-4	0-15	70-100	60-85	55-75	30-70	15-40	NP-10
	23-60	Channery loam, sandy loam, gravelly silt loam.	SM, GM, ML, ML-CL	A-2, A-1 A-4	0-20	55-90	45-90	35-80	25-60	15-30	NP-10
WpB, WpC----------	0-10	Extremely stony loam.	ML, CL, SM, GM	A-4, A-2	10-25	70-90	60-85	55-80	30-60	---	---
	10-23	Gravelly loam, channery silt loam, loam.	ML, CL, SM, GC	A-2, A-4	0-15	70-100	60-85	55-75	30-70	15-40	NP-10
	23-60	Channery loam, channery silt loam, channery loam.	GM, ML, SM, ML-CL	A-2, A-4	0-20	55-90	45-90	35-80	25-60	15-30	NP-10

See footnote at end of table.

TABLE 14--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Worth:											
WrB, WrC----------	0-7	Extremely stony sandy loam.	ML, SM	A-4, A-1 A-2	5-25	85-95	65-85	40-85	25-75	25-35	NP-6
	7-30	Gravelly fine sandy loam, gravelly loam, gravelly loamy sand.	SM, ML, GM	A-4, A-2 A-1	5-10	55-90	55-85	40-75	20-60	20-30	NP-5
	30-60	Gravelly fine sandy loam, gravelly loam, gravelly loamy sand.	GM, GM-GC SM, SM-SC	A-4, A-2, A-1	5-10	55-70	40-65	30-60	20-50	15-25	NP-5
Wurtsboro:											
WsB----------	0-9	Channery loam---	SM	A-2, A-4	0-10	70-95	65-90	55-85	30-50	---	---
	9-27	Gravelly fine sandy loam, gravelly sandy loam, channery loam.	SM	A-2, A-4	0-15	70-95	55-90	50-85	30-50	<30	NP-4
	27-60	Gravelly fine sandy loam, gravelly sandy loam, channery loam.	SM, GM	A-2, A-4	0-20	60-95	40-90	35-80	30-50	<25	NP-4
WxB, WxC----------	0-9	Extremely stony loam.	SM, GM	A-2, A-4	10-20	70-90	65-90	55-85	30-50	---	---
	9-27	Gravelly fine sandy loam, gravelly sandy loam, channery loam.	SM, GM	A-2, A-4	0-15	70-95	55-90	50-85	30-50	<30	NP-4
	27-60	Gravelly fine sandy loam, very gravelly sandy loam, channery loam.	SM, GM	A-2, A-4	0-20	60-95	40-90	35-80	30-50	<25	NP-4
Wyoming:											
WyA, WyB, WyC, WyD, WyE----------	0-8	Gravelly sandy loam.	SM, SW-SM GM, GW-GM	A-1, A-2 A-3	0-15	45-90	40-75	20-60	8-35	<30	NP-5
	8-26	Gravelly sandy loam, very gravelly sandy loam.	SM, GM, GW, SW	A-1, A-2 A-3	0-25	50-80	45-75	20-55	5-35	<30	NP-5
	26-60	Very gravelly loamy sand, very gravelly sand.	GW, GM, SM, SW	A-1	5-30	30-65	30-60	15-50	1-12	<25	NP-5

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior characteristics of the map unit.

TABLE 15--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means greater then. The erosion tolerance factor (T) is for the entire profile. Absence of an entry means data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Alden:									
Ad	0-9	0.6-2.0	0.16-0.22	6.1-7.3	Low	High	Low	0.32	3-2
	9-35	0.2-0.6	0.14-0.20	6.1-7.3	Low	High	Low	0.32	
	35-60	0.2-0.6	0.08-0.15	6.6-7.3	Low	High	Low	0.34	
Allenwood:									
AnA, AnB, AnC	0-9	0.6-2.0	0.14-0.18	3.6-5.5	Low	Moderate	High	0.24	4
	9-59	0.06-2.0	0.12-0.16	3.6-5.5	Low	Moderate	High	0.17	
	59-72	0.06-2.0	0.03-0.10	3.6-5.5	Low	Moderate	High	0.17	
Alluvial land:									
As	0-60	---	---	---	---	---	---	---	---
Alvira:									
AvB	0-10	0.6-2.0	0.14-0.18	3.6-5.0	Low	High	High	0.24	3-2
	10-17	0.6-2.0	0.14-0.18	3.6-5.0	Low	High	High	0.43	
	17-60	0.06-0.2	0.08-0.12	3.6-5.0	Low	High	High	0.28	
[1]AwB:									
Alvira part	0-10	0.6-2.0	0.14-0.20	4.5-5.5	Low	High	High	0.32	3-2
	10-17	0.6-2.0	0.14-0.18	4.5-5.5	Low	High	High	0.43	
	17-60	0.06-0.2	0.08-0.12	4.5-5.5	Low	High	High	0.28	
Watson part	0-10	0.6-2.0	0.12-0.18	4.5-5.5	Moderate	Moderate	High	0.24	3-2
	10-27	0.6-2.0	0.12-0.16	4.5-5.5	Moderate	Moderate	High	0.17	
	27-60	0.06-0.2	0.08-0.12	4.5-5.5	Moderate	Moderate	High	0.17	
Bath:									
BaB, BaC, BaD	0-10	0.6-2.0	0.10-0.20	4.5-6.0	Low	Moderate	Moderate	0.17	3
	10-26	0.6-2.0	0.08-0.18	4.5-6.0	Low	Moderate	Moderate	0.28	
	26-68	0.06-0.2	0.01-0.06	5.1-6.5	Low	Moderate	Moderate	0.28	
	68-79	0.06-0.2	0.01-0.06	5.1-7.3	Low	Moderate	Moderate	0.28	
BbB, BbC	0-10	0.6-2.0	0.10-0.20	4.5-6.0	Low	Moderate	Moderate	0.17	3
	10-26	0.6-2.0	0.08-0.18	4.5-6.0	Low	Moderate	Moderate	0.28	
	26-68	0.06-0.2	0.01-0.06	5.1-6.5	Low	Moderate	Moderate	0.28	
	68-79	0.06-0.2	0.01-0.06	5.1-7.3	Low	Moderate	Moderate	0.28	
Benson:									
[1]BeB:									
Benson part	0-8	0.6-2.0	0.14-0.20	6.1-7.3	Low	Low	Low	0.20	2
	8-18	0.6-2.0	0.10-0.18	6.1-7.3	Low	Low	Low	0.28	
	18	---	---	---	---	---	---	---	
Rock outcrop part.									
[1]BeC:									
Benson part	0-8	0.6-2.0	0.14-0.20	6.1-7.3	Low	Low	Low	0.20	2
	8-18	0.6-2.0	0.10-0.18	6.1-7.3	Low	Low	Low	0.28	
	18	---	---	---	---	---	---	---	
Rock outcrop part.									
[1]BeF:									
Benson part	0-8	0.6-2.0	0.14-0.20	6.1-7.3	Low	Low	Low	0.20	2
	8-18	0.6-2.0	0.10-0.18	6.1-7.3	Low	Low	Low	0.28	
	18	---	---	---	---	---	---	---	
Rock outcrop part.									

