United States Department of Agriculture

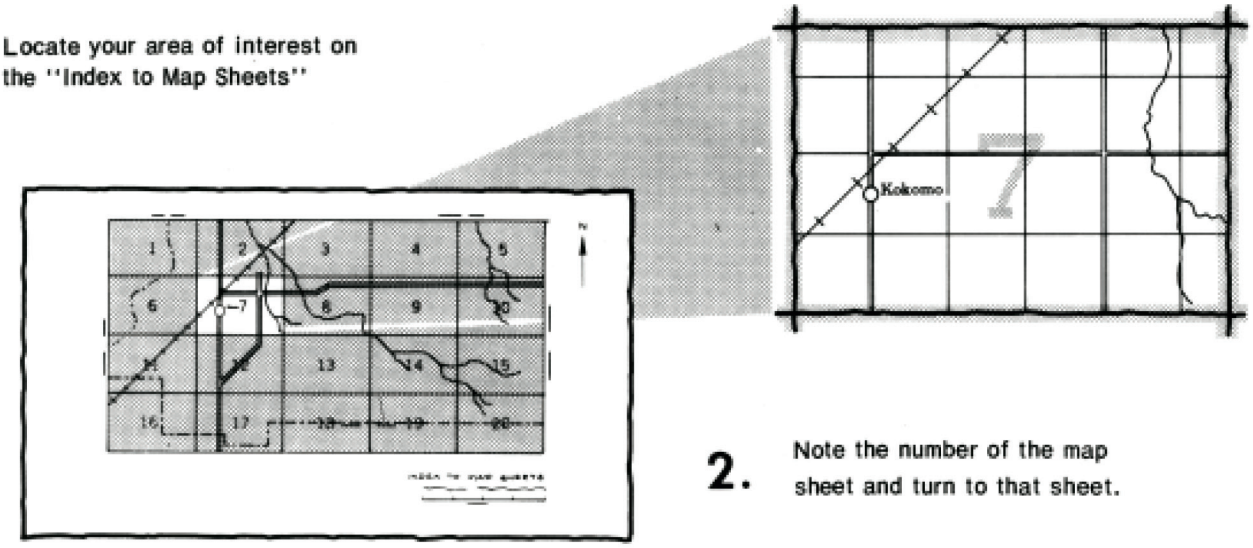
Soil Conservation Service

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

Soil Survey of Lycoming County Pennsylvania

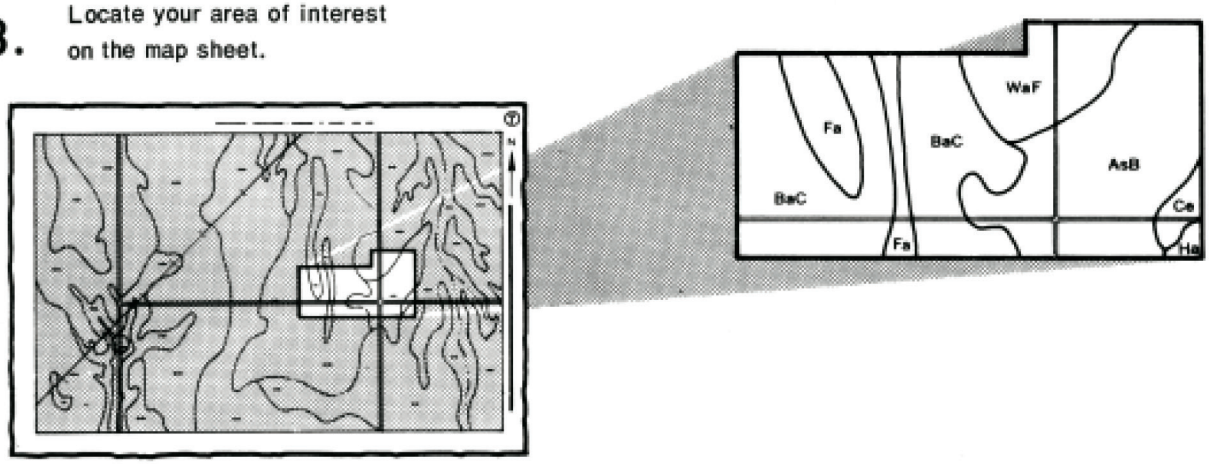
HOW TO USE

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

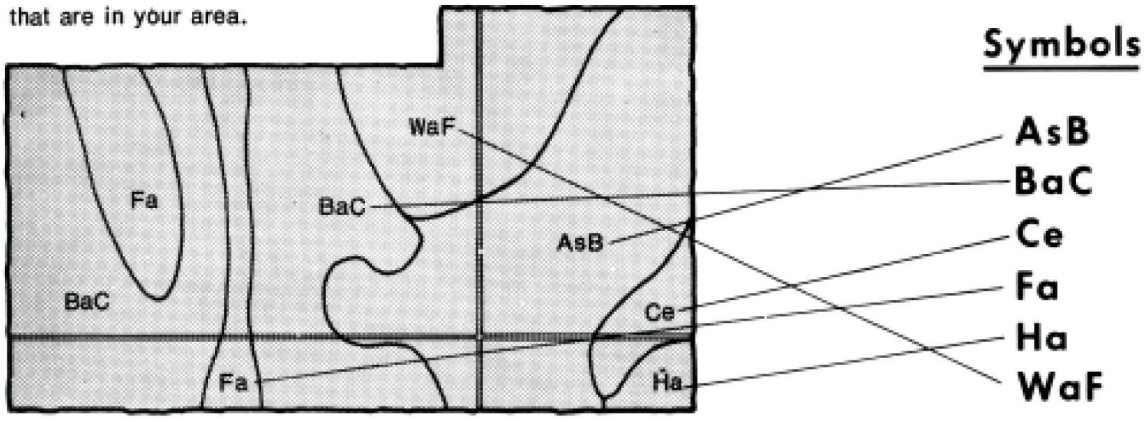


2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.

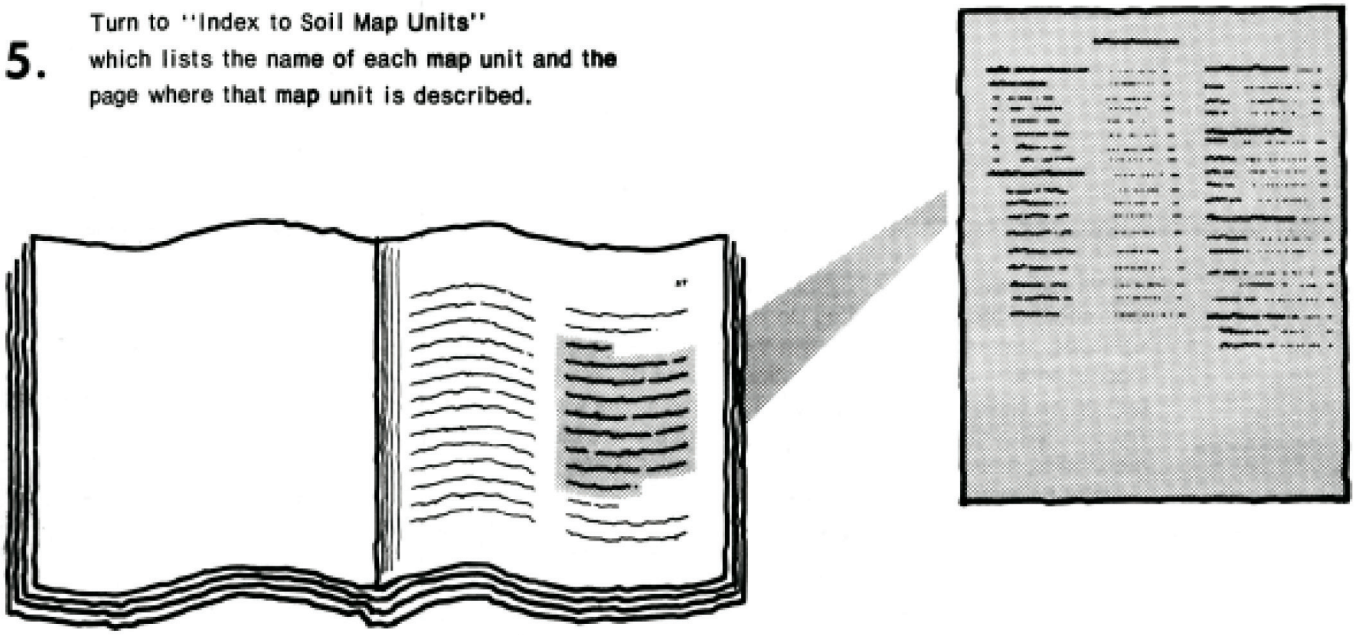


4. List the map unit symbols that are in your area.

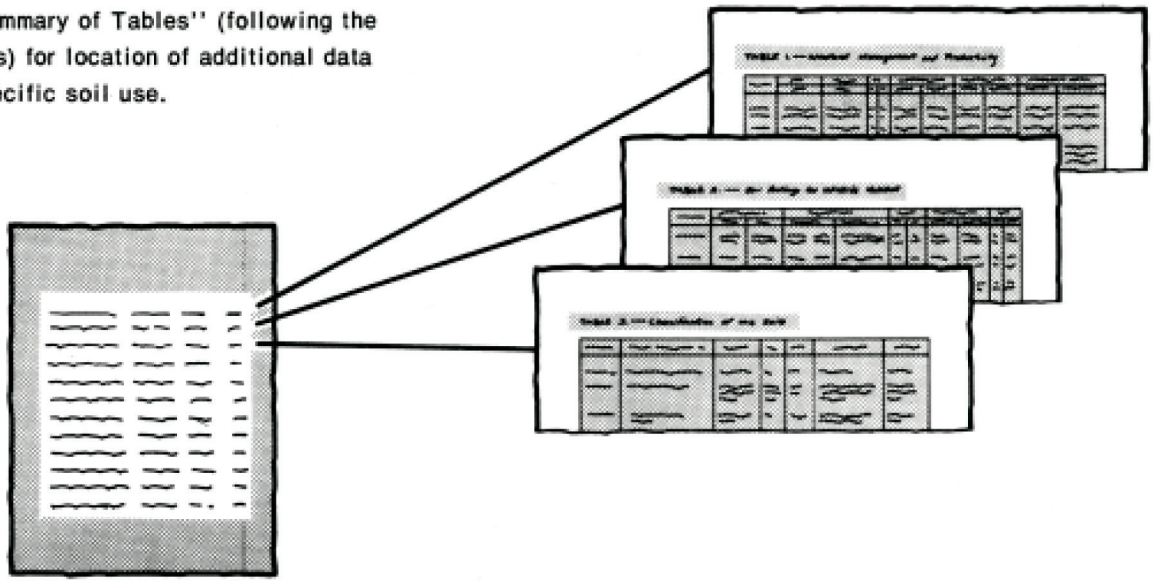


THIS SOIL SURVEY

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



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



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

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

Major fieldwork for this soil survey was completed in 1980. Soil names and descriptions were approved in 1981. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1981. This survey was made cooperatively by the Soil Conservation Service and The Pennsylvania State University, College of Agriculture, and the Pennsylvania Department of Environmental Resources, State Conservation Commission. The survey is part of the technical assistance furnished to the Lycoming County Conservation District.

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

Cover: Stripcropping helps to reduce surface runoff and to control erosion on Allenwood gravelly silt loam, 3 to 8 percent slopes. The soil is well suited to cultivated crops.

Contents

Soil Series

Issued November 1986

Index to Map Units

Summary of Tables

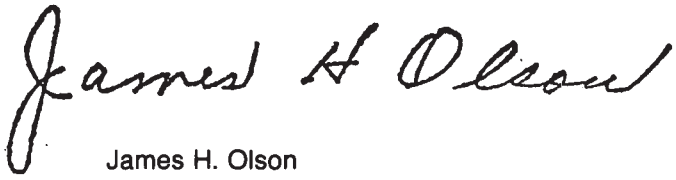
Foreword

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

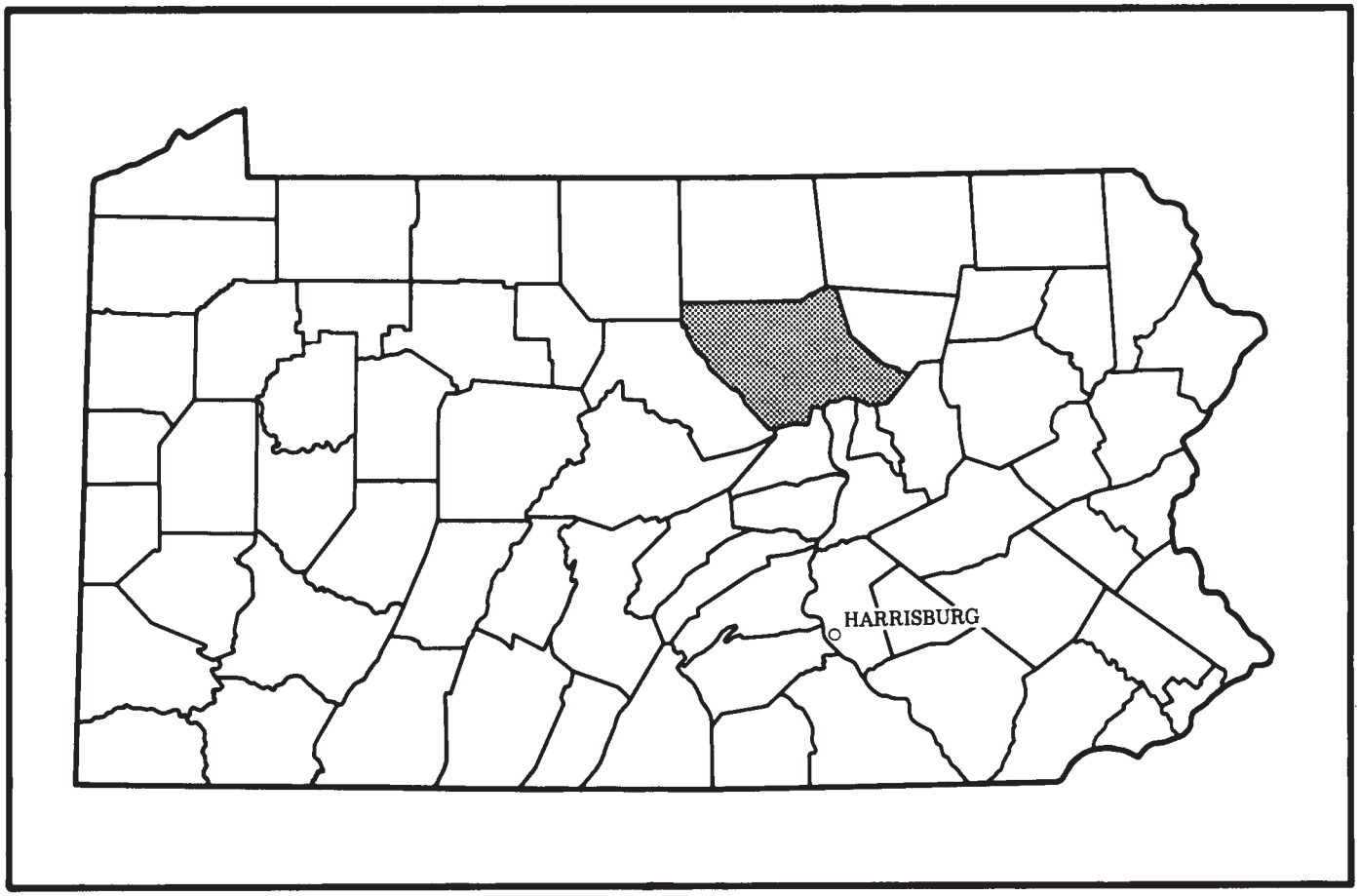
This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey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

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

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



James H. Olson
State Conservationist
Soil Conservation Service



Location of Lycoming County in Pennsylvania.

Soil Survey of Lycoming County, Pennsylvania

By Clifford D. Kohler, Soil Conservation Service

Fieldwork by Clifford D. Kohler, Ned B. Ellenberger,
William R. Knight, and Paul H. Parrish, 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

Lycoming County is in the north-central part of Pennsylvania. The total area of the county is 1,222 square miles, or about 782,000 acres. The southern half of the county is dominantly mountains and hills interspersed with several broad valleys. The northern half of the county consists of large plateaus dissected by drainageways. Approximately 84 percent of the county is wooded.

The county is bounded on the north by Tioga and Bradford Counties, on the east by Sullivan County, on the southeast by Columbia County, on the south by Montour, Northumberland, and Union Counties, on the west by Clinton County, and on the northwest by Potter County.

Most the soils in the county are well drained. However, on many of these well drained soils, slope is a limitation or depth to bedrock is shallow or moderately deep. Some soils in the county range from moderately well drained to very poorly drained.

The county is in the Susquehanna River basin. The other major streams are Pine Creek in the western part of the county, Lycoming Creek in the central part, and Loyalsock and Muncy Creeks in the eastern part. Muncy Creek flows southwest into the Susquehanna River; all the other creeks flow south into the river.

The population of Lycoming County in 1980 was 118,416. Williamsport, the county seat, and the surrounding area make up the major population center.

Farming is a major industry in the county. Dairy farming predominates, but grain, beef, and poultry operations are also important. Approximately 1,070 farms are in the county, according to the 1979 Pennsylvania crop and livestock annual summary (*10*).

The major routes in the county are U.S. 15 and U.S. 220. The other important routes are state routes 44, 87, 118, and 287.

This soil survey supersedes the soil survey of Lycoming County published in 1923 (*13*). This survey provides additional information and contains larger maps that show the soils in greater detail.

General Nature of the County

This section provides general information about the climate, geology, water supply, and history of Lycoming County.

Climate

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

Table 1 gives data on temperature and precipitation for the survey area as recorded at Williamsport in the period 1951 to 1978. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 29 degrees F, and the average daily minimum temperature is 21 degrees. The lowest temperature on record, which occurred at Williamsport on January 18, 1977, is -17

degrees. In summer the average temperature is 71 degrees, and the average daily maximum temperature is 82 degrees. The highest recorded temperature, which occurred at Williamsport on June 26, 1952, is 102 degrees.