See footnote at end of table.

TABLE 15--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Braceville:									
BrA, BrB	0-10	0.2-2.0	0.10-0.12	4.5-6.0	Low	Moderate	Moderate	0.20	3-2
	10-21	0.2-2.0	0.10-0.12	4.5-6.0	Low	Moderate	Moderate	0.20	
	21-36	0.06-0.6	0.07-0.10	4.5-6.5	Low	Moderate	Moderate	0.28	
	36-60	2.0-20	0.03-0.06	5.1-6.5	Low	Moderate	Moderate	0.17	
Buchanan:									
BuB	0-10	0.6-2.0	0.14-0.20	3.6-5.0	Moderate	High	High	0.28	3-2
	10-29	0.6-2.0	0.10-0.16	3.6-5.0	Moderate	High	High	0.28	
	29-65	0.06-0.2	0.06-0.10	3.6-5.0	Moderate	High	High	0.17	
BxB, BxC	0-10	0.6-2.0	0.11-0.16	3.6-5.0	Moderate	High	High	0.28	3-2
	10-29	0.6-2.0	0.10-0.16	3.6-5.0	Moderate	High	High	0.28	
	29-65	0.06-0.2	0.06-0.10	3.6-5.0	Moderate	High	High	0.17	
Chenango:									
ChA, ChB, ChC	0-8	0.6-6.0	0.10-0.12	4.5-5.5	Low	Low	Moderate	0.17	3
	8-32	0.6-6.0	0.07-0.10	4.5-5.5	Low	Low	Moderate	0.17	
	32-60	6.0-20	0.01-0.03	5.1-7.3	Low	Low	Moderate	0.17	
Chippewa:									
[1]CmA:									
Chippewa part	0-7	0.6-2.0	0.14-0.21	4.5-6.0	Low	High	Moderate	0.28	3
	7-19	0.6-2.0	0.10-0.17	4.5-6.0	Low	High	Moderate	0.43	
	19-60	0.06-0.2	0.01-0.02	5.1-7.3	Low	High	Moderate	0.28	
Norwich part	0-8	0.6-2.0	0.14-0.20	5.1-6.5	Low	High	Moderate	0.28	3
	8-16	0.6-2.0	0.11-0.18	5.1-6.5	Low	High	Moderate	0.43	
	16-60	<0.06	0.02-0.04	5.1-6.5	Low	High	Moderate	0.28	
[1]CnB:									
Chippewa part	0-7	0.6-2.0	0.11-0.18	4.5-6.0	Low	High	Moderate	0.28	3
	7-19	0.6-2.0	0.10-0.17	4.5-6.0	Low	High	Moderate	0.43	
	19-60	0.06-0.2	0.01-0.02	5.1-7.3	Low	High	Moderate	0.28	
Norwich part	0-8	0.6-2.0	0.12-0.18	5.1-6.5	Low	High	Moderate	0.28	3
	8-16	0.6-2.0	0.11-0.18	5.1-6.5	Low	High	Moderate	0.43	
	16-60	<0.06	0.02-0.04	5.1-6.5	Low	High	Moderate	0.28	
Clymer:									
CpA, CpB, CpC	0-9	0.6-2.0	0.10-0.16	3.6-5.5	Low	Low	High	0.28	3
	9-49	0.6-2.0	0.08-0.14	3.6-5.5	Low	Low	High	0.17	
	49-60	0.6-6.0	0.04-0.08	3.6-5.5	Low	Low	High	0.17	
CxB, CxC	0-9	0.6-2.0	0.10-0.16	3.6-5.5	Low	Low	High	0.28	3
	9-49	0.6-2.0	0.08-0.14	3.6-5.5	Low	Low	High	0.17	
	49-60	0.6-6.0	0.04-0.08	3.6-5.5	Low	Low	High	0.17	
Cut and fill land:									
Cy	0-60	---	---	---	---	---	---	---	---
Dekalb:									
DxB, DxC, DxE	0-7	6.0-20	0.10-0.12	3.6-5.5	Low	Low	High	0.17	3
	7-24	6.0-20	0.08-0.12	3.6-5.5	Low	Low	High	0.17	
	24-32	>6.0	0.05-0.10	3.6-5.5	Low	Low	High	0.17	
	32	---	---	---	---	---	---	---	
Empeyville:									
ExB	0-8	0.6-2.0	0.12-0.14	4.5-5.5	Low	Moderate	High	0.17	3
	8-22	0.6-2.0	0.08-0.15	4.5-5.5	Low	Moderate	High	0.28	
	22-60	0.06-0.2	0.03-0.07	4.5-5.5	Low	Moderate	High	0.28	
Hartleton:									
HaB, HaC	0-8	0.6-2.0	0.12-0.14	4.5-5.5	Low	Low	High	0.17	3-2
	8-37	0.6-2.0	0.08-0.10	4.5-5.5	Low	Low	High	0.17	
	37-47	0.6-6.0	0.04-0.08	4.5-5.5	Low	Low	High	0.28	
	47	---	---	---	---	---	---	---	

See footnote at end of table.