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

The total annual precipitation is 41 inches. Of this, 22 inches, or 55 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 18 inches. The heaviest 1-day rainfall during the period of record was 8.66 inches at Williamsport on June 22, 1972. Thunderstorms occur on about 35 days each year. Most thunderstorms occur in summer.

The average seasonal snowfall in Lycoming County is 47 inches. The greatest snow depth at any one time during the period of record was 24 inches. On the average, 29 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 65 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the west. Average windspeed is highest, 9 miles per hour, in spring.

Geology

Joseph N. Van, geologist, Soil Conservation Service, helped to prepare this section.

Lycoming County, in all parts except the extreme southern part, is in the Appalachian Plateau Province. The county in the extreme southern part is in the Valley and Ridge Province (*9*). The two provinces are separated by a striking escarpment, the Allegheny Front, trending in an east-west direction. Between the escarpment and the West Branch of the Susquehanna River is an irregular series of low, rolling hills. South of the river is a series of high, even-crested ridges and narrow valleys typical of the Valley and Ridge Province. North of the escarpment, there is a high plateau that is deeply dissected by four large streams.

McIntyre Mountain in McNett Township, a ridgetop that is 2,380 feet above sea level, is the highest elevation in the county. The lowest elevation, about 460 feet, is at the place where the West Branch of the Susquehanna River leaves the county.

Lycoming County is drained almost entirely by the West Branch of the Susquehanna River. A very small area in the eastern tip of the county is drained by Fishing Creek, a tributary of the North Branch of the Susquehanna River.

The most striking structural feature in Lycoming County is the eastward plunging Nitanny Anticlinorium, south of the Allegheny Front in the Valley and Ridge Province. The Anticlinorium consists of the Nippenose Anticline and the Mosquito Anticline to the north (*7*). The broad, eastward trending White Deer Syncline is at the southeast boundary of the county (*7*). Closely north of the Nittany Anticlinorium, the Sylvan Dell Syncline and Anticline are separated from the Lymehurst Syncline and Anticline by the eastward trending Williamsport thrust fault.

Other thrust faults in the folded area are the Beautys, Antes, Maranatha, and Jersey Shore faults. From south of the Allegheny Front, the most prominent folds include the Short Mountain Syncline and the Tombs Run Anticline, which trends southwest to northeast. Some of the other east-northeast trending folds in this area are the Loyalsock Syncline, the Warrensville Anticline, the Old Lycoming Anticline, the Woodland Syncline and Anticline, the Seeley Run Syncline, and the Tobert Anticline.

North of the Appalachian structural front, or Allegheny Front, the dips of bedding are gentle, rarely exceeding 15 degrees; the simplicity of this plateau area is a marked contrast to the valley and ridge structures to the south, where the bedrock dips steeply. Closely north of the front, the most prominent structure is the northeast trending Snow Shoe Syncline. Other structures include the Barbours Syncline, the Smithnob Anticline, the Nail Factory Anticline, the Mill Mountain Syncline and Anticline, the Rose Valley Anticline, the Ramseyville Syncline, the Jersey Mills Syncline, the Cogan House Anticline, the McIntyre Syncline, and the Slate Run Anticline.

The rocks exposed range in age from Lower Ordovician, which are the oldest, to Lower Pennsylvanian, which are the youngest, and have been divided into thirty formations. The Lower and Middle Ordovician rocks are predominantly limestone, and some are dolomite. The dominant soils that formed in the areas underlain by these rocks are in association 6 of the General Soil Map. These carbonates grade upward into the Upper Ordovician shale, siltstone, and sandstone, in part conglomeratic, which are overlain by the Lower Silurian quartzite. The dominant soils that formed in areas underlain by these rocks are in association 7. The rest of the Silurian rocks consists of shale, calcareous shale, and limestone.

The Lower Devonian limestone, chert, sandstone, and shale sequence is succeeded by the Middle and Upper Devonian gray marine shale and siltstone and a minor limestone interval. There is a red and gray sandstone,

siltstone, and mudstone fluvial in the uppermost Upper Devonian (*7*). The Mississippian and Pennsylvanian Systems are dominated by sandstone that is mostly quartzitic and in some places conglomeratic. The soils that formed in areas underlain by these rocks are in associations 2, 8, and 10. In addition, the upper part of the preserved Pennsylvanian sequence is coal bearing.

During the Pleistocene Epoch, Lycoming County was glaciated at least three times in the last 500,000 years and possibly at least once by older glaciations (*12*). The known glaciations are the Illinoian, which is the oldest, the Altonian, which is early and mid-Wisconsinan, and the Woodfordian, which is late Wisconsinan (*5*). The glacial lake sediment consists of clay, silt, sand, gravel, and some boulders. The glacial drift consists of unsorted till, outwash, and stratified drift. There are large areas of stony and bouldery colluvium. There are some boulder fields. The alluvial terraces consist of sheet-like deposits and lengthy gravel bars, as in the Susquehanna and Muncy Valleys (*3*). The recent alluvial deposits are in most of the small tributaries and main streams. They consist of gravel, sand, silt, clay, and swamp deposits (*6*).

The principal economic mineral resources in Lycoming County are bituminous coal; stone (coarse aggregate); sand and gravel; natural gas; and other potential materials, such as chemical grade limestone, agricultural lime, clay, and shale; iron ore; rottenstone (tripoli); dimension stone (riprap); and flagstone (bluestone). Local borrow pits throughout the county produce stone for general fill, secondary road surfacing, road shoulders, and riprap (*4*). Shale-chip colluvium is suitable for building and facing brick.

The red shale at the top of the Old Port Formation weathers into a sticky clay, and is suitable for structural clay products. The sandstone of the Old Port Formation, which is probably 100 feet thick in the vicinity of Montoursville, is suitable for glasswork. The small amounts of minerals in different rocks in the county do not have commercial value.

The numerous flowing springs in Lycoming County provide water for domestic and industrial use and for some municipal water supplies. Many wells are dug or drilled in the alluvial and the Pleistocene sand and gravel, which are good reservoirs. The water supply for Williamsport is provided by the Mosquito Creek Reservoir and Hagermans Run Reservoir, but in times of drought, an auxiliary supply of water is obtained from seven dug wells and two drilled wells in the Pleistocene sand and gravel (*8*). The average yield is 300 gal/min from unconsolidated materials, 200 gal/min from carbonate rocks, 150 gal/min from sandstone aquifers, 100 gal/min from fractured shale, and 75 gal/min from siltstone. The maximum yields from these sources range from 2.5 to 10 times these amounts.

Water Supply

Joseph N. Van, geologist, Soil Conservation Service, helped to prepare this section.

Most areas of Lycoming County depend on ground water supplies for their water needs. Some of the larger communities are supplied by mountain streams.

The average rainfall for the area is 41 inches per year. Much of this is lost through evaporation and transpiration. Some moves directly into streams as runoff. Thus, only a small amount filters through the soil and recharges the ground water supply.

Water consumption is continually increasing, and the demand on the ground water supply may cause future shortages, especially in developing areas. Water quality is a continual concern. If the soil is used for onsite waste disposal, the ground water may be polluted because of the rapid permeability in the subsoil, such as that in Wyoming and Wheeling soils. Ground water may also be polluted in areas underlain by fractured shale bedrock or bedrock that has solution channels near the surface. Such bedrock underlies Weikert, Berks, and Klinesville soils.

History

Lycoming County was established in 1795 by a bill signed by the first governor of Pennsylvania, Thomas Mifflin. The name of the county derives from "Legani-Hanne," or "Sandy Creek," the name that the Wolf Indians gave to Lycoming Creek. The area of Lycoming County originally was more than 12,000 square miles. From this, parts or all of 16 other counties were formed.

In 1795 Williamsport was established as the county seat. In 1806 it became a borough and in 1866 was incorporated as a city.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material has few or no roots or other living organisms and has been changed very little by other biologic activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief,

climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

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

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

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

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

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

Map Unit Composition

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

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

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the

landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

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

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

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

There are areas along the borders of Lycoming County where the boundaries on the general soil map and the names of the general soil map units do not match those of adjoining counties. These discrepancies exist because of conditions such as differences in the detail of mapping, changes in soil classification, and different proportions of the same soil in adjoining counties. Where some of these conditions exist, the adjoining counties match with similar kinds of soils.

Soil Descriptions

Areas Dominated by Soils that Formed in Residuum or Glacial Till

The soils in this group are mainly nearly level to very steep, moderately deep, and well drained. They are on ridges and mountainsides and in valleys. Some soils on the steep slopes are shallow, and some at the base of slopes are somewhat poorly drained. The soils in this group are used mainly as woodland or cropland.

1. Weikert-Berks-Hartleton Association

Gently sloping to very steep, shallow to deep, well drained soils; on hills and ridges

These soils formed in material weathered from acid siltstone, sandstone, and shale (fig. 1). They are on ridges and rolling hills that have steep side slopes and in narrow valleys.

This map unit makes up about 14 percent of the county. It is about 30 percent Weikert soils, 25 percent Berks soils, 15 percent Hartleton soils, and 30 percent minor soils.

Weikert soils are gently sloping to very steep and are on narrow ridgetops and on hills and valley sides. These soils are shallow and well drained.

Berks soils are gently sloping to moderately steep and are on ridges and hills. These soils are moderately deep and well drained.

Hartleton soils are gently sloping to moderately steep and are on broad ridgetops and hills. These soils are deep and well drained.

The minor soils are Klinesville, Allenwood, Alvira, and Shelmadine soils on side slopes and foot slopes and in valleys and Barbour, Basher, and Holly soils on flood plains.

In most areas the soils in this map unit are wooded or in native vegetation. Some areas are used for dairy farming and beef farming, and other areas, for Christmas tree plantations. Many areas were cleared and cultivated, but most farming operations were unprofitable because of steep slopes, droughtiness, and the use of small fields. The main limitations for most uses are shallowness to rock, slope, and the moderately rapid permeability.

2. Dekalb-Clymer-Cookport Association

Nearly level to very steep, moderately deep and deep, well drained and moderately well drained soils; on broad mountaintops and in intermountain valleys

These soils formed in material weathered from acid sandstone and shale. They are on broad mountaintops and steep mountainsides.

This map unit makes up about 25 percent of the county. It is about 50 percent Dekalb soils, 20 percent Clymer soils, 5 percent Cookport soils, and 25 percent minor soils.

Dekalb soils are nearly level to very steep and are on ridgetops and side slopes of mountains. These soils are moderately deep and well drained. Most areas of the soils have stones on the surface.

Clymer soils are nearly level to moderately steep and are on broad mountaintops. These soils are deep and well drained. Some areas have very few stones on the

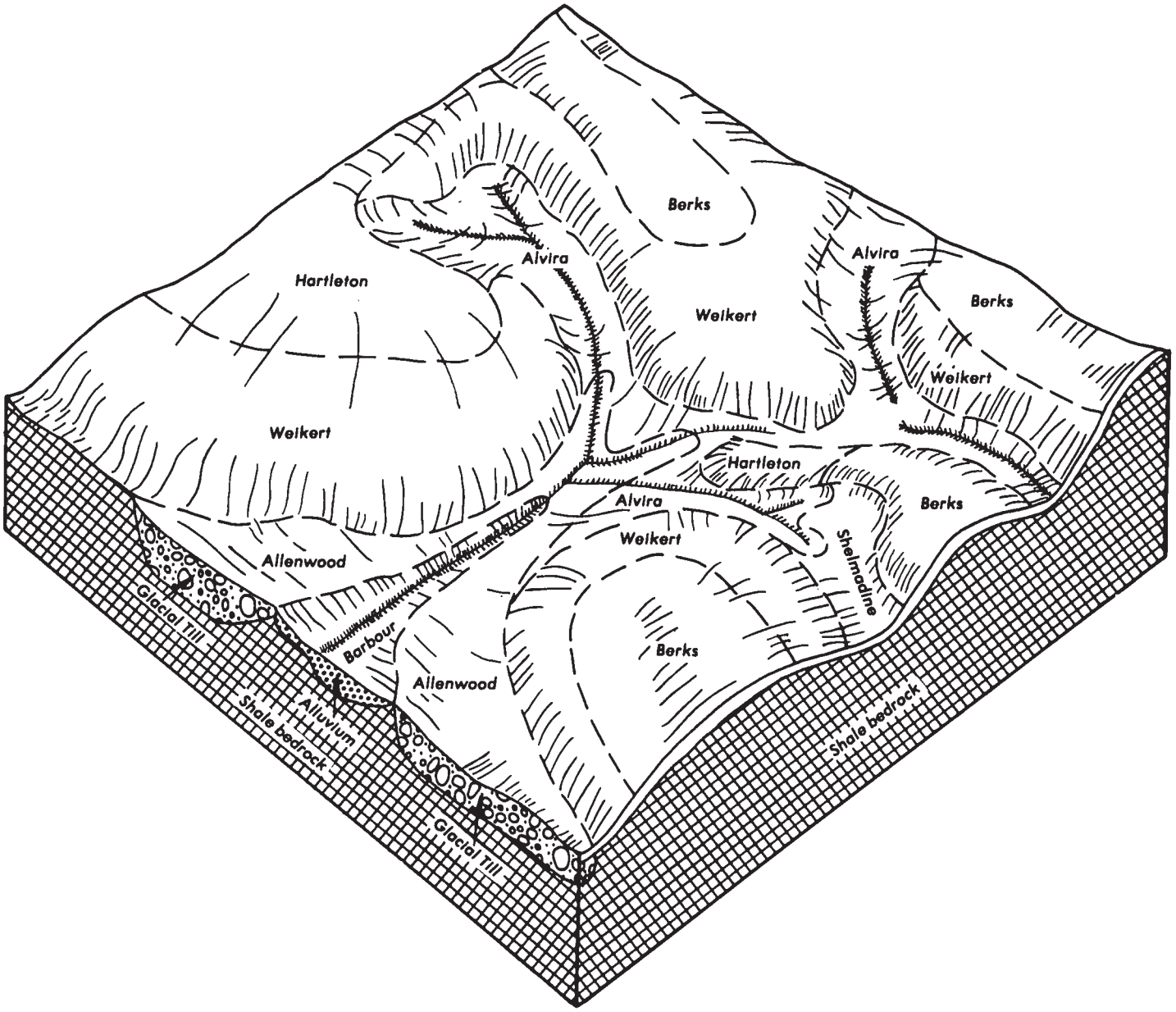


Figure 1.—Typical pattern of soils and underlying material in the Welkert-Berks-Hartleton association.

surface, and other areas have many stones on the surface.

Cookport soils are nearly level to moderately steep and are on broad mountaintops and near the heads of drainageways. These soils are deep and moderately well drained. They have a fragipan in the subsoil. Except in some areas, these soils have stones on the surface.

The minor soils are Nolo, Laidig, and Berks soils and Udorthents on mountaintops and Barbour and Basher soils along streams. Some areas of Rubble land are on side slopes of mountains and ridges.

The soils in this map unit are used mainly as woodland. The stony and steep areas generally are used as woodland, as habitat for wildlife, for recreation, and for watershed protection. Generally, only Clymer soils are suitable for farming. They are suitable for most general farm crops, but only a very small acreage is farmed. The main limitations for most uses of the soils in

this map unit are slope, the seasonal high water table, and stones on the surface.

3. Watson-Allenwood-Alvira Association

Nearly level to sloping, deep, well drained to somewhat poorly drained soils; mainly on hills and ridges that were glaciated

These soils formed in loamy glacial till derived from sandstone, siltstone, and shale (fig. 2). They are on slopes along rivers and their tributaries.

This map unit makes up about 4 percent of the county. It is about 35 percent Watson soils, 25 percent Allenwood soils, 20 percent Alvira soils, and 20 percent minor soils.

Watson soils are nearly level to sloping and are on the lower slopes at the base of steep hillsides. These soils are deep and moderately well drained. They have a fragipan in the subsoil.

Allenwood soils are gently sloping and sloping and are on the lower slopes of ridges near the Susquehanna River. These soils are deep and well drained.

Alvira soils are nearly level to sloping and are at the base of steeper slopes and at the heads of drainageways. These soils are deep and somewhat poorly drained. They have a fragipan in the subsoil.

The minor soils are Berks, Weikert, Hartleton, and Shelmadine soils on foot slopes and Barbour and Basher soils along streams.

In most areas the soils in this map unit are used as cropland. These soils are suitable for most general farm crops, except deep-rooted crops on the soils that have a fragipan. Many dairy farms in the county are on these soils. The main limitations for urban uses are slope and the slow permeability.

4. Washington-Hagerstown-Clarksburg Association

Nearly level to sloping, deep, well drained and moderately well drained soils; in valleys

These soils formed in material weathered from limestone or in glacial till over limestone.