TABLE 15--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Hazleton:									
HxB, HxC	0-5	2.0-6.0	0.12-0.16	3.6-5.5	Low	Low	High	0.24	3-2
	5-31	2.0-20	0.10-0.12	3.6-5.5	Low	Low	High	0.17	
	31-60	2.0-20	0.04-0.10	3.6-5.5	Low	Low	High	0.17	
Holly:									
Hy	0-8	0.6-2.0	0.15-0.17	5.6-7.3	Low	High	Low	0.49	4.3
	8-41	0.6-2.0	0.10-0.12	5.6-7.3	Low	High	Low	0.37	
	41-60	0.6-6.0	0.08-0.12	5.6-7.3	Low	High	Moderate	0.17	
Kedron:									
KaB, KaC	0-10	0.6-2.0	0.16-0.20	3.6-5.5	Low	Moderate	High	0.43	3-2
	10-24	0.2-2.0	0.09-0.14	3.6-5.5	Low	Moderate	High	0.28	
	24-60	0.06-0.2	0.06-0.10	3.6-5.5	Low	Moderate	High	0.28	
KdB	0-10	0.6-2.0	0.14-0.20	3.6-5.5	Low	Moderate	High	0.37	3
	10-24	0.2-2.0	0.09-0.14	3.6-5.5	Low	Moderate	High	0.28	
	24-60	0.06-0.2	0.06-0.10	3.6-5.5	Low	Moderate	High	0.28	
Klinesville:									
KvB, KvC, KvD	0-6	2.0-6.0	0.08-0.12	4.5-6.0	Low	Low	Moderate	0.20	2
	6-15	2.0-6.0	0.06-0.10	4.5-6.0	Low	Low	Moderate	0.28	
	15-48	2.0-6.0	0.01-0.02	4.5-6.0	Low	Low	Moderate	0.28	
	48	---	---	---	---	---	---	---	
Lackawanna:									
LaB, LaC, LaD	0-12	0.6-2.0	0.10-0.14	4.5-5.5	Low	Moderate	High	0.17	3-2
	12-33	0.6-2.0	0.08-0.12	4.5-5.5	Low	Moderate	High	0.28	
	33-75	0.06-0.2	0.04-0.06	4.5-5.5	Low	Moderate	High	0.28	
LbB, LbC	0-12	0.6-2.0	0.10-0.14	4.5-5.5	Low	Moderate	High	0.17	3-2
	12-33	0.6-2.0	0.08-0.12	4.5-5.5	Low	Moderate	High	0.28	
	33-75	0.06-0.2	0.04-0.06	4.5-5.5	Low	Moderate	High	0.28	
[1]LBE:									
Lackawanna part	0-12	0.6-2.0	0.10-0.14	4.5-5.5	Low	Moderate	High	0.17	3-2
	12-33	0.6-2.0	0.08-0.12	4.5-5.5	Low	Moderate	High	0.28	
	33-75	0.06-0.2	0.04-0.06	4.5-5.5	Low	Moderate	High	0.28	
Bath part	0-10	0.6-2.0	0.10-0.20	4.5-6.0	Low	Moderate	Moderate	0.24	3
	10-26	0.6-2.0	0.08-0.18	4.5-6.0	Low	Moderate	Moderate	0.28	
	26-68	0.06-0.2	0.01-0.06	5.1-6.5	Low	Moderate	Moderate	0.28	
	68-79	0.06-0.2	0.01-0.06	5.1-7.3	Low	Moderate	Moderate	0.28	
Laidig:									
LgB, LgC	0-6	0.6-6.0	0.08-0.12	3.6-5.5	Low	Moderate	High	0.28	4
	6-31	0.6-6.0	0.08-0.12	3.6-5.5	Low	Moderate	High	0.28	
	31-60	0.2-0.6	0.06-0.10	3.6-5.5	Low	Moderate	High	0.17	
Lawrenceville:									
Lh	0-10	0.6-2.0	0.12-0.14	4.5-5.5	Low	Moderate	High	0.49	3
	10-25	0.6-2.0	0.10-0.12	4.5-5.5	Low	Moderate	High	0.64	
	25-37	0.2-0.6	0.05-0.07	4.5-5.5	Low	Moderate	High	0.64	
	37-60	0.2-0.6	0.05-0.07	4.5-5.5	Low	Moderate	High	0.64	
Leck Kill:									
LkB, LkC, LkD	0-7	0.6-6.0	0.14-0.18	4.5-6.0	Low	Low	Moderate	0.20	3
	7-40	0.6-6.0	0.14-0.16	4.5-6.0	Low	Low	Moderate	0.17	
	40-60	0.6-6.0	0.04-0.08	4.5-6.0	Low	Low	Moderate	0.28	
Lordstown:									
LsB, LsC, LsD, LxB	0-7	0.6-2.0	0.11-0.17	4.5-5.5	Low	Low	High	0.20	3
	7-26	0.6-2.0	0.10-0.16	4.5-5.5	Low	Low	High	0.28	
	26-32	0.6-2.0	0.05-0.14	4.5-5.5	Low	Low	High	0.28	
	32	---	---	---	---	---	---	---	

See footnote at end of table.