This map unit makes up 2 percent of the county. It is about 22 percent Washington soils, 19 percent

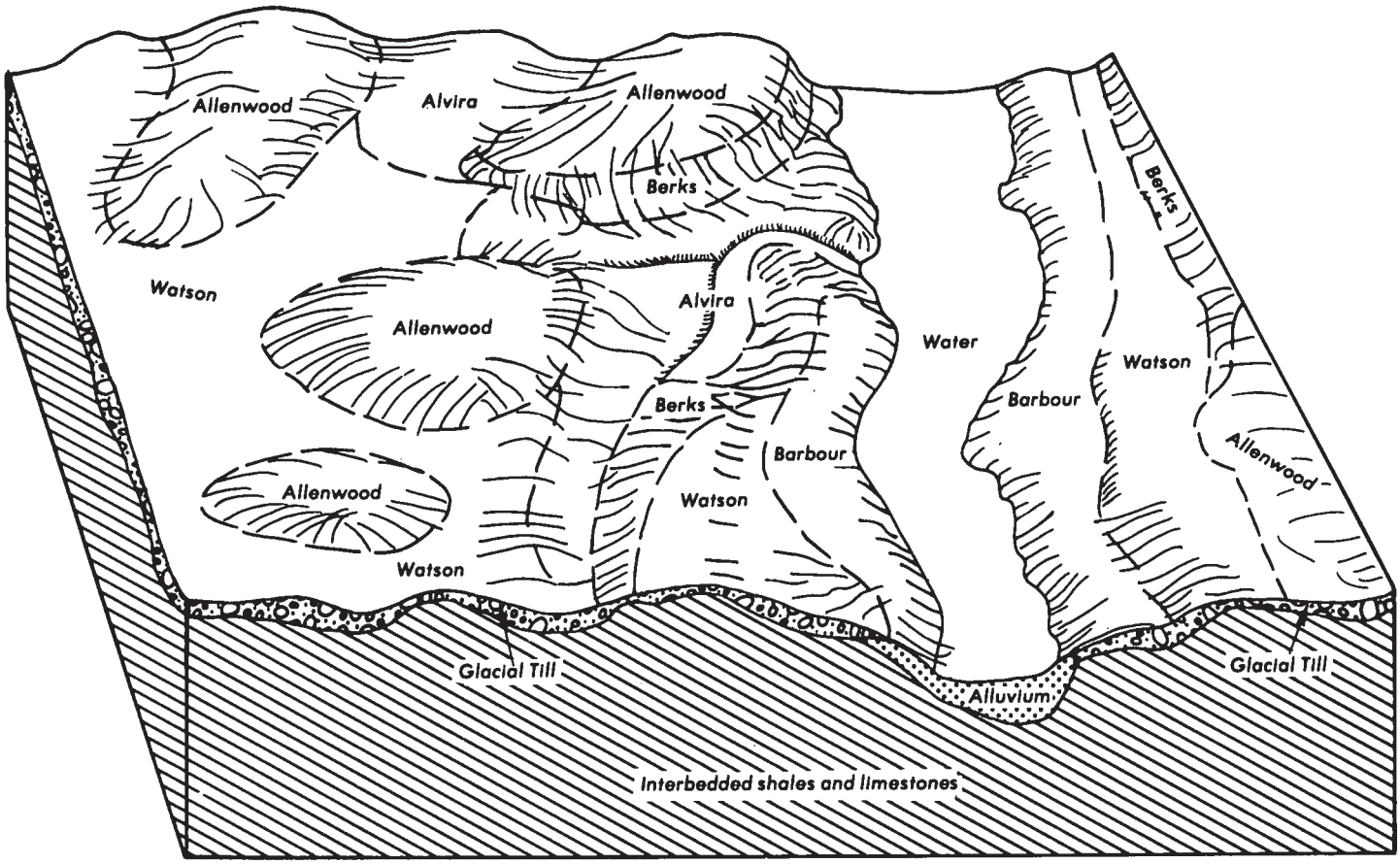


Figure 2.—Typical pattern of soils and underlying material in the Watson-Allenwood-Alvira association.

Hagerstown soils, 14 percent Clarksburg soils, and 45 percent minor soils.

Washington soils are nearly level to sloping. These soils are deep and well drained.

Hagerstown soils are nearly level to sloping. These soils are deep and well drained.

Clarksburg soils are nearly level and gently sloping. These soils are deep and moderately well drained. They have a fragipan in the subsoil.

The minor soils are Weikert, Hartleton, Allenwood, Watson, and Alvira soils on nearby uplands and Barbour and Basher soils along streams.

In most areas the soils in this map unit are used as cropland. The main enterprises are dairy farming and grain farming. Some areas are used for hay and pasture or are wooded. The main limitations for most uses are depth to rock, slope, and the slow permeability.

5. Dekalb-Laidig-Buchanan Association

Nearly level to very steep, moderately deep and deep, well drained and moderately well drained soils; on mountainsides and foot slopes

These soils formed in residuum and colluvium weathered from acid sandstone and shale (fig. 3). They are mainly on mountainsides and the middle and lower foot slopes.

This map unit makes up about 6 percent of the county. It is about 40 percent Dekalb soils, 35 percent Laidig soils, 10 percent Buchanan soils, and 15 percent minor soils.

Dekalb soils are nearly level to very steep and are on valley sides. These soils are moderately deep and well drained. Most areas of the soils have stones on the surface.

Laidig soils are nearly level to very steep and are on the middle and lower foot slopes. These soils are deep and well drained. They have a fragipan in the subsoil. Most areas of the soils have stones on the surface.

Buchanan soils are nearly level to moderately steep and are on the lower foot slopes. These soils are deep and moderately well drained. They have a fragipan in the subsoil. Most areas of the soils have stones on the surface.

The minor soils are Berks, Clymer, Weikert, Watson, Alvira, and Shelmadine soils on uplands; Barbour, Basher, and Linden soils along streams; and some areas of Rubble land on side slopes of mountains and ridges.

The soils in this map unit are used mainly as woodland. The stony and steep areas generally are used as woodland, as wildlife habitat, for recreation, and for watershed protection. A small acreage, mainly of Laidig soils, is farmed. The main limitations for most uses are slope, the seasonal high water table, and stones on the surface.

6. Leck Kill-Klinesville-Albrights Association

Gently sloping to very steep, deep and shallow, well drained and moderately well drained soils; mainly on hills and ridges, some of which were glaciated

These soils formed in glacial till or in material weathered from red shale, siltstone, and sandstone.

This map unit makes up about 12 percent of the county. It is 50 percent Leck Kill soils, 25 percent Klinesville soils, 5 percent Albrights soils, and 20 percent minor soils.

Leck Kill soils are gently sloping to moderately steep and are on hills and ridges. These soils are deep and well drained.

Klinesville soils are gently sloping to very steep and are on ridges and valley sides. These soils are shallow and well drained.

Albrights soils are gently sloping and sloping and are at the base of steep slopes and around drainageways. These soils are deep and moderately well drained. They have a fragipan in the subsoil.

The minor soils are Weikert, Berks, Oquaga, and Watson soils on uplands and Barbour, Basher, and Holly soils along streams.

In most areas the soils in this map unit are used as cropland (fig. 4). These soils are suitable for most general farm crops grown in the county, except deep-rooted crops on the soils that have a fragipan. The main limitations for urban use are slope, shallowness to rock, and the slow permeability.

Areas Dominated by Soils that Formed in Glacial Till

The soils in this group are mainly nearly level to very steep, moderately deep, and well drained to excessively drained. They are on mountainsides, on plateaus, and in intermountain valleys. Some soils are deep, and some are well drained or moderately well drained. The soils in this group are used mainly as woodland, but some are used as cropland.

7. Lordstown-Oquaga-Wurtsboro Association

Nearly level to very steep, moderately deep and deep, excessively drained to moderately well drained soils; on broad mountaintops and on mountainsides

These soils formed in glacial till derived from sandstone, siltstone, shale, and some conglomerate.

This map unit makes up about 10 percent of the county. It is about 50 percent Lordstown soils, 15 percent Oquaga soils, 5 percent Wurtsboro soils, and 30 percent minor soils.

Lordstown soils are nearly level to very steep and are on the sides and tops of mountains. These soils are moderately deep and well drained. Most areas of these soils have stones on the surface.

Oquaga soils are nearly level to very steep and are on the sides and tops of mountains. These soils are

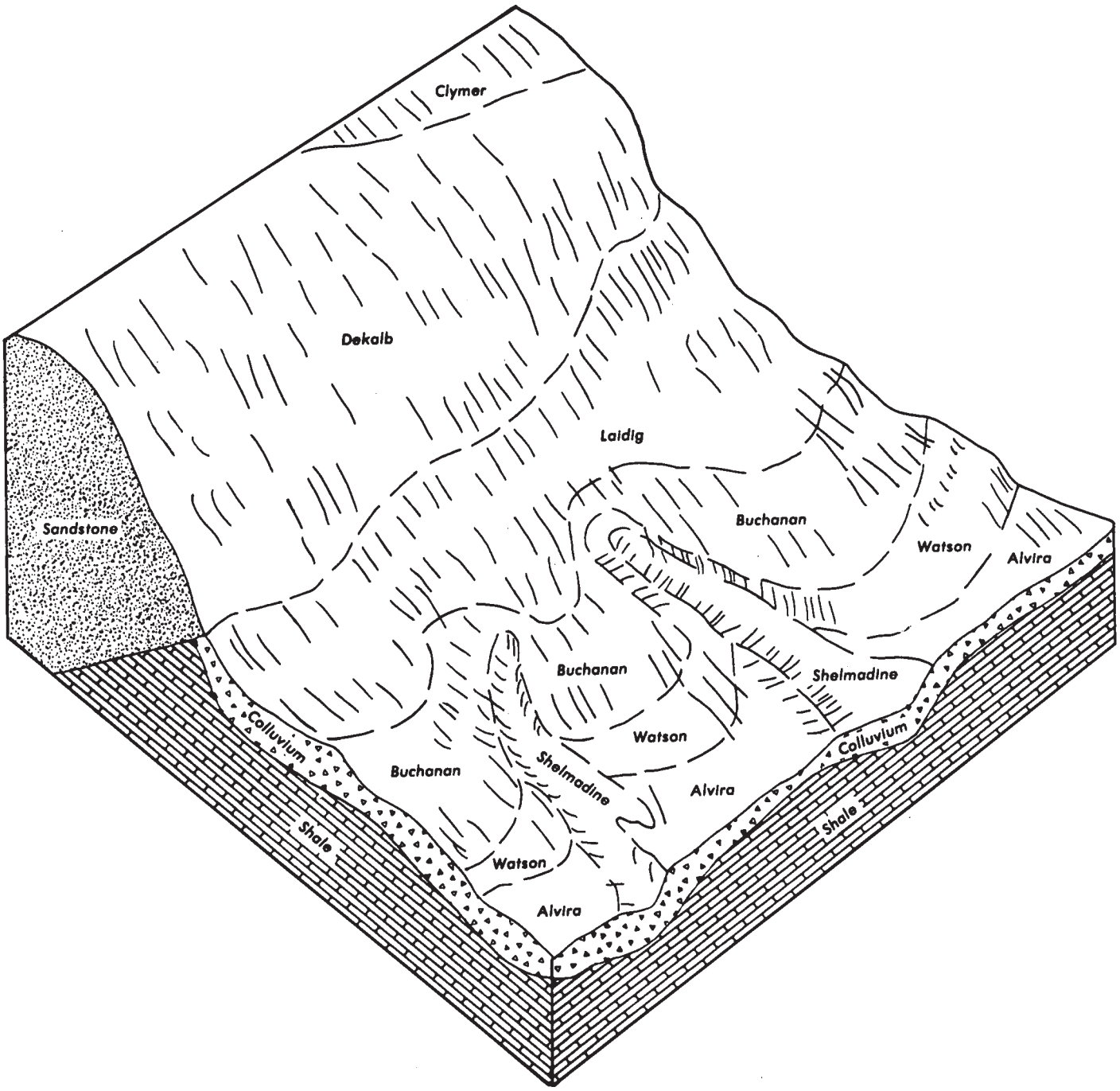


Figure 3.—Typical pattern of soils and underlying material in the Dekalb-Laidig-Buchanan association.

moderately deep and well drained to excessively drained. Most areas of the soils have stones on the surface.

Wurtsboro soils are nearly level to moderately steep and are on broad mountaintops. These soils are deep and moderately well drained. They have a fragipan in the subsoil. Most areas of the soils have stones on the surface.

The minor soils are Wellsboro, Morris, and Norwich soils on uplands; Barbour, Basher, and Wyoming soils

Figure 4.—Contour stripcropping is a suitable management practice to reduce surface runoff and to control erosion on the steeper slopes of the soils in the Leck Kill-Klinesville-Albrights association.

along streams; and some areas of Rubble land on side slopes of mountains and ridges.

The soils in this map unit are used mainly as woodland. They are also used as wildlife habitat, for recreation, and for watershed protection. A small acreage is farmed. The main limitations for most uses are slope, the seasonal high water table, depth to bedrock, and stones on the surface.

8. Oquaga-Lackawanna-Wellsboro Association

Nearly level to very steep, moderately deep and deep, excessively drained to moderately well drained soils; on broad mountaintops and on mountainsides

These soils formed in glacial till derived from reddish sandstone, siltstone, and shale.

This map unit makes up about 21 percent of the county. It is 65 percent Oquaga soils, 10 percent Lackawanna soils, 5 percent Wellsboro soils, and 20 percent minor soils.

Oquaga soils are nearly level to very steep and are on the sides and tops of mountains. These soils are moderately deep and well drained to excessively drained. Most areas of the soils have stones on the surface.

Lackawanna soils are nearly level to moderately steep and are on broad mountaintops and on hills. These soils are deep and well drained. They have a fragipan in the subsoil. Most areas of the soils have stones on the surface.

Wellsboro soils are nearly level to moderately steep and are on lower slopes and around drainageways. These soils are deep and moderately well drained. They have a fragipan in the subsoil. Many areas of the soils have stones on the surface.

The minor soils are Lordstown, Morris, Norwich, Leck Kill, and Wurtsboro soils on uplands; Barbour, Basher, and Wyoming soils along streams; and some areas of Rubble land on side slopes of mountains and ridges.

The soils in this map unit are used mainly as woodland. They are also used as wildlife habitat, for recreation, and for watershed protection. Some areas near Liberty and Oregon Hill have been cleared and are used mainly for dairy farming. The main limitations for most uses are slope, stones on the surface, depth to bedrock, and the seasonal high water table.

Areas Dominated by Soils that Formed in Alluvium or Glacial Outwash

The soils in this group are mainly nearly level to moderately steep, deep, and well drained. They are on flood plains, river terraces, and glacial outwash terraces. Some of the soils are moderately well drained and very poorly drained. Generally, the soils in this group are used mainly as cropland.

9. Linden-Holly-Wheeling Association

Nearly level and gently sloping, deep, well drained, very poorly drained, and poorly drained soils; flood plains and river terraces

These soils formed in material deposited by streams (fig. 5).

This map unit makes up 3 percent of the county. It is 30 percent Linden soils, 20 percent Holly soils, 10 percent Wheeling soils, and 40 percent minor soils.

Linden soils are nearly level and formed in recent alluvium adjacent to streams. In some places these soils are occasionally flooded; in other places they are frequently flooded. They are deep and well drained.

Holly soils are nearly level and formed in recent alluvium. These soils are frequently flooded. They are deep and very poorly drained and poorly drained.

Wheeling soils are nearly level and gently sloping and formed in old alluvium. These soils are deep and well drained. They are on terraces.

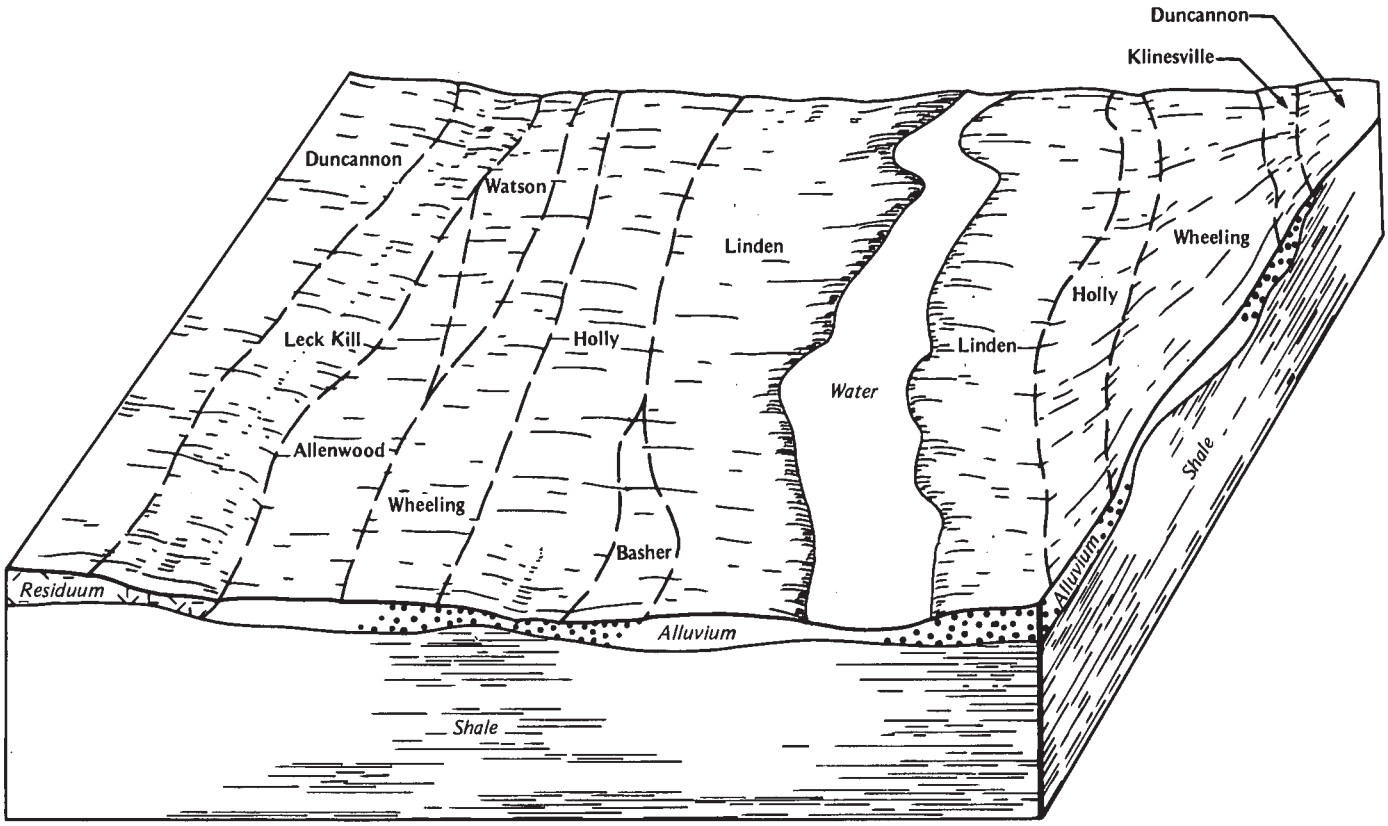


Figure 5.—Typical pattern of soils and underlying material in the Linden-Holly-Wheeling association.