TABLE 15--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Lordstown:									
LxC	0-7	0.6-2.0	0.11-0.17	4.5-5.5	Low	Low	High	0.20	3
	7-26	0.6-2.0	0.10-0.16	4.5-5.5	Low	Low	High	0.28	
	26-32	0.6-2.0	0.05-0.14	4.5-5.5	Low	Low	High	0.28	
	32	---	---	---	---	---	---	---	
[1]LyE:									
Lordstown part	0-7	0.6-2.0	0.11-0.17	4.5-5.5	Low	Low	High	0.20	3
	7-26	0.6-2.0	0.10-0.16	4.5-5.5	Low	Low	High	0.28	
	26-32	0.6-2.0	0.05-0.14	4.5-5.5	Low	Low	High	0.28	
	32	---	---	---	---	---	---	---	
Oquaga part	0-3	0.6-2.0	0.08-0.17	4.5-5.5	Low	Low	High	0.20	3
	3-26	0.6-2.0	0.04-0.12	4.5-5.5	Low	Low	High	0.28	
	26	---	---	---	---	---	---	---	
Mardin:									
MaB, MaC	0-9	0.6-2.0	0.11-0.17	4.5-6.0	Low	Moderate	Moderate	0.20	3
	9-24	0.6-2.0	0.09-0.16	4.5-6.0	Low	Moderate	Moderate	0.28	
	24-70	0.06-0.2	0.01-0.03	4.5-6.5	Low	Moderate	Moderate	0.28	
	70-110	0.06-0.2	0.01-0.03	4.5-7.3	Low	Moderate	Moderate	0.28	
MbB, MbC	0-9	0.6-2.0	0.11-0.17	4.5-6.0	Low	Moderate	Moderate	0.20	3
	9-24	0.6-2.0	0.09-0.16	4.5-6.0	Low	Moderate	Moderate	0.28	
	24-70	0.06-0.2	0.01-0.03	4.5-6.5	Low	Moderate	Moderate	0.28	
	70-110	0.06-0.2	0.01-0.03	4.5-7.3	Low	Moderate	Moderate	0.28	
Meckesville:									
MeA, MeB, MeC	0-9	0.6-2.0	0.12-0.16	4.5-5.5	Low	Low	High	0.28	4
	9-32	0.6-2.0	0.12-0.16	4.5-5.5	Low	Low	High	0.28	
	32-60	0.2-0.6	0.08-0.12	4.5-5.5	Low	Moderate	High	0.28	
MfB, MfC	0-9	0.6-2.0	0.12-0.16	4.5-5.5	Low	Low	High	0.28	4
	9-32	0.6-2.0	0.10-0.14	4.5-5.5	Low	Low	High	0.28	
	32-60	0.2-0.6	0.08-0.12	4.5-5.5	Low	Moderate	High	0.28	
Morris:									
MgB	0-15	0.6-2.0	0.12-0.14	4.5-6.0	Low	High	Moderate	0.24	3-2
	15-60	<0.06	0.06-0.08	5.1-6.5	Low	High	Moderate	0.28	
MoB, MoC	0-15	0.6-2.0	0.12-0.16	4.5-6.0	Low	High	Moderate	0.24	3-2
	15-60	<0.06	0.06-0.08	5.1-6.5	Low	High	Moderate	0.28	
Mucky peat:									
Mp, Ms	0-84	2.0-6.0	0.20-0.30	4.5-5.5	High	High	High	---	---
	84-99	0.2-0.6	0.12-0.16	4.5-5.5	Moderate	High	High	---	
Oquaga:									
[1]OkB:									
Oquaga part	0-3	0.6-2.0	0.08-0.17	4.5-5.5	Low	Low	High	0.24	3
	3-26	0.6-2.0	0.04-0.12	4.5-5.5	Low	Low	High	0.28	
	26	---	---	---	---	---	---	---	
Lackawanna part	0-12	0.6-2.0	0.10-0.14	4.5-5.5	Low	Low	High	0.17	3-2
	12-33	0.6-2.0	0.08-0.12	4.5-5.5	Low	Low	High	0.28	
	33-75	0.06-0.2	0.04-0.06	4.5-5.5	Low	Low	High	0.28	
[1]OkC:									
Oquaga part	0-3	0.6-2.0	0.08-0.17	4.5-5.5	Low	Low	High	0.24	3
	3-26	0.6-2.0	0.04-0.12	4.5-5.5	Low	Low	High	0.28	
	26	---	---	---	---	---	---	---	
Lackawanna part	0-12	0.6-2.0	0.10-0.14	4.5-5.5	Low	Moderate	High	0.17	3-2
	12-33	0.6-2.0	0.08-0.12	4.5-5.5	Low	Moderate	High	0.28	
	33-75	0.06-0.2	0.04-0.06	4.5-5.5	Low	Moderate	High	0.28	

See footnote at end of table.