The minor soils are Klinesville, Leck Kill, Oquaga, Allenwood, Duncannon, and Watson soils on nearby uplands and Barbour, Wyoming, and Basher soils along streams.

In most areas the soils in this map unit are used as cropland. Some areas are Urban land. The main enterprise is grain farming. Some areas are used for truck or dairy farming. The wetter areas are used for hay or pasture or are wooded. The main limitations for most uses are flooding and the seasonal high water table.

10. Barbour-Tunkhannock-Basher Association

Nearly level to moderately steep, deep, somewhat excessively drained to somewhat poorly drained soils; on flood plains and glacial outwash terraces

These soils formed in material deposited by streams or in glacial outwash. The most extensive areas are adjacent to the tributaries of the Susquehanna River.

This map unit makes up 3 percent of the county. It is about 40 percent Barbour soils, 25 percent Tunkhannock soils, 20 percent Basher soils, and 15 percent minor soils.

Barbour soils are nearly level and formed in recent alluvium adjacent to streams. These soils are occasionally or frequently flooded. They are deep and well drained.

Tunkhannock soils are nearly level to moderately steep and formed in water-sorted glacial material. These soils are deep and well drained and somewhat excessively drained. They are on glacial outwash terraces.

Basher soils are nearly level and formed in recent alluvium adjacent to streams. In some places these soils are occasionally flooded; in other places they are frequently flooded. They are deep and moderately well drained and somewhat poorly drained.

The minor soils are Leck Kill, Oquaga, Klinesville, and Wellsboro soils on nearby uplands, Chenango and Rexford soils on outwash terraces, Linden soils on flood plains, and Wyoming soils on low terraces.

In most areas the soils in this map unit are used as cropland. Some areas are Urban land. The main enterprise is grain farming. Some areas are used for truck or dairy farming. The wetter areas are used for hay or pasture or are wooded. The main limitations for most uses are flooding, the seasonal high water table, and slope.

Detailed Soil Map Units

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

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

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

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

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Berks channery silt loam, 3 to 8 percent slopes, is one of several phases in the Berks series.

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

A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Rubble land-Dystrochrepts complex, 15 to 80 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in the mapped areas are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Oquaga and Lordstown very stony loams, 0 to 8 percent slopes, is an undifferentiated group in this survey area.

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

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

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

Soil Descriptions

AbB—Albrights silt loam, 3 to 8 percent slopes. This is a gently sloping, deep, moderately well drained soil on foot slopes of ridges. Slopes generally are concave and are 100 to 300 feet long. Individual areas are irregular in shape and range mainly from 2 to 40 acres.

Typically, the surface layer is dark reddish gray silt loam about 9 inches thick. The subsoil is 43 inches thick. In the upper 11 inches it is reddish brown silty clay loam. In the lower 32 inches it is a mottled, weak red and reddish gray, firm and very firm layer of silty clay loam called a fragipan. The substratum is mottled, weak red, firm channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the deep, well drained Leck Kill soils and the nearly level Albrights soils. Also included are some areas of soils that are similar to this Albrights soil but that are poorly drained. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Albrights soil is moderately slow in the fragipan. The available water capacity is moderate. Runoff is medium. The fragipan restricts the root zone at a depth of about 18 to 30 inches. The seasonal high water table is at a depth of about 12 to 30 inches. In unlimed areas the soil ranges from extremely acid to strongly acid in the surface layer and the upper part of the subsoil and from very strongly acid to slightly acid in the lower part of the substratum. The hazard of erosion is moderate.

Most areas of this soil are used for cultivated crops. Some areas are used as woodland and pasture.

This soil is well suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce surface runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Keeping natural drainageways open helps to remove excess surface runoff. Artificial drainage allows timely tillage and improves crop production.

This soil is well suited to pasture. Overgrazing and grazing when the soil is wet are the major concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain the key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 30 percent of the areas of this soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to control erosion are suitable management practices. In some places the use of equipment may be restricted briefly by the seasonal high water table. Machine planting is practical on larger areas except when the soil is too wet.

The seasonal high water table and the moderately slow permeability are limitations for use of this soil for onsite waste disposal, as sites for dwellings with basements, and for some other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIe and in woodland ordination group 3o.

AbC—Albrights silt loam, 8 to 15 percent slopes. This is a sloping, deep, moderately well drained soil on foot slopes of ridges. Slopes generally are concave and are 100 to 300 feet long. Individual areas are irregular to rectangular in shape and range mainly from 2 to 40 acres.

Typically, the surface layer is dark reddish gray silt loam about 9 inches thick. The subsoil is 43 inches thick. In the upper 11 inches it is reddish brown silty clay loam. In the lower 32 inches it is a mottled, weak red and reddish gray, firm and very firm layer of silty clay loam called a fragipan. The substratum is mottled, weak red, firm channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the deep, well drained Leck Kill soils and the gently sloping Albrights soils. The included soils make up 10 to 20 percent of the map unit.

Permeability is moderately slow in the fragipan. The available water capacity is moderate. Runoff is medium. The fragipan restricts the root zone at a depth of about 18 to 30 inches. The seasonal high water table is at a depth of about 12 to 30 inches. In unlimed areas the soil ranges from extremely acid to strongly acid in the surface layer and the upper part of the subsoil and from very strongly acid to slightly acid in the lower part and the substratum. The hazard of erosion is severe.

Most areas of this soil are used as woodland. Some areas are used for crops or pasture.

This soil is well suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Keeping natural drainageways open helps remove excess surface runoff. Artificial drainage allows timely tillage and improves crop production.

This soil is well suited to pasture. Overgrazing and grazing when the soil is wet are the major concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 40 percent of the areas of this soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. In some places the use of equipment is restricted briefly by the seasonal high water table. Machine planting is practical on larger areas except when the soil is too wet.

The seasonal high water table, slope, and the moderately slow permeability are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundations with proper outlets.

This soil is in capability subclass IIIe and in woodland ordination group 3o.

AlB—Allenwood gravelly silt loam, 3 to 8 percent slopes. This is a gently sloping, deep, well drained soil on the lower slopes of ridges. Slopes generally are smooth or slightly convex and are 250 to 1,000 feet

long. Individual areas are irregular in shape and range mainly from 5 to 30 acres.

Typically, the surface layer is dark grayish brown gravelly silt loam about 9 inches thick. The subsoil is 31 inches thick. In the upper 4 inches it is yellowish red, friable silt loam. In the lower 27 inches it is yellowish red, friable gravelly silt loam and red, friable, firm and very firm silty clay loam. The substratum is red, very firm gravelly sandy clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the nearly level and sloping Allenwood soils and the deep, moderately well drained Watson soils. Also included are some areas of soils that are similar to this Allenwood soil but that are sandy loam throughout. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Allenwood soil is moderate, and the available water capacity is high. Runoff is medium. In unlimed areas the soil is strongly acid to extremely acid throughout. The hazard of erosion is moderate.

Most areas of this soil are used for cultivated crops (fig. 6). Some areas are used as woodland or pasture or are in urban use.

This soil is well suited to cultivated crops. Contour stripcropping, minimum tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places the gravel in the surface layer interferes with the seeding and harvesting of some crops.

This soil is well suited to pasture. Overgrazing is the main concern in pasture management. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is high for trees. About 5 percent of the areas of this soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to control erosion are suitable

Figure 6.—Farmland in the foreground and a housing development in the background in an area of Allenwood gravelly silt loam, 3 to 8 percent slopes.

management practices. Machine planting is practical in larger areas.

The seasonal high water table, the gravelly surface layer, and the moderate permeability are limitations to use of this soil for some urban uses. The seasonal high water table and the moderate permeability are limitations for onsite waste disposal and for dwellings with basements. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIe and in woodland ordination group 2o.

AlC—Allenwood gravelly silt loam, 8 to 15 percent slopes. This is a sloping, deep, well drained soil on the lower slopes of ridges. Slopes generally are smooth and are 250 to 1,000 feet long. Individual areas are irregular in shape and range mainly from 2 to 50 acres.

Typically, the surface layer is dark grayish brown gravelly silt loam about 9 inches thick. The subsoil is 31 inches thick. In the upper 4 inches it is yellowish red silt loam. In the lower 27 inches it is yellowish red gravelly silt loam and red, firm and very firm silty clay loam. The substratum is red, very firm gravelly sandy clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the gently sloping Allenwood soils and the deep, moderately well drained Watson soils. Also included are some areas of soils that are similar to this Allenwood soil but that are sandy loam throughout. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Allenwood soil is moderate, and the available water capacity is high. Runoff is medium. In unlimed areas the soil is strongly acid to extremely acid throughout. The hazard of erosion is severe.

Most areas of this soil are used for cultivated crops. Some areas are used as woodland or pasture or are in urban use.

This soil is well suited to cultivated crops. Contour stripcropping, minimum tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places the gravel in the surface layer interferes with the seeding and harvesting of some crops.

This soil is well suited to pasture. Overgrazing is the main concern in pasture management. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is high for trees. About 15 percent of the areas of this soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to control erosion are suitable management practices. Machine planting is practical in larger areas.

The seasonal high water table, the gravelly surface layer, the moderate permeability, and slope are limitations to use of this soil for some urban uses. The moderate permeability and slope are limitations for onsite waste disposal and for dwellings with basements. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIIe and in woodland ordination group 2o.

AvA—Alvira silt loam, 0 to 3 percent slopes. This is a nearly level, deep, somewhat poorly drained soil on the foot slopes of ridges and in depressions. Slopes generally are smooth to slightly concave and are 100 to 500 feet long. Individual areas are irregular in shape and range mainly from 2 to 50 acres.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is 38 inches thick. In the upper 15 inches it is mottled, brown silt loam and firm channery silty clay loam. In the lower 23 inches it is a mottled, yellowish brown and reddish brown, very firm layer of channery silty clay loam called a fragipan. The substratum is mottled, yellowish brown, firm very channery silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the gently sloping Alvira soils. Also included are some areas of the deep, well drained Allenwood and Hartleton soils, the deep, moderately well drained Watson soils, and the deep, poorly drained Shelmadine soils. The included soils make up 10 to 20 percent of the map unit.

Permeability in this Alvira soil is slow in the fragipan. The available water capacity is moderate. Runoff is slow. The fragipan restricts the root zone at a depth of about 16 to 28 inches. The seasonal high water table is at a depth of about 6 to 18 inches. In unlimed areas the soil is strongly acid or very strongly acid throughout. The hazard of erosion is slight.

Most areas of this soil are used as pasture or hayland. Some areas are used for cultivated crops or as woodland or are in urban use.

This soil is suited to cultivated crops that can tolerate wetness. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Keeping natural drainageways open helps to remove excess surface runoff. Artificial drainage allows timely tillage and improves crop production.

This soil is suited to pasture. Overgrazing and grazing when the soil is wet are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper

stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 30 percent of the areas of the soil are wooded. The seedling mortality rate, the windthrow hazard, and the equipment limitation are management problems. Thinning and removing undesirable species are suitable management practices. In some places the use of equipment is restricted by the seasonal high water table. Machine planting is practical on larger areas, but in some places is restricted by the seasonal high water table.

The slow permeability and the seasonal high water table are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIIw and in woodland ordination group 3w.

AvB—Alvira silt loam, 3 to 8 percent slopes. This is a gently sloping, deep, somewhat poorly drained soil on foot slopes of ridges and in depressions. Slopes generally are smooth to slightly concave and are 100 to 500 feet long. Individual areas are irregular in shape and range mainly from 2 to 75 acres.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is 38 inches thick. In the upper 15 inches it is mottled, brown silt loam and firm channery silty clay loam. In the lower 23 inches it is a mottled, yellowish brown and reddish brown, very firm layer of channery silty clay loam called a fragipan. The substratum is mottled, yellowish brown, firm very channery silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the nearly level and sloping Alvira soils. Also included are some areas of the deep, well drained Allenwood and Hartleton soils, the deep, moderately well drained Watson soils, and the deep, poorly drained Shelmadine soils. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Alvira soil is slow in the fragipan. The available water capacity is moderate. Runoff is medium. The very firm layer in the subsoil restricts the root zone at a depth of about 16 to 28 inches. The seasonal high water table is at a depth of about 6 to 18 inches. In unlimed areas the soil is strongly acid or very strongly acid throughout. The hazard of erosion is moderate.

Most areas of this soil are used as pasture. Other areas are used for cultivated crops or as woodland or are in urban use.

This soil is suited to cultivated crops that can tolerate wetness. Contour stripcropping, minimum tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Keeping natural drainageways open helps to remove excess surface runoff. Artificial drainage allows timely tillage and improves crop production.

This soil is suited to pasture. Overgrazing and grazing when the soil is wet are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 20 percent of the areas of the soil are wooded. The seedling mortality rate, the windthrow hazard, and the equipment limitation are management problems. Thinning, removing undesirable species, and constructing roads on the contour to control erosion are suitable management practices. In some places the use of equipment is restricted by the seasonal high water table. Machine planting is practical in larger areas, but in some places it is restricted by the seasonal high water table.

The slow permeability and the seasonal high water table are limitations to use of this soil for onsite waste disposal, as sites for buildings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIIw and in woodland ordination group 3w.

AvC—Alvira silt loam, 8 to 15 percent slopes. This is a sloping, deep, somewhat poorly drained soil on the foot slopes of ridges and in depressions. Slopes generally are smooth to slightly concave and are 100 to 300 feet long. Individual areas are irregular in shape and range mainly from 2 to 100 acres.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is 38 inches thick. In the upper 15 inches it is mottled, brown silt loam and firm channery silty clay loam. In the lower 23 inches it is a mottled, yellowish brown and reddish brown, very firm layer of channery silty clay loam called a fragipan. The substratum is mottled, yellowish brown, firm very channery silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the gently sloping and moderately steep Alvira soils. Also included are some areas of the deep, well drained Hartleton soils, the deep, moderately well drained Watson soils, and the deep, poorly drained Shelmadine soils. The included soils make up 10 to 15 percent of the map unit.

Permeability of this Alvira soil is slow in the fragipan. The available water capacity is moderate. Runoff is medium to high. The fragipan restricts the root zone at a

depth of 16 to 28 inches. The seasonal high water table is at a depth of about 6 to 18 inches. In unlimed areas the soil is strongly acid or very strongly acid throughout. The hazard of erosion is moderate.

Most areas of this soil are used as pasture or hayland. Some areas are used for cultivated crops or as woodland or are in urban use.

This soil is suited to cultivated crops that can tolerate wetness. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Keeping natural drainageways open helps to remove excess surface runoff. Artificial drainage allows timely tillage and improves crop production.

This soil is suited to pasture. Overgrazing and grazing when the soil is wet are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 30 percent of the areas of this soil are wooded. The seedling mortality rate, the windthrow hazard, and the equipment limitation are management problems. Thinning, removing undesirable species, and constructing roads on the contour to control erosion are suitable management practices. In some places the use of equipment is restricted by the seasonal high water table. Machine planting is practical on larger areas but in some places is restricted by the seasonal high water table.

The slow permeability, the seasonal high water table, and slope are limitations to use of this soil for most urban uses. The slow permeability and the seasonal high water table are limitations for onsite waste disposal and for dwellings with basements. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIIe and in woodland ordination group 3w.

AxB—Alvira very stony loam, 0 to 8 percent slopes. This is a nearly level and gently sloping, deep, somewhat poorly drained soil on foot slopes of ridges and in depressions. Slopes generally are smooth to slightly concave and are 100 to 300 feet long. Individual areas are irregular in shape and range mainly from 2 to 100 acres. Large stones cover about 3 to 10 percent of the surface.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is 38 inches thick. In the upper 15 inches it is mottled, brown silt loam and firm channery silty clay loam. In the lower 23 inches it is a mottled, yellowish brown and reddish brown, very firm layer of channery silty clay loam called a fragipan. The substratum is mottled, yellowish brown, firm very channery silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the gently sloping and moderately steep Alvira soils, the deep, well drained Hartleton soils, the deep, moderately well drained Watson soils, and the deep, poorly drained Shelmadine soils. The included soils make up 10 to 15 percent of the map unit.

Permeability of this Alvira soil is slow in the fragipan. The available water capacity is moderate. Runoff is slow to medium. The fragipan in the subsoil restricts the root zone at a depth of about 16 to 28 inches. The seasonal high water table is at a depth of about 6 to 18 inches. In unlimed areas the soil is strongly acid or very strongly acid throughout.

Most areas of this soil are used as woodland.

This soil is not suited to cultivated crops or pasture. The stones in the surface layer interfere with the seeding and harvesting of most crops and with pasture management.

The potential productivity of this soil is moderately high for trees. About 80 percent of the areas of the soil are wooded. The seedling mortality rate, the windthrow hazard, and the equipment limitation are management problems. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. In some places the use of equipment is restricted by the seasonal high water table.

The seasonal high water table, the slow permeability, and stones on the surface are limitations to use of this soil for most urban uses. The slow permeability and the seasonal high water table are limitations for onsite waste disposal and for dwellings with basements. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass and in woodland ordination group 3w.

Ba—Barbour fine sandy loam. This is a nearly level, deep, well drained soil on flood plains. Slopes generally are smooth. Individual areas are long and narrow and range mainly from 5 to 100 acres or more. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark reddish gray, fine sandy loam about 9 inches thick. The subsoil is 19 inches thick. In the upper 7 inches it is dark reddish brown fine sandy loam. In the lower 12 inches it is reddish brown fine sandy loam. The substratum is reddish brown, loose sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the nearly level, moderately well drained Basher soils, the very poorly drained and poorly drained Holly soils, and the well drained Linden and Wyoming soils. Also included are some small areas of soils that are similar to this Barbour soil but that are brownish throughout. The included soils make up 15 to 20 percent of the map unit.

Permeability of this Barbour soil is moderately rapid in the subsoil. The available water capacity is moderate. Runoff is slow. The soil is subject to frequent flooding mainly in late winter and early spring. In unlimed areas the soil is medium acid to very strongly acid in the surface layer and subsoil and slightly acid to very strongly acid in the substratum. The hazard of erosion is slight.

Most areas of this soil are used for cultivated crops. Some areas are used as woodland or pasture or are in urban use.

This soil is well suited to cultivated crops. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Flooding during the growing season can damage crops or delay tillage operations. Streambank stabilization is needed in many areas of this soil.

This soil is well suited to pasture. Overgrazing is the main concern in pasture management. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is high for trees. About 10 percent of the areas of the soil are wooded. Thinning and removing undesirable species are suitable management practices. In some places the use of equipment is restricted for short periods because of flooding. Machine planting is practical on larger areas.

Frequent flooding is a limitation to use of this soil for most nonfarm uses.

This soil is in capability subclass IIw and in woodland ordination group 2o.

Bb—Barbour fine sandy loam, occasionally flooded. This is a nearly level, deep, well drained soil on flood plains. Slopes generally are smooth. Individual areas are long and narrow and range mainly from 4 to 200 acres. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark reddish gray fine sandy loam about 9 inches thick. The subsoil is 19 inches thick. In the upper 7 inches it is dark reddish brown fine sandy loam. In the lower 12 inches it is reddish brown fine sandy loam. The substratum is reddish brown, loose sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the nearly level, moderately well drained Basher soils, the very poorly drained and poorly drained Holly soils, and the well drained Linden and Wyoming soils. Also included are some areas of soils that are similar to this Barbour soil but that are brownish throughout. The included soils make up 15 to 20 percent of the map unit.

Permeability of this Barbour soil is moderately rapid in the subsoil. The available water capacity is moderate. Runoff is medium to slow. This soil is subject to occasional flooding mainly in late winter and early spring. In unlimed areas the soil is medium acid to very strongly acid in the surface layer and the subsoil and slightly acid to very strongly acid in the substratum. The hazard of erosion is slight.

Most areas of this soil are used for cultivated crops. Some areas are used as woodland or pasture or are in urban use.

This soil is well suited to cultivated crops. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Streambank stabilization is needed in many areas of this soil (fig. 7).

This soil is well suited to pasture. Overgrazing is the main concern in pasture management. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is high for trees. About 5 percent of the areas of the soil are wooded. Thinning and removing undesirable species are suitable management practices. The use of equipment may be restricted for short periods by flooding. Machine planting is practical on larger areas.

Occasional flooding is a limitation to use of this soil for picnic areas and playgrounds and for most other urban uses.

This soil is in capability class I and in woodland ordination group 2o.

Bc—Basher silt loam. This is a nearly level, deep, moderately well drained and somewhat poorly drained soil on flood plains. Slopes generally are smooth. Individual areas are rectangular and range mainly from 2 to 50 acres. Slopes range from 0 to 3 percent.

Typically, the surface layer is reddish brown silt loam about 10 inches thick. The subsoil is 30 inches thick. In the upper 6 inches it is reddish brown fine sandy loam. In the lower 24 inches it is mottled, reddish brown and dark reddish brown, firm and friable silt loam. The substratum is reddish brown gravelly sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the well drained Barbour and Linden soils and the very poorly drained and poorly drained Holly soils. Also included are small areas of soils that are similar to this Basher soil but that are brownish throughout. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Basher soil is moderate to moderately slow in the lower part of the subsoil. The

Figure 7.—Streambank stabilization is needed in many areas of Barbour fine sandy loam, occasionally flooded, to control streambank erosion.

available water capacity is high. Runoff is slow. This soil is subject to frequent flooding mainly in late winter or early spring. The seasonal high water table is at a depth of about 6 to 24 inches. The seasonal high water table restricts root growth. In unlimed areas the soil is very strongly acid to medium acid throughout. The hazard of erosion is slight.

Most areas of this soil are used for cultivated crops. Some areas are used as hayland, pasture, or woodland.

This soil is well suited to cultivated crops. Flooding, which on the average occurs more than once in 2 years, can severely damage crops. Growing cover crops, using crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Keeping natural drainageways open helps to remove excess surface water. Artificial drainage allows timely tillage and improves crop production.

This soil is well suited to pasture. Overgrazing and grazing when the soil is wet are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is high for trees. About 10 percent of the areas of the soil are wooded. Thinning and removing undesirable species are suitable

management practices. In some places the use of equipment is restricted by the seasonal high water table. Machine planting is practical on larger areas.

Frequent flooding is a limitation to use of this soil for most urban uses.

This soil is in capability subclass IIw and in woodland ordination group 2o.

Bd—Basher silt loam, occasionally flooded. This is a nearly level, deep, moderately well drained and somewhat poorly drained soil on flood plains. Slopes generally are smooth. Individual areas are rectangular and range mainly from 5 to 90 acres. Slopes range from 0 to 3 percent.

Typically, the surface layer is reddish brown silt loam about 10 inches thick. The subsoil is 30 inches thick. In the upper 6 inches it is reddish brown fine sandy loam. In the lower 24 inches it is mottled, reddish brown and dark reddish brown, firm and friable silt loam. The substratum is reddish brown, stratified gravelly sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the well drained Barbour and Linden soils and the very poorly drained and poorly drained Holly soils. Also included are small areas of soils that are similar to this Basher soil but that are brownish throughout. The included soils make up 15 to 20 percent of the map unit.

Permeability of this Basher soil is moderate to moderately slow in the lower part of the subsoil. The available water capacity is high. Runoff is slow. This soil is subject to occasional flooding mainly in late winter or early spring. The seasonal high water table restricts root growth at a depth of about 6 to 24 inches. In unlimed areas the soil is very strongly acid to medium acid throughout. The hazard of erosion is slight.

Most areas of this soil are used for cultivated crops. Some areas are used as hayland, pasture, or woodland.

This soil is well suited to cultivated crops. Flooding, which on the average occurs no more than once in 2 years, can damage crops. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Keeping natural drainageways open helps to remove excess surface runoff. Artificial drainage allows for timely tillage and improves crop production.

This soil is well suited to pasture. Overgrazing and grazing when the soil is wet are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is high for trees. About 10 percent of the areas of the soil are wooded. Thinning and removing undesirable species are suitable management practices. In some places the use of equipment is restricted by the seasonal high water table. Machine planting is practical on larger areas.

Flooding is a limitation to use of this soil for most urban uses.

This soil is in capability subclass IIw and in woodland ordination group 2o.

BeB—Berks channery silt loam, 3 to 8 percent slopes. This is a gently sloping, moderately deep, well drained soil on ridgetops and side slopes. Slopes generally are smooth or slightly convex and are 200 to 1,200 feet long. Individual areas are irregular in shape and range mainly from 2 to 40 acres.

Typically, the surface layer is dark brown channery silt loam about 7 inches thick. The subsoil is 14 inches thick. In the upper 7 inches it is brown channery silt loam. In the lower 7 inches it is yellowish brown very channery silt loam. The substratum is yellowish brown, firm very channery loam to a depth of 28 inches. Fractured shale bedrock is at a depth of 28 inches.

Included with this soil in mapping are small areas of the deep, well drained Hartleton soils and the deep, moderately well drained Watson soils. Also included are some areas of the nearly level Berks soils. The included soils make up 15 to 25 percent of the map unit.

Permeability of this Berks soil is moderate to moderately rapid in the subsoil. The available water capacity is low. Runoff is medium. The depth of the root zone is restricted by bedrock. In unlimed areas the soil is very strongly acid or strongly acid throughout. The hazard of erosion is moderate.

Most areas of this soil are used as pasture or woodland. Some areas are used for cultivated crops.

This soil is fairly suited to cultivated crops. Contour stripcropping, minimum tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. The low available water capacity restricts crop production. The channers in the surface layer interfere with the seeding and harvesting of some crops.

This soil is suited to pasture. Overgrazing is the main concern in pasture management. The low available water capacity restricts forage production. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 20 percent of the areas of the soil are wooded. The low available water capacity causes slow growth, and seedling mortality is a hazard. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

Depth to bedrock is a limitation to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

This soil is in capability subclass IIe and in woodland ordination group 3f.

BeC—Berks channery silt loam, 8 to 15 percent slopes. This is a sloping, moderately deep, well drained soil on ridgetops and side slopes. Slopes generally are smooth or slightly convex and are 300 to 2,000 feet long. Individual areas are irregular in shape and range mainly from 2 to 80 acres.

Typically, the surface layer is dark brown channery silt loam about 7 inches thick. The subsoil is 14 inches thick. In the upper 7 inches it is brown channery silt loam. In the lower 7 inches it is yellowish brown very channery silt loam. The substratum is yellowish brown, firm very channery loam to a depth of 28 inches. Fractured shale bedrock is at a depth of 28 inches.

Included with this soil in mapping are small areas of the gently sloping Berks soils, the shallow, well drained Weikert soils, and the deep, well drained Hartleton soils. Also included are small areas of the deep, moderately well drained Watson soils. The included soils make up 15 to 25 percent of the map unit.

Permeability in this Berks soil is moderate to moderately rapid in the subsoil. The available water capacity is low. Runoff is medium. The depth of the root zone is restricted by bedrock. In unlimed areas the soil is very strongly acid or strongly acid throughout. The hazard of erosion is severe.

Most areas of this soil are used as pasture or woodland. Some areas are used for cultivated crops.

This soil is suited to cultivated crops. Contour stripcropping, minimum tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. The low available water capacity restricts crop production. The channers in the surface layer interfere with the seeding and harvesting of some crops.

This soil is suited to pasture. Overgrazing is the main concern in pasture management. The low available water capacity restricts crop production. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 30 percent of the areas of the soil are wooded. The low available water capacity causes slow growth, and seedling mortality is a hazard. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

Depth to bedrock is a limitation to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

This soil is in capability subclass IIIe and in woodland ordination group 3f.

BeD—Berks channery silt loam, 15 to 25 percent slopes. This is a moderately steep, well drained soil on side slopes of shale hills. Slopes generally are smooth or slightly convex and are 200 to 2,000 feet long. Individual areas are irregular in shape and range mainly from 2 to 60 acres.

Typically, the surface layer is dark brown channery silt loam about 7 inches thick. The subsoil is 14 inches thick. In the upper 7 inches it is brown channery silt loam. In the lower 7 inches it is yellowish brown very channery silt loam. The substratum is yellowish brown, fine very channery loam to a depth of 28 inches. Fractured shale bedrock is at a depth of 28 inches.

Included with this soil in mapping are small areas of the deep, well drained Hartleton soils, the shallow, well drained Weikert soils, and a few areas of sloping and steep Berks soils. The included soils make up 15 to 20 percent of the map unit.

Permeability in this Berks soil is moderate to moderately rapid in the subsoil. The available water capacity is low. Runoff is rapid. The depth of the root zone is restricted by bedrock. In unlimed areas the soil is very strongly acid or strongly acid throughout. The hazard of erosion is very severe.

Most areas of this soil are used as pasture or woodland. Some areas are used as hayland.

This soil is poorly suited to cultivated crops. Contour stripcropping, minimum tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. The low available water capacity restricts crop production. The channers in the surface layer interfere with the seeding and harvesting of some crops.

This soil is suited to pasture. Overgrazing is the main concern in pasture management. The low available water capacity restricts forage production. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 40 percent of the areas of the soil are wooded. The low available water capacity causes slow growth, and seedling mortality is a hazard. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

Depth to bedrock and slope are limitations to use of this soil for onsite waste disposal, as sites for buildings with basements, and for most other urban uses.

This soil is in capability subclass IVe and in woodland ordination group 3f.

BuB—Buchanan very stony loam, 0 to 8 percent slopes. This is a nearly level and gently sloping, deep, moderately well drained soil on foot slopes. Slopes generally are smooth or slightly concave and are 200 to 1,000 feet long. Individual areas are rectangular in shape and range mainly from 2 to 100 acres. Large stones cover about 3 to 15 percent of the surface.

Typically, the surface layer is yellowish brown channery loam about 5 inches thick. The subsoil is 37 inches thick. In the upper 15 inches it is yellowish brown and light yellowish brown, friable and firm channery silt loam, silt loam, and sandy clay loam. In the lower 22 inches it is mottled, pale brown, very firm sandy clay loam. The substratum is mottled, strong brown, very firm, very channery sandy clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the sloping and moderately steep Buchanan soils. Also included are some areas of the nearly level and gently sloping, deep, well drained Laidig soils. The included soils make up 15 to 25 percent of the map unit.

Permeability of this Buchanan soil is slow in the fragipan. The available water capacity is moderate. Runoff is medium. The fragipan in the subsoil restricts the root zone at a depth of about 20 to 36 inches. The seasonal high water table is at a depth of 12 to 36 inches. In unlimed areas the soil is extremely acid to strongly acid throughout.

Most areas of this soil are used as woodland. Some areas are in urban use.

This soil is not suited to cultivated crops or pasture. The large stones in the surface layer interfere with the seeding and harvesting of crops and with pasture management.

The potential productivity of this soil is high for trees. Most areas of the soil are wooded. Thinning and removing undesirable species are suitable management practices. In some places the use of equipment is restricted briefly by the seasonal high water table.

The slow permeability and the seasonal high water table are limitations to use of this soil for onsite waste disposal, as sites for buildings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing a foundation drain with proper outlets.

This soil is in capability subclass VIs and in woodland ordination group 2o.

BuD—Buchanan very stony loam, 8 to 25 percent slopes. This is a sloping and moderately steep, deep, moderately well drained soil on side slopes and foot slopes. Slopes generally are smooth or slightly concave and are 200 to 1,000 feet long. Individual areas are rectangular in shape and range mainly from 5 to 100 acres. Large stones cover about 3 to 15 percent of the surface.

Typically, the surface layer is yellowish brown channery loam about 5 inches thick. The subsoil is 37 inches thick. In the upper 15 inches it is yellowish brown and light yellowish brown, friable and firm channery silt loam, silt loam, and sandy clay loam. In the lower 22 inches it is a mottled, pale brown, very firm layer of sandy clay loam called a fragipan. The substratum is mottled, strong brown, very firm, very channery sandy clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the nearly level and gently sloping Buchanan soils. Also included are some areas of the sloping and moderately steep, deep, well drained Laidig soils. The included soils make up 15 to 25 percent of the map unit.

Permeability of this Buchanan soil is slow in the fragipan. The available water capacity is moderate. Runoff is medium to rapid. The fragipan in the subsoil restricts the root zone at a depth of about 20 to 36 inches. The seasonal high water table is at a depth of about 12 to 36 inches. In unlimed areas the soil is extremely acid to strongly acid throughout.

Most areas of this soil are used as woodland. Some areas are in urban use.

This soil is not suited to cultivated crops or pasture. The large stones in the surface layer interfere with the seeding and harvesting of crops and with pasture management.

The potential productivity of this soil is high for trees. Most areas of the soil are wooded. Management problems are caused mainly by slope. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. The use of equipment is restricted by slope.

The slow permeability and the seasonal high water table are limitations to use of this soil for onsite waste disposal, as sites for buildings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass VIs and in woodland ordination group 2r.

ChA—Chenango gravelly loam, 0 to 3 percent slopes. This is a nearly level, deep, well drained and somewhat excessively drained soil on glacial outwash terraces and kames. Slopes generally are smooth and are more than 100 feet long. Individual areas are irregular in shape and range mainly from 5 to 300 acres.

Typically, the surface layer is dark grayish brown gravelly loam about 9 inches thick. The subsoil is 17 inches thick. In the upper 13 inches it is dark brown gravelly silt loam. In the lower 4 inches it is dark brown

gravelly sandy loam. The substratum is dark brown and brown, loose gravelly coarse sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the gently sloping and sloping Chenango soils. Also included are small areas of the somewhat poorly drained and poorly drained Rexford soils. The included soils make up 10 to 25 percent of the map unit.

Permeability of this Chenango soil is moderate to moderately rapid in the surface layer and subsoil and rapid in the substratum. The available water capacity is moderate. Runoff is slow or medium. In unlimed areas the soil is strongly acid or moderately acid in the subsoil and strongly acid to neutral in the substratum. The hazard of erosion is slight.

Most areas of this soil are used for cultivated crops. Some areas are used as woodland or pasture or are in urban use.

This soil is suited to cultivated crops. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. The gravel in the surface layer interferes with the seeding and harvesting of some crops.

This soil is suited to pasture. Overgrazing is the main concern in pasture management. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is high for trees. About 10 percent of the areas of the soil are wooded. Thinning and removing undesirable species are suitable management practices. Machine planting is practical on larger areas.

The gravelly surface layer and the rapid or very rapid permeability in the subsoil and substratum are limitations to use of this soil for some urban uses. If the soil is used for onsite waste disposal, the ground water can be polluted because of the moderate to moderately rapid permeability in the subsoil and rapid permeability in the substratum.

This soil is in capability subclass IIs and in woodland ordination group 2o.

CIA—Clarksburg silt loam, 0 to 3 percent slopes. This is a nearly level, deep, moderately well drained soil on the lower slopes of hills and ridges and on valley floors. Slopes generally are concave and are more than 200 feet long. Individual areas are irregular in shape and range mainly from 2 to 100 acres.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is 41 inches thick. In the upper 27 inches it is strong brown and brown, friable and firm silt loam and mottled, brown, firm silty clay loam. In the lower 14 inches it is a mottled, strong brown, very firm layer of silty clay loam called a fragipan. The substratum is mottled, strong brown, extremely firm gravelly clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the nearly level and gently sloping, deep, well drained Washington and Hagerstown soils. Also included are some areas of somewhat poorly drained and poorly drained soils. The included soils make up 10 to 20 percent of the map unit.

Permeability in this Clarksburg soil is slow to moderately slow in the fragipan. The available water capacity is moderate. Runoff is slow. The fragipan restricts the root zone at a depth of about 22 to 36 inches. The seasonal high water table is at a depth of about 18 to 36 inches. In unlimed areas the soil is strongly acid to slightly acid throughout. The hazard of erosion is slight.

Most areas of this soil are used as cropland. Some areas are used as pasture or woodland or are in urban use.

This soil is well suited to cultivated crops. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Keeping natural drainageways open helps to remove excess surface runoff. Artificial drainage allows timely tillage and improves crop production.

This soil is well suited to pasture. Overgrazing and grazing when the soil is wet are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 10 to 15 percent of the areas of the soil are wooded. Thinning and removing undesirable species are suitable management practices. In some places the use of equipment is restricted briefly by the seasonal high water table. Machine planting is practical on larger areas but in some places is restricted by the seasonal high water table.