TABLE 15--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Oquaga:									
[1]OkD:									
Oquaga part-----	0-3	0.6-2.0	0.08-0.17	4.5-5.5	Low-------	Low-------	High------	0.20	3
	3-26	0.6-2.0	0.04-0.12	4.5-5.5	Low-------	Low-------	High------	0.28	
	26	---	---	---	----------	----------	----------	---	
Lackawanna part-	0-12	0.6-2.0	0.10-0.14	4.5-5.5	Low-------	Moderate	High------	0.17	3-2
	12-33	0.6-2.0	0.08-0.12	4.5-5.5	Low-------	Moderate	High------	0.28	
	33-75	0.06-0.2	0.04-0.06	4.5-5.5	Low-------	Moderate	High------	0.28	
[1]OxB:									
Oquaga part-----	0-3	0.6-2.0	0.08-0.17	4.5-5.5	Low-------	Low-------	High------	0.20	3
	3-26	0.6-2.0	0.04-0.12	4.5-5.5	Low-------	Low-------	High------	0.28	
	26	---	---	---	----------	----------	----------	---	
Lackawanna part-	0-12	0.6-2.0	0.10-0.14	4.5-5.5	Low-------	Moderate	High------	0.17	3-2
	12-33	0.6-2.0	0.08-0.12	4.5-5.5	Low-------	Moderate	High------	0.28	
	33-75	0.06-0.2	0.04-0.06	4.5-5.5	Low-------	Moderate	High------	0.28	
[1]OxC:									
Oquaga part-----	0-3	0.6-2.0	0.08-0.17	4.5-5.5	Low-------	Low-------	High------	0.20	3
	3-26	0.6-2.0	0.04-0.12	4.5-5.5	Low-------	Low-------	High------	0.28	
	26	---	---	---	----------	----------	----------	---	
Lackawanna part-	0-12	0.6-2.0	0.10-0.14	4.5-5.5	Low-------	Moderate	High------	0.17	3-2
	12-33	0.6-2.0	0.08-0.12	4.5-5.5	Low-------	Moderate	High------	0.28	
	33-75	0.06-0.2	0.04-0.06	4.5-5.5	Low-------	Moderate	High------	0.28	
Philo:									
Ph----------	0-40	0.6-2.0	0.13-0.20	4.5-6.0	Low-------	Moderate	Moderate	0.49	4-3
	40-60	2.0-20	0.06-0.10	4.5-6.0	Low-------	Moderate	Moderate	0.37	
Pope:									
Po, Pp----------	0-10	0.6-2.0	0.12-0.20	4.5-5.5	Low-------	Low-------	High------	0.49	4-3
	10-60	0.6-6.0	0.10-0.15	4.5-5.5	Low-------	Low-------	High------	0.37	
Rexford:									
ReA, ReB----------	0-16	0.6-2.0	0.14-0.16	4.5-6.0	Low-------	High------	Moderate	0.20	3-2
	16-29	0.06-0.2	0.04-0.08	4.5-6.0	Low-------	High------	Moderate	0.28	
	29-36	0.06-0.2	0.04-0.08	5.6-6.5	Low-------	High------	Moderate	0.28	
	36-60	>2.0	0.03-0.06	5.6-6.5	Low-------	High------	Moderate	0.17	
Rushtown:									
RuC, RuD----------	0-9	>6.0	0.10-0.14	5.1-6.0	Low-------	Low-------	Moderate	0.17	3
	9-20	>6.0	0.06-0.09	5.1-6.0	Low-------	Low-------	Moderate	0.17	
	20-60	>6.0	0.03-0.05	5.1-6.0	Low-------	Low-------	Moderate	0.17	
Sheffield:									
Sh----------	0-7	0.6-2.0	0.16-0.20	5.1-7.3	Low-------	High------	Moderate	0.37	3
	7-19	0.2-0.6	0.13-0.17	5.1-7.3	Low-------	High------	Moderate	0.37	
	19-38	<0.06	0.08-0.12	5.1-7.3	Low-------	High------	Moderate	0.28	
	38-66	0.2-0.6	0.10-0.14	5.1-7.3	Low-------	High------	Moderate	0.17	
Shelmadine:									
SmA----------	0-6	0.6-2.0	0.14-0.18	3.6-5.5	Low-------	High------	High------	0.28	3-2
	6-20	0.6-2.0	0.10-0.14	3.6-5.5	Low-------	High------	High------	0.28	
	20-48	0.06-0.2	0.08-0.12	3.6-5.5	Low-------	High------	High------	0.28	
	48-60	0.06-0.6	0.10-0.14	3.6-5.5	Low-------	High------	High------	---	
SpB----------	0-6	0.6-2.0	0.12-0.18	3.6-5.5	Low-------	High------	High------	0.28	3-2
	6-20	0.6-2.0	0.10-0.14	3.6-5.5	Low-------	High------	High------	0.28	
	20-48	0.06-0.2	0.08-0.12	3.6-5.5	Low-------	High------	High------	0.28	
	48-60	0.06-0.6	0.10-0.14	3.6-5.5	Low-------	High------	High------	0.28	
Swartswood:									
SwB, SwC----------	0-15	0.6-2.0	0.10-0.12	3.6-5.5	Low-------	Moderate	High------	0.17	3-2
	15-34	0.6-2.0	0.08-0.12	3.6-5.5	Low-------	Moderate	High------	0.28	
	34-60	0.06-0.6	0.06-0.10	3.6-5.5	Low-------	Moderate	High------	0.28	

See footnote at end of table.