The seasonal high water table and the slow to moderately slow permeability are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIw and in woodland ordination group 3o.

CIB—Clarksburg silt loam, 3 to 8 percent slopes. This is a gently sloping, deep, moderately well drained soil on the lower slopes of hills and ridges and on valley floors. Slopes generally are concave and are 200 to 500 feet long. Individual areas are irregular in shape and range mainly from 2 to 60 acres.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is 41 inches thick. In the upper 27 inches it is strong brown and brown, friable and firm silt loam and mottled, brown, firm silty clay loam. In the lower 14 inches it is a mottled, strong brown, very firm layer of silty clay loam called a fragipan. The substratum is mottled, strong brown, extremely firm gravelly clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the nearly level and sloping Clarksburg soils and the deep, well drained Hagerstown and Washington soils. Also included are some areas of somewhat poorly drained and poorly drained soils. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Clarksburg soil is slow to moderately slow in the fragipan. The available water capacity is moderate. Runoff is medium. The fragipan in the subsoil restricts the root zone at a depth of about 22 to 36 inches. The seasonal high water table is at a depth of about 18 to 36 inches. In unlimed areas the soil is strongly acid to slightly acid throughout. The hazard of erosion is moderate.

Most areas of this soil are used as cropland. Some areas are used as pasture or woodland or are in urban use.

This soil is well suited to cultivated crops. Contour stripcropping, minimum tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, utilizing crop residue, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Artificial drainage allows timely tillage and improves crop production.

This soil is suited to pasture. Overgrazing and grazing when the soil is wet are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 10 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. In some places the use of equipment is restricted briefly by the seasonal high water table. Machine planting is practical on larger areas but in some places is restricted by the seasonal high water table.

The seasonal high water table and the slow to moderately slow permeability are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIe and in woodland ordination group 3o.

CmB—Clymer channery loam, 3 to 8 percent slopes. This is a gently sloping, deep, well drained soil on mountaintops and benches. Slopes generally are smooth and convex and are 100 to 400 feet long. Individual areas are irregular in shape and range mainly from 5 to 400 acres.

Typically, the surface layer is very dark brown channery loam about 3 inches thick. The subsurface layer is yellowish brown channery loam about 4 inches thick. The subsoil is 23 inches thick. In the upper 8 inches it is brownish yellow channery loam. In the lower 15 inches it is dark brown channery sandy clay loam and strong brown very channery sandy clay loam. The substratum is yellowish brown very channery sandy loam to a depth of 44 inches. Gray and brown sandstone bedrock is at a depth of 44 inches.

Included with this soil in mapping are small areas of the nearly level and sloping Clymer soils, the moderately deep, well drained Dekalb soils, and the deep, moderately well drained Cookport soils. Also included are some areas of deep, well drained soils that are similar to this Clymer soil but that have less clay in the subsoil. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Clymer soil is moderate, and the available water capacity is moderate. Runoff is medium. In unlimed areas the soil is strongly acid or very strongly acid throughout. The hazard of erosion is moderate.

Most areas of this soil are used as woodland. Some areas are used for cultivated crops or pasture or are in urban use.

This soil is well suited to cultivated crops. Contour stripcropping, minimum tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, utilizing crop residue, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places the channers in the surface layer interfere with the seeding and harvesting of some crops.

This soil is well suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is high for trees. About 90 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

Depth to bedrock and channers in the surface layer are limitations to use of this soil for some urban uses. Depth to bedrock is a limitation for onsite waste disposal.

This soil is in capability subclass IIe and in woodland ordination group 2o.

CmC—Clymer channery loam, 8 to 15 percent slopes. This is a sloping, deep, well drained soil on mountaintops and benches. Slopes generally are smooth and convex and are 100 to 300 feet long. Individual areas are irregular in shape and range mainly from 5 to 100 acres.

Typically, the surface layer is very dark brown channery loam about 3 inches thick. The subsurface layer is yellowish brown channery loam about 4 inches thick. The subsoil is 23 inches thick. In the upper 8 inches it is brownish yellow channery loam. In the lower 15 inches it is dark brown channery sandy clay loam and strong brown very channery sandy clay loam. The substratum is yellowish brown very channery sandy loam to a depth of 44 inches. Gray and brown sandstone bedrock is at a depth of 44 inches.

Included with this soil in mapping are small areas of the gently sloping and moderately steep Clymer soils, the moderately deep, well drained Dekalb soils, and the deep, moderately well drained Cookport soils. Also included are some areas of deep, well drained soils that are similar to this Clymer soil but that have less clay in the subsoil. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Clymer soil is moderate, and the available water capacity is moderate. Runoff is medium to rapid. In unlimed areas the soil is strongly acid or very strongly acid throughout. The hazard of erosion is severe.

Most areas of this soil are used as woodland. Some areas are used for cultivated crops or pasture or are in urban use.

This soil is well suited to cultivated crops. Contour stripcropping, minimum tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, utilizing crop residue, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places the channers in the surface layer interfere with the seeding and harvesting of some crops.

This soil is well suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is high for trees. About 90 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

Depth to bedrock, channers in the surface layer, and slope are limitations to use of this soil for some urban uses. Depth to bedrock and slope are limitations for onsite waste disposal and for dwellings with basements.

This soil is in capability subclass IIIe and in woodland ordination group 2o.

CnB—Clymer very stony loam, 0 to 8 percent slopes. This is a nearly level and gently sloping, deep, well drained soil on mountaintops and benches. Slopes generally are smooth or slightly convex and are 200 to 2,000 feet long. Individual areas are irregular in shape and range mainly from 5 to 500 acres. Large stones cover about 3 to 15 percent of the surface.

Typically, the surface layer is very dark brown channery loam about 3 inches thick. The subsurface layer is yellowish brown channery loam about 4 inches thick. The subsoil is 23 inches thick. In the upper 8 inches it is brownish yellow channery loam. In the lower 15 inches it is dark brown channery sandy clay loam and strong brown very channery sandy clay loam. The substratum is yellowish brown very channery sandy loam to a depth of 44 inches. Gray and brown sandstone bedrock is at a depth of 44 inches.

Included with this soil in mapping are small areas of the sloping Clymer soils, the moderately deep, well drained Dekalb soils, and the deep, moderately well drained Cookport soils. The included soils make up 15 to 20 percent of the map unit.

Permeability of this Clymer soil is moderate, and the available water capacity is moderate. Runoff is slow to medium. In unlimed areas the soil is strongly acid or very strongly acid throughout.

Most areas of this soil are used as woodland. Some areas are used for pasture.

This soil is not suited to cultivated crops or pasture. The stones in the surface layer interfere with the seeding and harvesting of crops and with pasture management.

The potential productivity of this soil is high for trees (fig. 8). Nearly all areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices.

Depth to bedrock is a limitation to use of this soil for most urban uses. Depth to bedrock is a limitation for onsite waste disposal and for dwellings with basements.

This soil is in capability subclass VIs and in woodland ordination group 2o.

CnD—Clymer very stony loam, 8 to 25 percent slopes. This is a sloping and moderately steep, deep, well drained soil on mountaintops and benches. Slopes generally are smooth or slightly convex and are 200 to 1,000 feet long. Individual areas are irregular in shape and range mainly from 5 to 300 acres. Large stones cover about 3 to 15 percent of the surface.

Typically, the surface layer is very dark brown channery loam about 3 inches thick. The subsurface layer is yellowish brown channery loam about 4 inches

Figure 8.—Clymer very stony loam, 0 to 8 percent slopes, is used mainly as woodland. The potential productivity for trees on the soil is high.

thick. The subsoil is 23 inches thick. In the upper 8 inches it is brownish yellow channery loam. In the lower 15 inches it is dark brown channery sandy clay loam and strong brown very channery sandy clay loam. The substratum is yellowish brown very channery sandy clay loam to a depth of 44 inches. Gray and brown sandstone bedrock is at a depth of 44 inches.

Included with this soil in mapping are small areas of the gently sloping, very stony Clymer soils, the moderately deep, well drained Dekalb soils, and the deep, moderately well drained Cookport soils. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Clymer soil is moderate, and the available water capacity is moderate. Runoff is medium to rapid. In unlimed areas the soil is strongly acid or very strongly acid throughout.

Most areas of this soil are used as woodland.

This soil is not suited to cultivated crops or pasture. The stones in the surface layer interfere with the seeding and harvesting of crops and with pasture management.

The potential productivity of this soil is high for trees. Nearly all the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. The use of equipment is restricted by slope.

Depth to bedrock and slope are limitations to use of this soil for onsite waste disposal, for buildings with basements, and for most urban uses.

This soil is in capability subclass VIs and in woodland ordination group 2r.

CoB—Cookport loam, 3 to 8 percent slopes. This is a gently sloping, deep, moderately well drained soil on ridgetops and benches. Slopes generally are smooth and are 100 to 500 feet long. Individual areas are irregular in shape and range mainly from 5 to 200 acres.

Typically, the surface layer is very dark grayish brown loam about 4 inches thick. The subsurface layer is brown loam about 2 inches thick. The subsoil is 33 inches thick. In the upper 16 inches it is dark brown channery clay loam and mottled, yellowish brown sandy clay loam. In the lower 17 inches it is mottled, strong brown, very firm and brittle channery sandy clay loam and channery clay loam. The substratum is mottled, grayish brown, firm channery sandy loam to a depth of 48 inches. Pale brown and dark grayish brown sandstone bedrock is at a depth of 48 inches.

Included with this soil in mapping are small areas of the nearly level and gently sloping, deep, well drained Clymer soils and the moderately deep, well drained Dekalb soils. Also included are areas of the nearly level and sloping Cookport soils. The included soils make up 15 to 25 percent of the map unit.

Permeability of this Cookport soil is slow in the fragipan. The available water capacity is moderate. Runoff is medium. The fragipan restricts the root zone at a depth of about 16 to 27 inches. The seasonal high water table is at a depth of about 18 to 30 inches. In unlimed areas the soil is very strongly acid or strongly acid throughout. The hazard of erosion is moderate.

Most areas of this soil are used as woodland. Some areas are used as cropland or pasture.

This soil is well suited to cultivated crops. Contour stripcropping, minimum tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Artificial drainage allows timely tillage and improves crop production.

This soil is well suited to pasture. Overgrazing and grazing when the soil is wet are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is high for trees. Nearly all areas of the soil are wooded. The main limitations are the seasonal high water table and the slow permeability. Thinning and removing undesirable species are suitable management practices. The use of equipment may be restricted by the seasonal high water table. Machine planting is practical on larger areas except when the soil is too wet.

The seasonal high water table and the slow permeability are limitations to use of this soil for onsite waste disposal, for dwellings with basements, and for some other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIe and in woodland ordination group 2w.

CxB—Cookport very stony loam, 0 to 8 percent slopes. This is a nearly level and gently sloping, deep, moderately well drained soil on ridgetops and benches. Individual areas are irregular in shape and range mainly from 5 to 200 acres. Large stones cover about 3 to 15 percent of the surface.

Typically, the surface layer is very dark grayish brown channery loam about 4 inches thick. The subsurface layer is brown channery loam about 2 inches thick. The subsoil is 33 inches thick. In the upper 16 inches it is dark brown channery light clay loam and mottled yellowish brown sandy clay loam. In the lower 17 inches it is mottled, strong brown, very firm and brittle channery sandy clay loam and channery clay loam. The substratum is mottled, grayish brown, firm channery sandy loam to a depth of 48 inches. Pale brown and dark grayish brown sandstone bedrock is at a depth of 48 inches.

Included with this soil in mapping are small areas of the nearly level and gently sloping, deep, well drained Clymer soils and the moderately deep, well drained Dekalb soils. Also included are some areas of Cookport loam. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Cookport soil is slow in the fragipan. The available water capacity is moderate. Runoff is medium. The fragipan restricts the root zone at a depth of about 16 to 27 inches. The seasonal high water table is at a depth of about 18 to 30 inches. In unlimed areas the soil is very strongly acid or strongly acid throughout.

Most areas of this soil are used as woodland.

This soil is not suited to cultivated crops or pasture. The stones in the surface layer interfere with the seeding and harvesting of crops and with pasture management.

The potential productivity of this soil is high for trees. Nearly all areas of the soil are wooded. The main limitations are the seasonal high water table and the slow permeability. Thinning and removing undesirable species are suitable management practices. The use of equipment is restricted by the seasonal high water table.

The seasonal high water table and the slow permeability are limitations to use of this soil for onsite waste disposal, for dwellings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass VIs and in woodland ordination group 2w.

CxD—Cookport very stony loam, 8 to 25 percent slopes. This is a sloping and moderately steep, deep, moderately well drained soil on mountaintops and benches. Slopes generally are smooth and are 200 to 1,000 feet long. Individual areas are irregular in shape and range mainly from 5 to 70 acres. Large stones cover about 3 to 15 percent of the surface.

Typically, the surface layer is very dark grayish brown channery loam about 4 inches thick. The subsurface layer is brown channery loam about 2 inches thick. The subsoil is 33 inches thick. In the upper 16 inches it is dark brown channery clay loam and mottled, yellowish brown sandy clay loam. In the lower 17 inches it is a mottled, strong brown, very firm and brittle layer of channery sandy clay loam and channery clay loam called a fragipan. The substratum is mottled, grayish brown, firm, channery sandy loam to a depth of 48 inches. Pale brown and dark grayish brown sandstone bedrock is at a depth of 48 inches.

Included with this soil in mapping are small areas of the sloping and moderately steep, deep, well drained Clymer soils and the moderately deep, well drained Dekalb soils. Also included are some areas of Cookport loam. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Cookport soil is slow in the fragipan. The available water capacity is moderate. Runoff is medium. The fragipan restricts the root zone at a depth of about 16 to 27 inches. The seasonal high water table is at a depth of about 18 to 30 inches. In unlimed areas the soil is very strongly acid or strongly acid throughout.

Most areas of this soil are used as woodland.

This soil is not suited to cultivated crops or pasture. The stones in the surface layer interfere with the seeding and harvesting of crops and with pasture management.

The potential productivity of this soil is high for trees. Nearly all areas of the soil are wooded. Management problems are caused by wetness. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. The use of equipment is restricted by the seasonal high water table.

The seasonal high water table and the slow permeability are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

This soil is in capability subclass VIs and in woodland ordination group 2w.

DeB—Dekalb channery loam, 3 to 8 percent slopes. This is a gently sloping, moderately deep, well drained soil on mountaintops and ridges. Slopes generally are convex and are 100 to 500 feet long. Individual areas are irregular in shape and range mainly from 3 to 80 acres.

Typically, the surface layer is very dark grayish brown channery loam about 3 inches thick. The subsurface layer is pale brown very channery loam about 6 inches thick. The subsoil is 23 inches thick. In the upper 13 inches it is yellowish brown very channery loam and brown very channery loam. In the lower 10 inches it is yellowish brown very channery sandy loam. The substratum is strong brown, loose, very channery loamy sand to a depth of 36 inches. Gray sandstone bedrock is at a depth of 36 inches.

Included with this soil in mapping are small areas of the nearly level and sloping Dekalb soils, the deep, moderately well drained Cookport soils, and the deep, well drained Clymer soils. Also included are some areas of soils that have textures like those of this Dekalb soil but are deeper than 40 inches to bedrock. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Dekalb soil is rapid, and the available water capacity is low. Runoff is medium. The depth of the root zone is restricted by bedrock. In unlimed areas the soil is strongly acid to extremely acid throughout. The hazard of erosion is moderate.

Most areas of this soil are used as woodland. Some areas are used for cultivated crops.

This soil is fairly suited to cultivated crops. Contour stripcropping, minimum tillage, grassed waterways,

diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. The low available water capacity restricts crop production.

This soil is suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers. The low available water capacity restricts forage production.

The potential productivity of this soil is moderate for trees. Most areas of the soil are wooded. Management problems are caused by the low available water capacity. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas. The low available water capacity restricts tree growth.

Depth to bedrock is a limitation to use of this soil for onsite waste disposal, as sites for buildings with basements, and for most other urban uses.

This soil is in capability subclass IIe and in woodland ordination group 4f.

DeC—Dekalb channery loam, 8 to 15 percent slopes. This is a sloping, moderately deep, well drained soil on mountaintops and ridges. Slopes generally are convex and are 100 to 500 feet long. Individual areas are irregular in shape and range mainly from 2 to 100 acres.

Typically, the surface layer is very dark grayish brown channery loam about 3 inches thick. The subsurface layer is pale brown very channery loam about 6 inches thick. The subsoil is 23 inches thick. In the upper 13 inches it is yellowish brown very channery loam and brown very channery loam. In the lower 10 inches it is yellowish brown channery sandy loam. The substratum is strong brown, loose, very channery loamy sand to a depth of 36 inches. Gray sandstone bedrock is at a depth of 36 inches.

Included with this soil in mapping are small areas of the gently sloping and moderately steep Dekalb soils, the deep, well drained Clymer soils, and the deep, moderately well drained Cookport soils. Also included are some areas of soils that have textures similar to those of this Dekalb soil but that are more than 40 inches deep to bedrock. The included soils make up 10 to 15 percent of the map unit.

Permeability of this Dekalb soil is rapid, and the available water capacity is low. Runoff is medium. The depth of the root zone is restricted by bedrock. In unlimed areas the soil is strongly acid to extremely acid throughout. The hazard of erosion is severe.

Most areas of this soil are used as woodland. Some areas are used for cultivated crops.

This soil is poorly suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. The low available water capacity restricts crop production.

This soil is poorly suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers. The low available water capacity restricts plant production.

The potential productivity of this soil is moderate for trees. Most areas of the soil are wooded. The main limitation is the low available water capacity. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas. The low available water capacity restricts tree growth.

Depth to bedrock is a limitation to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most urban uses.

This soil is in capability subclass IIIe and in woodland ordination group 4f.

DkB—Dekalb very stony sandy loam, 0 to 8 percent slopes. This is a nearly level and gently sloping, moderately deep, well drained soil on mountaintops and benches. Slopes generally are convex and are 200 to 1,000 feet long. Individual areas are irregular in shape and range mainly from 3 to 100 acres. Large stones cover about 3 to 15 percent of the surface.

Typically, the surface layer is very dark grayish brown very channery sandy loam about 3 inches thick. The subsurface layer is pale brown very channery loam about 6 inches thick. The subsoil is 23 inches thick. In the upper 13 inches it is yellowish brown very channery loam and brown very channery loam. In the lower 10 inches it is yellowish brown very channery sandy loam. The substratum is strong brown, loose, very channery loamy sand to a depth of 36 inches. Gray sandstone bedrock is at a depth of 36 inches.

Included with this soil in mapping are small areas of the deep, moderately well drained Cookport soils, the channery Dekalb soils, and the deep, well drained Clymer soils. Also included are some areas of soils that have textures like those of this Dekalb soil but that are more than 40 inches deep to bedrock. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Dekalb soil is rapid, and the available water capacity is low. Runoff is medium. The depth of the root zone is restricted by bedrock. In unlimed areas the soil is strongly acid to extremely acid throughout.

Most areas of this soil are used as woodland.

This soil is not suited to cultivated crops and pasture. The stones in the surface layer interfere with the seeding and harvesting of cultivated crops and with pasture management.

The potential productivity of this soil is moderate for trees. Nearly all areas of the soil are wooded. Management problems are caused by the low available water capacity. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. The low available water capacity restricts tree growth.

Depth to bedrock is a limitation to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most urban uses.

This soil is in capability subclass VIs and in woodland ordination group 4f.

DkD—Dekalb very stony sandy loam, 8 to 25 percent slopes. This is a sloping and moderately steep, moderately deep, well drained soil on mountainsides and ridges. Slopes generally are convex and are 200 to 1,500 feet long. Individual areas are irregular in shape and range mainly from 5 to 800 acres. Large stones cover about 3 to 15 percent of the surface.

Typically, the surface layer is very dark grayish brown very channery sandy loam about 3 inches thick. The subsurface layer is pale brown very channery loam about 6 inches thick. The subsoil is 23 inches thick. In the upper 13 inches it is yellowish brown very channery loam and brown very channery loam. In the lower 10 inches it is yellowish brown very channery sandy loam. The substratum is strong brown, very channery loamy sand to a depth of 36 inches. Gray sandstone bedrock is at a depth of 36 inches.

Included with this soil in mapping are small areas of the deep, well drained Clymer soils and the deep, moderately well drained Cookport soils. Also included are some areas of soils that have textures like those of this Dekalb soil but that are more than 40 inches deep to bedrock. Also included are some areas of soils that have reddish colors. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Dekalb soil is rapid, and the available water capacity is low. Runoff is medium. The depth of the root zone is restricted by bedrock. In unlimed areas the soil is strongly acid to extremely acid throughout.

Most areas of this soil are used as woodland.

This soil is not suited to cultivated crops and pasture. The stones in the surface layer interfere with the seeding and harvesting of cultivated crops and with pasture management.

The potential productivity of this soil is moderate for trees. Nearly all areas of the soil are wooded. Management problems are caused by the low available water capacity and slope. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. The use of equipment is restricted by slope.

Depth to bedrock is a limitation to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

This soil is in capability subclass VIs and in woodland ordination group 4f.

DlE—Dekalb and Lehew very stony sandy loams, 25 to 80 percent slopes. This map unit consists of steep and very steep, moderately deep, well drained soils on mountainsides. Dekalb soils make up about 70 percent of the total acreage of this map unit, Lehew soils make up about 20 percent, and the included soils make up 10 percent. Some areas are mostly Dekalb soils, some are mostly Lehew soils, and some consist of both. Of the areas that consist of both soils, Dekalb soils generally make up the greater percentage. The Dekalb and Lehew soils were mapped together because they are similar in use and management. Slopes generally are convex and are 200 to 1,600 feet long. Individual areas are irregular in shape and range from 10 to 1,000 acres. Large stones cover about 3 to 15 percent of the surface area.

Typically, the surface layer of Dekalb soils is very dark grayish brown very channery sandy loam about 3 inches thick. The subsurface layer is pale brown very channery loam about 6 inches thick. The subsoil is 23 inches thick. In the upper 13 inches it is yellowish brown and brown very channery loam. In the lower 10 inches it is yellowish brown very channery sandy loam. The substratum is strong brown, loose, very channery loamy sand to a depth of 36 inches. Gray sandstone bedrock is at a depth of 36 inches.

Typically, the surface layer of the Lehew soils is dark brown channery sandy loam about 3 inches thick. The subsurface layer is reddish brown channery sandy loam about 4 inches thick. The subsoil is reddish brown very channery sandy loam to a depth of 19 inches. The substratum is weak red very channery loamy sand to a depth of 26 inches. Weak red sandstone bedrock is at a depth of 26 inches.

Included with these soils in mapping are small areas of the moderately deep, well drained Oquaga and Lordstown soils. Also included are some areas of extremely stony soils. The included soils make up about 10 percent of the unit.

Permeability in the Dekalb soils is rapid and in the Lehew soils is moderately rapid to rapid. The available water capacity is low. Runoff is rapid. The depth of the root zone is restricted by bedrock. In unlimed areas the soil is strongly acid to extremely acid throughout.

Most areas of these soils are used as woodland.

These soils are not suited to cultivated crops or pasture because of slope and stoniness.

The potential productivity of these soils is moderate for trees. Nearly all areas are wooded. Management

problems are caused by slope and the low available water capacity. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. The use of equipment is restricted by slope.

Slope is a limitation to use of these soils for most urban uses. Slope and depth to rock are limitations for onsite waste disposal and for dwellings with basements.

These soils are in capability subclass VIIs and in woodland ordination group 4f.

DuB—Duncannon loam, 3 to 8 percent slopes. This is a gently sloping, deep, well drained soil on hilltops and terraces. Slopes generally are smooth or slightly convex and are 200 to 1,000 feet long. Individual areas are irregular in shape and range mainly from 10 to 400 acres.

Typically, the surface layer is dark grayish brown loam about 9 inches thick. The subsoil is 38 inches thick. In the upper 15 inches it is yellowish brown and brown silt loam. In the lower 23 inches it is yellowish red and reddish brown, friable and firm silt loam. The substratum is reddish brown silt loam and very fine sandy loam to a depth of 70 inches.

Included with this soil in mapping are small areas of the nearly level and sloping Duncannon soils and the deep, well drained Allenwood soils. Also included are some areas of moderately well drained soils that have a fragipan. The included soils make up 20 to 25 percent of the map unit.

Permeability of this Duncannon soil is moderate, and the available water capacity is high. Runoff is moderate. In unlimed areas the soil is very strongly acid to moderately acid in the surface layer and subsoil and very strongly acid to slightly acid in the substratum. The hazard of erosion is severe.

Most areas of this soil are used for cultivated crops. Some areas are used as woodland or pasture or are in urban use.

This soil is well suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth.

This soil is well suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotation grazing, and application of fertilizers.

The potential productivity of this soil is high for trees. About 10 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

There are few limitations to use of this soil for urban uses. Disturbed areas are subject to severe erosion. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIe and in woodland ordination group 2o.

HaA—Hagerstown silt loam, 0 to 3 percent slopes. This is a nearly level, deep, well drained soil on valley floors and adjacent hills. Slopes generally are smooth and are 100 to 600 feet long. Individual areas are irregular in shape and range mainly from 2 to 150 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is 52 inches thick. In the upper 8 inches it is dark brown silt loam. In the lower 44 inches it is yellowish red, friable and firm clay and silty clay loam.

Included with this soil in mapping are small areas of the gently sloping Hagerstown soils and the deep, moderately well drained Clarksburg soils. Also included are small areas of the deep, well drained Washington soils, which formed in till, and small areas of soils that are similar to this Hagerstown soil but that are less than 40 inches deep to bedrock. The included soils make up 10 to 25 percent of the map unit.

Permeability of this Hagerstown soil is moderate, and the available water capacity is high. Runoff is slow to medium. In unlimed areas the soil is strongly acid or very strongly acid in the surface layer and strongly acid to neutral in the subsoil. The hazard of erosion is slight.

Most areas of this soil are used for cultivated crops. Some areas are used for pasture or are in urban use.

This soil is well suited to cultivated crops. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth.

This soil is well suited to pasture. Overgrazing and grazing when the soil is wet are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is very high for trees. About 5 percent of the areas of this soil are wooded. Thinning and removing undesirable species are suitable management practices. The use of equipment is restricted in areas of exposed clay subsoil, which is slippery when wet. Machine planting is practical on larger areas unless the soil is wet.

In most areas depth to bedrock is more than 60 inches. In areas where depth to bedrock is 40 to 60 inches, bedrock is a limitation to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for some other urban uses.

This soil is in capability class I and in woodland ordination group 1c.

HaB—Hagerstown silt loam, 3 to 8 percent slopes. This is a gently sloping, deep, well drained soil on valley floors and adjacent hills. Slopes generally are smooth and are 200 to 800 feet long. Individual areas are irregular in shape and range mainly from 2 to 350 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is 52 inches thick. In the upper 8 inches it is dark brown silt loam. In the lower 44 inches it is yellowish red, friable and firm clay and silty clay loam.

Included with this soil in mapping are small areas of the nearly level and sloping Hagerstown soils and the deep, moderately well drained Clarksburg soils. Also included are small areas of the deep, well drained Washington soils, which formed in glacial till, and small areas of soils that are similar to this Hagerstown soil but that are less than 40 inches deep to bedrock. The included soils make up 5 to 10 percent of the map unit.

Permeability of this Hagerstown soil is moderate, and the available water capacity is high. Runoff is medium. In unlimed areas the soil is strongly acid or very strongly acid in the surface layer and in the upper part of the subsoil and ranges from strongly acid to neutral in the lower part. The hazard of erosion is moderate.

Most areas of this soil are used for cultivated crops. Some areas are used for pasture or are in urban use.

This soil is well suited to cultivated crops. Contour stripcropping, minimum tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth.

This soil is well suited to pasture. Overgrazing and grazing when the soil is wet are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is very high for trees. About 5 percent of the areas of the soil is wooded. Management problems are related to equipment limitations. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. The use of equipment is restricted in areas of exposed clay subsoil, which is slippery when wet. Machine planting is practical on larger areas unless the soil is wet.

In most areas depth to bedrock is more than 60 inches. In areas where depth to bedrock is 40 to 60 inches, bedrock is a limitation to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for some other urban uses.

This soil is in capability subclass IIe and in woodland ordination group 1c.

HaC—Hagerstown silt loam, 8 to 20 percent slopes. This is a sloping and moderately steep, deep, well drained soil on valley floors and adjacent hills. Slopes generally are smooth and are 100 to 500 feet long. Individual areas are irregular to long and narrow in shape and range mainly from 2 to 80 acres.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is 52 inches thick. In the upper 8 inches it is dark brown silt loam. In the lower 44 inches it is yellowish red, friable and firm clay and silty clay loam.

Included with this soil in mapping are small areas of the gently sloping and steep Hagerstown soils, the deep, moderately well drained Clarksburg soils, and small areas of soils that are similar to this Hagerstown soil but that are less than 40 inches deep to bedrock. The included soils make up 10 to 15 percent of the map unit.

Permeability of this Hagerstown soil is moderate, and the available water capacity is high. Runoff is medium to rapid. In unlimed areas the soil is strongly acid or very strongly acid in the surface layer and the upper part of the subsoil and ranges from strongly acid to neutral in the lower part. The hazard of erosion is severe.

Most areas of this soil are used for cultivated crops. Some areas are used for pasture or are in urban use.

This soil is well suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth.

This soil is well suited to pasture. Overgrazing and grazing when the soil is wet are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is very high for trees. About 10 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. The use of equipment is restricted by slope and by the exposed clay subsoil, which is slippery when wet. Machine planting is practical on larger areas unless the soil is wet.

In most areas depth to bedrock is more than 60 inches. In areas where bedrock is at a depth of 40 to 60 inches, depth to bedrock as well as slope are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

This soil is in capability subclass IIIe and in woodland ordination group 1c.

HhB—Hartleton channery silt loam, 3 to 8 percent slopes. This is a gently sloping, deep, well drained soil on low hills and ridges. Slopes generally are convex and are 200 to 600 feet long. Individual areas are irregular in shape and range mainly from 2 to 70 acres.

Typically, the surface layer is dark grayish brown channery silt loam about 2 inches thick. The subsoil is 30 inches thick. In the upper 12 inches it is light yellowish brown channery silt loam. In the lower 18 inches it is yellowish brown channery silt loam. The substratum is light yellowish brown and yellowish brown very channery silt loam to a depth of 52 inches. Olive brown fractured sandstone and shale bedrock is at a depth of 52 inches.

Included with this soil in mapping are small areas of the nearly level and sloping Hartleton soils, the deep, moderately well drained Watson soils, the moderately deep, well drained Berks soils, and the deep, well drained Allenwood soils. The included soils make up 15 to 25 percent of the map unit.

Permeability of this Hartleton soil is moderate to moderately rapid, and the available water capacity is moderate. Runoff is medium. In unlimed areas the soil is strongly acid or very strongly acid throughout. The hazard of erosion is moderate.

Most areas of this soil are used for cultivated crops. Some areas are used for woodland or pasture or are in urban use.

This soil is well suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places the channers in the surface layer interfere with the seeding and harvesting of some crops.

This soil is well suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 20 percent of the areas of this soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

Depth to bedrock is a limitation to use of this soil for onsite waste disposal and for some other urban uses.

This soil is in capabillty subclass IIe and in woodland ordination group 3f.

HhC—Hartleton channery silt loam, 8 to 15 percent slopes. This is a sloping, deep, well drained soil on low hills and ridges. Slopes generally are convex and are 200 to 2,000 feet long. Individual areas are irregular in shape and range mainly from 2 to 100 acres.

Typically, the surface layer is dark grayish brown, channery silt loam about 2 inches thick. The subsoil is 30 inches thick. In the upper 12 inches it is light yellowish brown channery silt loam. In the lower 18 inches it is yellowish brown channery silt loam. The substratum is light yellowish brown and yellowish brown very channery silt loam to a depth of 52 inches. Olive brown fractured sandstone and shale bedrock is at a depth of 52 inches.

Included with this soil in mapping are small areas of the gently sloping and moderately steep Hartleton soils, the deep, moderately well drained Watson soils, the moderately deep, well drained Berks soils, and the deep, well drained Allenwood soils. The included areas make up 15 to 20 percent of the map unit.

Permeability of this Hartleton soil is moderate to moderately rapid, and the available water capacity is moderate. Runoff is medium. In unlimed areas the soil is strongly acid or very strongly acid throughout. The hazard of erosion is severe.

Most areas of this soil are used for cultivated crops. Some areas are used for woodland or pasture or are in urban use.

This soil is well suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places the channers in the surface layer interfere with the seeding and harvesting of some crops.

This soil is suited to pasture (fig. 9). Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 30 percent of the areas of this soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

Depth to bedrock and slope are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for some other urban uses.

This soil is in capability subclass IIIe and in woodland ordination group 3f.

HhD—Hartleton channery silt loam, 15 to 25 percent slopes. This is a moderately steep, deep, well drained soil on side slopes of ridges. Slopes generally are convex and are 200 to 1,200 feet long. Individual areas are irregular in shape and range mainly from 2 to 50 acres.

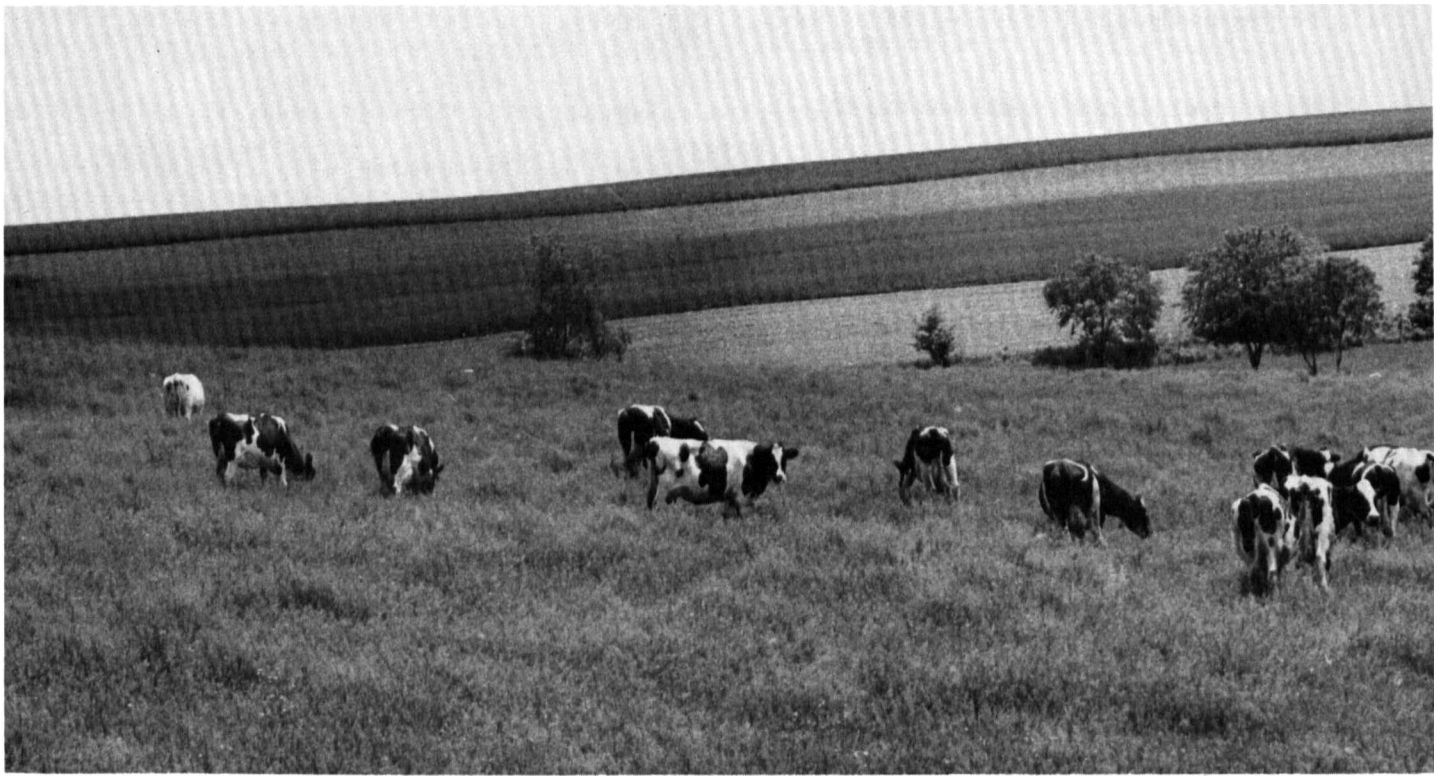


Figure 9.—Pasture in the foreground and contour stripcropping in the background on Hartleton channery silt loam, 8 to 15 percent slopes. The use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers are suitable management practices.