TABLE 15--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Swartswood:									
SxB, SxC	0-15	0.6-2.0	0.10-0.12	3.6-5.5	Low	Moderate	High	0.17	3-2
	15-34	0.6-2.0	0.08-0.12	3.6-5.5	Low	Moderate	High	0.28	
	34-60	0.06-0.6	0.06-0.10	3.6-5.5	Low	Moderate	High	0.28	
Very stony land:									
[1]VaC, [1]VaE	0-60	---	---	---	---	---	---	---	---
Volusia:									
VoA, VoB	0-10	0.6-2.0	0.12-0.14	4.5-6.0	Low	High	Moderate	0.24	3
	10-16	0.6-2.0	0.14-0.16	4.5-6.0	Low	High	Moderate	0.43	
	16-60	<0.06	0.01-0.02	5.1-6.0	Low	High	Moderate	0.28	
VxB	0-10	0.6-2.0	0.14-0.19	4.5-5.0	Low	High	Moderate	0.24	3
	10-16	0.6-2.0	0.14-0.16	4.5-6.0	Low	High	Moderate	0.43	
	16-60	<0.06	0.01-0.02	5.1-6.0	Low	High	Moderate	0.28	
Watson:									
WaB	0-10	0.6-2.0	0.14-0.18	4.5-5.5	Moderate	Moderate	Moderate	0.24	3-2
	10-27	0.6-2.0	0.12-0.16	4.5-5.5	Moderate	Moderate	Moderate	0.17	
	27-60	0.06-0.2	0.08-0.12	4.5-5.5	Moderate	Moderate	Moderate	0.17	
Wayland:									
Wb	0-9	0.2-2.0	0.17-0.22	5.6-6.0	Low	High	Moderate	0.49	3-2
	9-41	0.06-0.2	0.16-0.20	6.6-7.8	Low	High	Low	0.49	
	41-60	0.06-0.2	0.11-0.19	6.6-8.4	Low	High	Low	0.28	
Weikert:									
WeB3, WeC3, WeD3	0-6	2.0-6.0	0.08-0.14	4.5-6.0	Low	Low	Moderate	0.20	2
	6-40	2.0-6.0	0.02-0.04	4.5-6.0	Low	Low	Moderate	0.28	
	40	---	---	---	---	---	---	---	
[1]WhB:									
Weikert part	0-6	2.0-6.0	0.08-0.14	4.5-6.0	Low	Low	Moderate	0.20	2
	6-40	2.0-6.0	0.02-0.04	4.5-6.0	Low	Low	Moderate	0.28	
	40	---	---	---	---	---	---	---	
Hartleton part	0-8	0.6-2.0	0.12-0.14	4.5-5.5	Low	Low	High	0.17	3-2
	8-37	0.6-2.0	0.08-0.10	4.5-5.5	Low	Low	High	0.17	
	37-47	0.6-6.0	0.04-0.08	4.5-5.5	Low	Low	High	0.28	
	47	---	---	---	---	---	---	---	
[1]WhC:									
Weikert part	0-6	2.0-6.0	0.08-0.14	4.5-6.0	Low	Low	Moderate	0.20	2
	6-40	2.0-6.0	0.02-0.04	4.5-6.0	Low	Low	Moderate	0.28	
	40	---	---	---	---	---	---	---	
Hartleton part	0-8	0.6-2.0	0.12-0.14	4.5-5.5	Low	Low	High	0.17	3-2
	8-37	0.6-2.0	0.08-0.10	4.5-5.5	Low	Low	High	0.17	
	37-47	0.6-6.0	0.04-0.08	4.5-5.5	Low	Low	High	0.28	
	47	---	---	---	---	---	---	---	
[1]WhD:									
Weikert part	0-6	2.0-6.0	0.08-0.14	4.5-6.0	Low	Low	Moderate	0.20	2
	6-40	2.0-6.0	0.02-0.04	4.5-6.0	Low	Low	Moderate	0.28	
	40	---	---	---	---	---	---	---	
Hartleton part	0-8	0.6-2.0	0.12-0.14	4.5-5.5	Low	Low	High	0.17	3-2
	8-37	0.6-2.0	0.08-0.10	4.5-5.5	Low	Low	High	0.17	
	37-47	0.6-6.0	0.04-0.08	4.5-5.5	Low	Low	High	0.28	
	47	---	---	---	---	---	---	---	
[1]WKE:									
Weikert part	0-6	2.0-6.0	0.08-0.14	4.5-6.0	Low	Low	Moderate	0.20	2
	6-40	2.0-6.0	0.02-0.04	4.5-6.0	Low	Low	Moderate	0.28	
	40	---	---	---	---	---	---	---	

See footnote at end of table.

TABLE 15--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Weikert:									
Klinesville part	0-6	2.0-6.0	0.08-0.12	4.5-6.0	Low	Low	Moderate	0.20	2
	6-15	2.0-6.0	0.06-0.10	4.5-6.0	Low	Low	Moderate	0.28	
	15-48	2.0-6.0	0.01-0.02	4.5-6.0	Low	Low	Moderate	0.28	
	48	---	---	---	---	---	---	---	
Wellsboro:									
WmB, WmC	0-10	0.6-2.0	0.10-0.14	4.5-6.0	Low	Moderate	Moderate	0.20	3-2
	10-23	0.6-2.0	0.10-0.14	4.5-6.0	Low	Moderate	Moderate	0.28	
	23-60	0.06-0.2	0.06-0.10	4.5-6.0	Low	Moderate	Moderate	0.28	
WpB, WpC	0-10	0.6-2.0	0.10-0.14	4.5-6.0	Low	Moderate	Moderate	0.20	3-2
	10-23	0.6-2.0	0.10-0.14	4.5-6.0	Low	Moderate	Moderate	0.28	
	23-60	0.06-0.2	0.06-0.10	4.5-6.0	Low	Moderate	Moderate	0.28	
Worth:									
WrB, WrC	0-7	0.6-2.0	0.12-0.16	4.5-5.5	Low	Moderate	High	0.17	3
	7-30	0.6-2.0	0.08-0.14	4.5-5.5	Low	Moderate	High	0.28	
	30-60	0.06-0.2	0.02-0.06	4.5-5.5	Low	Moderate	High	0.28	
Wurtsboro:									
WsB	0-9	0.6-2.0	0.10-0.14	3.6-5.5	Low	Moderate	High	0.17	3-2
	9-27	0.6-2.0	0.10-0.14	3.6-5.5	Low	Moderate	High	0.28	
	27-60	0.06-0.2	0.08-0.12	3.6-5.5	Low	Moderate	High	0.28	
WxB, WxC	0-9	0.6-2.0	0.10-0.16	3.6-5.5	Low	Moderate	High	0.17	3-2
	9-27	0.6-2.0	0.10-0.14	3.6-5.5	Low	Moderate	High	0.28	
	27-60	0.06-0.2	0.08-0.12	3.6-5.5	Low	Moderate	High	0.28	
Wyoming:									
WyA, WyB, WyC, WyD, WyE	0-8	6.0-20	0.06-0.14	4.5-6.0	Low	Low	High	0.17	3
	8-26	6.0-20	0.06-0.09	4.5-6.0	Low	Low	High	0.17	
	26-60	6.0-20	0.02-0.04	4.5-6.0	Low	Low	High	0.17	

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior characteristics of the map unit.

TABLE 16--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. The definitions of "flooding" and "water table" in the Glossary explain such terms as "rare," "brief," and "perched." The symbol < means less than; > means greater than]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
Alden:										
Ad	D	None	---	---	0	Perched	Nov-Jun	>60	---	High.
Allenwood:										
AnA, AnB, AnC	B	None	---	---	>6.0	---	---	>60	---	Moderate.
Alluvial land:										
As	C/D	Frequent	Very brief	Sep-Jun	0-3.0	Apparent	Oct-Apr	>60	---	---
Alvira:										
AvB	C	None	---	---	0.5-1.5	Perched	Oct-May	>40	Rippable	High.
[1]AwB:										
Alvira part	C	None	---	---	0.5-1.5	Perched	Oct-May	>40	Rippable	High.
Watson part	C	None	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate.
Bath:										
BaB, BaC, BaD	C	None	---	---	3.0-6.0	Perched	Nov-Mar	>40	Hard	Moderate.
BbB, BbC	C	None	---	---	3.0-6.0	Perched	Nov-Mar	>40	Hard	Moderate.
Benson:										
[1]BeB:										
Benson part	C/D	None	---	---	>6.0	---	---	12-20	Hard	Moderate.
Rock outcrop part.										
[1]BeC:										
Benson part	C/D	None	---	---	>6.0	---	---	12-20	Hard	Moderate.
Rock outcrop part.										
[1]BeF:										
Benson part	C/D	None	---	---	>6.0	---	---	12-20	Hard	High.
Rock outcrop part.										
Braceville:										
BrA, BrB	C	None	---	---	0.5-3.0	Perched	Nov-Mar	>60	---	Moderate.
Buchanan:										
BuB, BxB, BxC	C	None	---	---	1.0-3.0	Perched	Nov-Mar	>60	---	Moderate.
Chenango:										
ChA, ChB, ChC	A	None	---	---	>6.0	---	---	>60	---	Low.
Chippewa:										
[1]CmA:										
Chippewa part	D	None	---	---	0.0-0.5	Perched	Nov-May	48-60	Hard	Moderate.
Norwich part	D	None	---	---	0.0-0.5	Perched	Nov-May	>42	Hard	Moderate.
[1]CnB:										
Chippewa part	D	None	---	---	0.0-0.5	Perched	Nov-May	48-60	Hard	Moderate.
Norwich part	D	None	---	---	0.0-0.5	Perched	Nov-May	>42	Hard	Moderate.

See footnote at end of table.

TABLE 16--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
Clymer: CpA, CpB, CpC, CxB, CxC	B	None	---	---	>6.0	---	---	>60	---	Moderate.
Cut and fill land: Cy	B-D	None to rare	Very brief	Jan-Mar	1.0-6.0	Apparent	Nov-Apr	>36	---	---
Dekalb: DxB, DxC, DxE	C	None	---	---	>6.0	---	---	20-40	Hard	Low.
Empeyville: ExB	C	None	---	---	1.0-3.0	Perched	Feb-May	>60	---	Moderate.
Hartleton: HaB, HaC	B	None	---	---	>6.0	---	---	40-60	Rippable	Moderate.
Hazleton: HxB, HxC	B	None	---	---	>6.0	---	---	>60	---	Moderate.
Holly: Hy	D	Frequent	Very brief	Nov-May	0-0.5	Apparent	Dec-May	>60	---	High.
Kedron: KaB, KaC, KdB	C	None	---	---	1.5-3.0	Perched	Nov-May	>60	---	Moderate.
Klinesville: KvB, KvC, KvD	C/D	None	---	---	>6.0	---	---	40-60	Rippable	Moderate.
Lackawanna: LaB, LaC, LaD	C	None	---	---	3.0-6.0	Perched	Nov-Mar	>42	Hard	Moderate.
LbB, LbC	C	None	---	---	3.0-6.0	Perched	Nov-Mar	>42	Hard	Moderate.
[1]LBE: Lackawanna part	C	None	---	---	3.0-6.0	Perched	Nov-Mar	>42	Hard	Moderate.
Bath part	C	None	---	---	3.0-6.0	Perched	Nov-Mar	>40	Hard	Moderate.
Laidig: LgB, LgC	C	None	---	---	3.0-4.0	Perched	Jan-Mar	>42	Hard	Low.
Lawrenceville: Lh	C	None	---	---	1.5-3.0	Perched	Nov-Mar	>48	Rippable	Moderate.
Leck Kill: LkB, LkC, LkD	B	None	---	---	>6.0	---	---	40-72	Rippable	Moderate.
Lordstown: LsB, LsC, LsD, LxB, LxC	C	None	---	---	>6.0	---	---	20-40	Hard	Low.
[1]LyE: Lordstown part	C	None	---	---	>6.0	---	---	20-40	Hard	Low.
Oquaga part	C	None	---	---	>6.0	---	---	20-40	Hard	Low.
Mardin: MaB, MaC	C	None	---	---	1.5-3.0	Perched	Mar-May	>42	Hard	Moderate.
MbB, MbC	C	None	---	---	1.5-3.0	Perched	Mar-May	>42	Hard	Moderate.

See footnote at end of table.

TABLE 16--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
Meckesville: MeA, MeB, MeC, MfB, MfC	C	None	---	---	>6.0	---	---	>60	---	Moderate.
Morris: MgB, MoB, MoC	C	None	---	---	0.5-1.5	Perched	Nov-Mar	>42	---	High.
Mucky peat: Mp, Ms	D	Frequent	Very long	Sep-May	0	Apparent	Jan-Dec	>60	---	High.
Oquaga: [1]OkB: Oquaga part	C	None	---	---	>6.0	---	---	20-40	Hard	Low.
Lackawanna part	C	None	---	---	3.0-6.0	Perched	Nov-Mar	>42	Hard	Moderate.
[1]OkC: Oquaga part	C	None	---	---	>6.0	---	---	20-40	Hard	Low.
Lackawanna part	C	None	---	---	3.0-6.0	Perched	Nov-Mar	>42	Hard	Moderate.
[1]OkD: Oquaga part	C	None	---	---	>6.0	---	---	20-40	Hard	Low.
Lackawanna part	C	None	---	---	3.0-6.0	Perched	Nov-Mar	>42	Hard	Moderate.
[1]OxB: Oquaga part	C	None	---	---	>6.0	---	---	20-40	Hard	Low.
Lackawanna part	C	None	---	---	3.0-6.0	Perched	Nov-Mar	>42	Hard	Moderate.
[1]OxC: Oquaga part	C	None	---	---	>6.0	---	---	20-40	Hard	Low.
Lackawanna part	C	None	---	---	3.0-6.0	Perched	Nov-Mar	>42	Hard	Moderate.
Philo: Ph	B	Common	Very brief	Nov-May	1.5-3.0	Apparent	Dec-Apr	>60	---	Moderate.
Pope: Po, Pp	B	Rare to common.	Very brief	Nov-Apr	>4.0	Apparent	Feb-Mar	>60	---	Moderate.
Rexford: ReA, ReB	C	None	---	---	0.5-1.5	Perched	Oct-May	>60	---	High.
Rushtown: RuC, RuD	A	None	---	---	>6.0	---	---	>36	Rippable	Low.
Sheffield: Sh	D	None	---	---	0-0.5	Perched	Jan-Apr	>48	Rippable	High.
Shelmadine: SmA, SpB	D	None	---	---	0.0-0.5	Perched	Sep-Jun	>60	Rippable	High.
Swartswood: SwB, SwC, SxB, SxC	C	None	---	---	3.0-4.0	Perched	Nov-Mar	>48	Hard	Moderate.
Very stony land: [1]VaC, [1]VaE	B/D	None	---	---	>0.5	Apparent	Nov-Mar	>48	Hard	---
Volusia: VoA, VoB, VxB	C	None	---	---	0.5-1.5	Perched	Dec-May	>48	Hard	Moderate.

See footnote at end of table.

TABLE 16--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	
					Ft			In		
Watson:										
WaB	C	None	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate.
Wayland:										
Wb	D	Frequent	Long to brief	Oct-May	0	Apparent	Nov-Jun	>60	---	High.
Weikert:										
WeB3, WeC3, WeD3	C/D	None	---	---	>6.0	---	---	40-60	Ripable	Moderate.
[1]WhB:										
Weikert part	C/D	None	---	---	>6.0	---	---	40-60	Ripable	Moderate.
Hartleton part	B	None	---	---	>6.0	---	---	40-60	Ripable	Moderate.
[1]WhC:										
Weikert part	C/D	None	---	---	>6.0	---	---	40-60	Ripable	Moderate.
Hartleton part	B	None	---	---	>6.0	---	---	40-60	Ripable	Moderate.
[1]WhD:										
Weikert part	C/D	None	---	---	>6.0	---	---	40-60	Ripable	Moderate.
Hartleton part	B	None	---	---	>6.0	---	---	40-60	Ripable	Moderate.
[1]WKE:										
Weikert part	C/D	None	---	---	>6.0	---	---	40-60	Ripable	Moderate.
Klinesville part	C/D	None	---	---	>6.0	---	---	40-60	Ripable	Moderate.
Wellsboro:										
WmB, WmC, WpB, WpC	C	None	---	---	1.5-3.0	Perched	Nov-Mar	>48	Hard	High.
Worth:										
WrB, WrC	C	None	---	---	4.0-6.0	Perched	Feb-May	>60	---	Moderate.
Wurtsboro:										
WsB	C	None	---	---	1.5-3.0	Perched	Nov-Mar	>48	Ripable	High.
WxB, WxC	C	None	---	---	1.5-3.0	Perched	Nov-Mar	>48	Ripable	High.
Wyoming:										
WyA, WyB, WyC, WyD, WyE	A	None	---	---	>6.0	---	---	>60	---	Low.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior characteristics of the map unit.

TABLE 17--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics of this taxadjunct that are outside the range of the series]

Soil name	Family or higher taxonomic class
Alden	Fine-loamy, mixed, nonacid, mesic Mollic Haplaquepts
Allenwood	Fine-loamy, mixed, mesic Typic Hapludults
Alluvial land	Fluvaquents
Alvira	Fine-loamy, mixed, mesic Aeric Fragiaquults
Bath	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Benson	Loamy-skeletal, mixed, mesic Lithic Eutrochrepts
Braceville	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Buchanan	Fine-loamy, mixed, mesic Aquic Fragiudults
Chenango	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Chippewa	Fine-loamy, mixed, mesic Typic Fragiaquepts
*Clymer	Fine-loamy, mixed, mesic Typic Hapludults
Cut and fill land	Arents
Dekalb	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Empeyville	Coarse-loamy, mixed, frigid Aquic Fragiorthods
Hartleton	Loamy-skeletal, mixed, mesic Typic Hapludults
Hazleton	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Holly	Fine-loamy, mixed, nonacid, mesic Typic Fluvaquents
Kedron	Fine-loamy, mixed, mesic Aquic Fragiudults
*Klinesville	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Lackawanna	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Laidig	Fine-loamy, mixed, mesic Typic Fragiudults
*Lawrenceville	Fine-silty, mixed, mesic Typic Fragiudalfs
Leck Kill	Fine-loamy, mixed, mesic Typic Hapludults
*Lordstown	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Mardin	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Meckesville	Fine-loamy, mixed, mesic Typic Fragiudults
Morris	Coarse-loamy, mixed, mesic Aeric Fragiaquepts
Mucky peat	Medifibrists and Medihemists
Norwich	Fine-loamy, mixed, mesic Typic Fragiaquepts
Oquaga	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Philo	Coarse-loamy, mixed, mesic Fluvaquentic Dystrochrepts
Pope	Coarse-loamy, mixed, mesic Fluventic Dystrochrepts
Rexford	Coarse-loamy, mixed, mesic Aeric Fragiaquepts
*Rushtown	Loamy-skeletal over fragmental, mixed, mesic Typic Dystrochrepts
*Sheffield	Fine-silty, mixed, mesic Typic Fragiaqualfs
Shelmadine	Fine-loamy, mixed, mesic Typic Fragiaquults
Swartswood	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Very stony land	Dystrochrepts
Volusia	Fine-loamy, mixed, mesic Aeric Fragiaquepts
Watson	Fine-loamy, mixed, mesic Typic Fragiudults
Wayland	Fine-silty, mixed, nonacid, mesic Mollic Fluvaquents
*Weikert	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Wellsboro	Coarse-loamy, mixed, mesic Typic Fragiochrepts
*Worth	Coarse-loamy, mixed, frigid Typic Fragiorthods
Wurtsboro	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Wyoming	Loamy-skeletal, mixed, mesic Typic Dystrochrepts

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