Typically, the surface layer is dark grayish brown channery silt loam about 2 inches thick. The subsoil is 30 inches thick. In the upper 12 inches it is light yellowish brown channery silt loam. In the lower 18 inches it is yellowish brown channery silt loam. The substratum is light yellowish brown and yellowish brown very channery silt loam to a depth of 52 inches. Olive brown fractured sandstone and shale bedrock is at a depth of 52 inches.

Included with this soil in mapping are small areas of the sloping and steep Hartleton soils, the moderately deep, well drained Berks soils, the deep, moderately well drained Watson soils, and the deep, well drained Allenwood soils. Also included are areas of shale Pits. The included areas make up 15 to 20 percent of the map unit.

Permeability of this Hartleton soil is moderate to moderately rapid, and the available water capacity is moderate. Runoff is medium to rapid. In unlimed areas the soil is strongly acid or very strongly acid throughout. The hazard of erosion is severe.

Most areas of this soil are used for cultivated crops or permanent hay. Some areas are used for woodland or pasture or are in urban use.

This soil is suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places the channers in the surface layer interfere with the seeding and harvesting of some crops.

This soil is well suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 40 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. The use of equipment is restricted by slope. Machine planting is practical on larger areas.

Slope and depth to bedrock are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

This soil is in capability subclass IVe and in woodland ordination group 3r.

Ho—Holly silt loam. This is a nearly level, deep, poorly drained and very poorly drained soil on flood plains. Slopes are smooth. The areas are irregular in shape and range mainly from 2 to 200 acres. Slopes range from 0 to 3 percent.

Typically, the surface layer is very dark gray silt loam about 5 inches thick. The subsoil, to a depth of 23 inches, is mottled light brownish gray silt loam and mottled, gray silt loam and silty clay loam. The substratum, to a depth of 48 inches, is mottled, gray sandy loam. Gray loamy sand is between depths of 48 and 60 inches.

Included with this soil in mapping are small areas of the deep, moderately well drained and somewhat poorly drained Basher soils and small areas of soils that have a mucky surface layer. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Holly soil is moderate to moderately slow in the subsoil. The available water capacity is high. The depth of the root zone is restricted by the high water table, which is at the surface or within 6 inches of the surface for most of the year. Runoff is slow to occasionally ponded. In unlimed areas reaction is medium acid or slightly acid throughout. This soil is subject to frequent flooding.

Most areas of this soil are in native vegetation. If adequately drained, it is used occasionally for row crops.

This soil is poorly suited to cultivated crops unless the soil is drained. Excess water causes the soil to warm slowly in spring. In some places crops are damaged by floodwaters following intensive rainfall. Keeping natural drainageways open helps to remove excess surface runoff. Artificial drainage, where outlets are available, helps to improve drainage.

This soil is suited to pasture. Grazing when the soil is wet and overgrazing are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are proper stocking rates to maintain key plant species, rotational grazing during wet periods, and application of fertilizers.

The potential productivity of this soil is moderate for water-tolerant trees. The depth of the root zone is restricted by the water table. Most areas of the soil are wooded. The use of equipment is restricted for most of the year because of the water table.

The high water table and flooding are limitations to use of this soil for most urban uses.

This soil is in capability subclass IVw and in woodland ordination group 4w.

KlB—Klinesville shaly silt loam, 3 to 8 percent slopes. This is a gently sloping, shallow, well drained soil on low hills and ridges. Slopes generally are smooth or slightly convex and are 100 to 400 feet long. Individual areas are irregular in shape and range mainly from 2 to 40 acres.

Typically, the surface layer is reddish brown shaly silt loam about 4 inches thick. The subsoil is weak red shaly silt loam about 8 inches thick. The substratum is weak red, firm very shaly silt loam to a depth of 19 inches. Dusky red fractured shale bedrock is at a depth of 19 inches.

Included with this soil in mapping are small areas of the nearly level and sloping Klinesville soils. Also included are some areas of the deep, well drained Leck Kill soils and the moderately deep, well drained Oquaga soils. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Klinesville soil is moderately rapid, and the available water is very low. Runoff is medium. The depth of the root zone is restricted by bedrock. In unlimed areas the soil is very strongly acid to medium acid throughout. The hazard of erosion is severe.

Most areas of this soil are used for pasture or hayland. Some areas are used as woodland and cropland.

This soil is poorly suited to cultivated crops because of the very low available water capacity. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places the shale in the surface layer interferes with the seeding and harvesting of some crops.

This soil is suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, application of fertilizers, and the seeding of drought-resistant legumes and grasses.

The potential productivity of this soil is moderate for trees. About 25 percent of the areas of the soil are wooded. The rate of seedling mortality is moderate because of the low available water capacity. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

Depth to bedrock is a limitation to use of this soil for onsite waste disposal, as sites for dwellings with basements, and most other urban uses.

This soil is in capability subclass IIIe and in woodland ordination group 4d.

KlC—Klinesville shaly silt loam, 8 to 15 percent slopes. This is a sloping, shallow, well drained soil on low hills and ridges. Slopes generally are smooth or slightly convex and are 100 to 600 feet long. Individual areas are irregular in shape and range mainly from 2 to 50 acres.

Typically, the surface layer is reddish brown shaly silt loam about 4 inches thick. The subsoil is weak red shaly silt loam about 8 inches thick. The substratum is weak red, firm very shaly silt loam to a depth of 19 inches. Dusky red fractured shale bedrock is at a depth of 19 inches.

Included with this soil in mapping are small areas of the gently sloping and moderately steep Klinesville soils. Also included are some areas of the deep, well drained Leck Kill soils and the moderately deep, well drained Oquaga soils. The included soils make up 5 to 10 percent of the map unit.

Permeability of this Klinesville soil is moderately rapid, the available water capacity is very low. Runoff is medium. The depth of the root zone is restricted by bedrock. In unlimed areas the soil is very strongly acid to medium acid throughout. The hazard of erosion is very severe.

Most areas of this soil are used as pasture or hayland. Some areas are used as woodland and cropland.

This soil is poorly suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places the shale in the surface layer interferes with the seeding and harvesting of some crops.

This soil is suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, application of fertilizers, and seeding of drought-resistant legumes and grasses.

The potential productivity of this soil is moderate for trees. About 40 percent of the areas of the soil are wooded. The management problems are the moderate rate of seedling mortality and the erosion hazard during harvesting. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

Depth to bedrock is a limitation to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

This soil is in capability subclass IVe and in woodland ordination group 4d.

KID—Klinesville shaly silt loam, 15 to 25 percent slopes. This is a moderately steep, shallow, well drained soil on low hills and ridges. Slopes generally are smooth or slightly convex and are 100 to 1,000 feet long. Individual areas are irregular in shape and range mainly from 2 to 40 acres.

Typically, the surface layer is reddish brown shaly silt loam about 4 inches thick. The subsoil is weak red shaly silt loam about 8 inches thick. The substratum is weak red, firm, very shaly silt loam to a depth of 19 inches. Dusky red fractured shale bedrock is at a depth of 19 inches.

Included with this soil in mapping are small areas of the sloping and steep Klinesville soils. Also included are some areas of the deep, well drained Leck Kill soils and the moderately deep, well drained Oquaga soils. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Klinesville soil is moderately rapid, and the available water capacity is very low. Runoff is medium to rapid. The depth of the root zone is restricted by bedrock. In unlimed areas the soil is very strongly acid to moderately acid throughout. The hazard of erosion is very severe.

Most areas of this soil are used as pasture or woodland. Some areas are used as hayland.

This soil is not suited to cultivated crops because erosion is a severe hazard. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. The shale in the surface layer interferes with the seeding and harvesting of some crops.

This soil is fairly suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, application of fertilizers, and the seeding of drought-resistant legumes and grasses.

The potential productivity of this soil for trees, north aspect, is moderate and, south aspect, is low. About 50 percent of the areas of the soil are wooded. Management problems are caused by the moderate rate of seedling mortality, north aspect, and the severe rate of seedling mortality, south aspect, and the erosion hazard during harvesting. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. In some places the use of equipment is restricted by slope. Machine planting is practical on larger areas.

Depth to bedrock and slope are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

This soil is in capability subclass VIe and in woodland ordination group 4d, north aspect, and 5d, south aspect.

LaB—Lackawanna channery silt loam, 3 to 8 percent slopes. This is a gently sloping, deep, well drained soil on broad ridgetops. Slopes generally are smooth or slightly convex and are 100 to 1,200 feet long. Individual areas are irregular in shape and range mainly from 2 to 300 acres.

Typically, the surface layer is dark reddish brown channery silt loam about 8 inches thick. The subsoil is 36 inches thick. In the upper 20 inches it is reddish

brown, friable and firm channery loam and channery silt loam. In the lower 16 inches it is a weak red and mottled, dusky red, very firm layer of channery silt loam called a fragipan. The substratum is dusky red channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the nearly level and sloping Lackawanna soils. Also included are some areas of the deep, moderately well drained Wellsboro soils, the deep, somewhat poorly drained Morris soils, the moderately deep, well drained Oquaga and Lordstown soils, and soils that are similar to this Lackawanna soil but that have a surface layer of gravelly sandy loam. The included soils make up 10 to 15 percent of the map unit.

Permeability of this Lackawanna soil is slow in the fragipan. The available water capacity is moderate. Runoff is medium. The fragipan restricts the root zone at a depth of about 20 to 34 inches. From November through March the seasonal high water table is at a depth of about 24 to 72 inches. In unlimed areas the soil is very strongly acid or strongly acid above the fragipan and very strongly acid to moderately acid in the fragipan and the substratum. The hazard of erosion is moderate.

Most areas of this soil are used for cultivated crops. Some areas are used as woodland and pasture.

This soil is well suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, utilizing crop residue, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places the channers in the surface layer interfere with the seeding and harvesting of some crops.

This soil is well suited to pasture. Overgrazing and grazing when the soil is wet are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 20 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

The seasonal high water table is a limitation to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. Slow permeability is also a limitation for onsite waste disposal. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIe and in woodland ordination group 3o.

LaC—Lackawanna channery silt loam, 8 to 15 percent slopes. This is a sloping, deep, well drained soil on broad ridgetops and side slopes. Slopes generally are smooth or slightly convex and are 100 to 600 feet long. Individual areas are irregular in shape and range mainly from 2 to 40 acres.

Typically, the surface layer is dark reddish brown channery silt loam about 8 inches thick. The subsoil is 36 inches thick. In the upper 20 inches it is reddish brown, friable and firm channery loam and channery silt loam. In the lower 16 inches it is a weak red and mottled, dusky red, very firm layer of channery silt loam called a fragipan. The substratum is dusky red channery loam at a depth of 60 inches or more.

Included with this soil in mapping are small areas of the gently sloping and moderately steep Lackawanna soils, the deep, moderately well drained Wellsboro soils, the deep, somewhat poorly drained Morris soils, the moderately deep, well drained and excessively drained Oquaga soils, and the well drained Lordstown soils. Also included are some areas of soils that are similar to this Lackawanna soil but that have a surface layer of gravelly sandy loam. The included soils make up 10 to 15 percent of the map unit.

Permeability of this Lackawanna soil is slow in the fragipan. The available water capacity is moderate. Runoff is medium to rapid. The fragipan restricts the root zone to a depth of about 20 to 34 inches. From November through March the seasonal high water table is at a depth of about 24 to 72 inches. In unlimed areas the soil is very strongly acid or strongly acid above the fragipan and very strongly acid to medium acid in the fragipan and the substratum. The hazard of erosion is moderate to severe.

Most areas of this soil are used for cultivated crops. Some areas are used as woodland and pasture.

This soil is well suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places the channers in the surface layer interfere with the seeding and harvesting of some crops.

This soil is well suited to pasture. Overgrazing and grazing when the soil is wet are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 30 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are

suitable management practices. Machine planting is practical on larger areas.

The seasonal high water table is a limitation to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. The slow permeability is also a limitation for onsite waste disposal. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIIe and in woodland ordination group 3o.

LbB—Lackawanna very stony silt loam, 0 to 8 percent slopes. This is a nearly level and gently sloping, deep, well drained soil on ridgetops and benches. Slopes generally are smooth or slightly convex and are 100 to 1,000 feet long. Individual areas are irregular in shape and range from 5 to 150 acres. Large stones cover about 3 to 10 percent of the surface.

Typically, the surface layer is dark reddish brown channery loam about 8 inches thick. The subsoil is 36 inches thick. In the upper 20 inches it is reddish brown, friable and firm, channery loam and channery silt loam. In the lower 16 inches it is a weak red and mottled, dusky red, very firm layer of channery silt loam called a fragipan. The substratum is dusky red channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the sloping Lackawanna soils. Also included are some areas of the deep, moderately well drained Wellsboro soils, the deep, somewhat poorly drained Morris soils, the moderately deep, well drained and excessively drained Oquaga soils, and the well drained Lordstown soils. Also included are some areas of soils that are similar to this Lackawanna soil but that have a surface layer of gravelly sandy loam. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Lackawanna soil is slow in the fragipan. The available water capacity is moderate. Runoff is slow to medium. The fragipan restricts the root zone at a depth of about 20 to 34 inches. From November through March the seasonal high water table is at a depth of about 24 to 72 inches. In unlimed areas the soil is very strongly acid or strongly acid above the fragipan and ranges from very strongly acid to moderately acid in the fragipan and the substratum.

Most areas of this soil are used as woodland. Some areas are used as native pasture.

This soil is not suited to cultivated crops or pasture. The stones in the surface layer interfere with the seeding and harvesting of most crops and with pasture management.

The potential productivity of this soil is moderately high for trees. Most areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices.

The seasonal high water table is a limitation to use of this soil for onsite waste disposal, dwellings with basements, and most other urban uses. The slow permeability is also a limitation for onsite waste disposal. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass VIs and in woodland ordination group 3o.

LbD—Lackawanna very stony silt loam, 8 to 25 percent slopes. This is a sloping and moderately steep, deep, well drained soil on ridgetops and side slopes. Slopes generally are smooth or slightly convex and are 100 to 1,500 feet long. Individual areas are irregular in shape and range mainly from 5 to 200 acres. Large stones cover about 3 to 10 percent of the surface.

Typically, the surface layer is dark reddish brown channery silt loam about 8 inches thick. The subsoil is 36 inches thick. In the upper 20 inches it is reddish brown, friable and firm channery loam and channery silt loam. In the lower 16 inches it is a weak red and mottled, dusky red, very firm layer of channery silt loam called a fragipan. The substratum is dusky red channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the gently sloping and steep Lackawanna soils and areas of the deep, moderately well drained Wellsboro soils, the deep, somewhat poorly drained Morris soils, the moderately deep, well drained and excessively drained Oquaga soils, and the moderately deep, well drained Lordstown soils. Also included are some areas of soils that are similar to this Lackawanna soil but that have a surface layer of gravelly sandy loam. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Lackawanna soil is slow in the fragipan. The available water capacity is moderate. Runoff is medium to rapid. The fragipan restricts the root zone at a depth of about 20 to 34 inches. From November through March the seasonal high water table is at a depth of about 24 to 72 inches. In unlimed areas the soil is very strongly acid or strongly acid above the fragipan and ranges from very strongly acid to moderately acid in the fragipan and the substratum.

Most areas of this soil are used as woodland.

This soil is not suited to cultivated crops or pasture. The stones in the surface layer interfere with the seeding and harvesting of most crops and with pasture management.

The potential productivity of this soil is moderately high for trees. Most areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices.

The seasonal high water table, the slow permeability, and slope are limitations to use of this soil for most urban uses. The seasonal high water table and slope are

limitations to use of this soil for onsite waste disposal and as sites for dwellings with basements. The slow permeability is also a limitation for onsite waste disposal. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass VIs and in woodland ordination group 3r.

LdB—Laidig channery silt loam, 3 to 8 percent slopes. This is a gently sloping, deep, well drained soil on the lower slopes of mountains. Slopes are generally smooth or slightly concave and are 200 to 500 feet long. Individual areas are irregular in shape and range mainly from 2 to 50 acres.

Typically, the surface layer is very dark gray channery silt loam about 3 inches thick. The subsurface layer is light yellowish brown channery loam about 5 inches thick. The subsoil is 57 inches thick. In the upper 8 inches it is yellowish brown channery loam. In the next 14 inches it is brown and strong brown, friable and firm channery sandy loam and channery sandy clay loam. In the lower 35 inches it is a mottled, brown, very firm layer of channery sandy loam called a fragipan.

Included with this soil in mapping are small areas of the nearly level and sloping Laidig soils and the deep, well drained Allenwood soils, which do not have a very firm layer in the subsoil. Also included are small areas of the deep, moderately well drained Buchanan and Watson soils and small areas of soils that are similar to this Laidig soil except for a gravelly surface layer. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Laidig soil is moderately slow in the fragipan. The available water capacity is moderate. Runoff is medium. The fragipan restricts the root zone at a depth of about 30 to 50 inches. The seasonal high water table is at a depth of about 30 to 48 inches. In unlimed areas the soil is strongly acid to extremely acid throughout. The hazard of erosion is moderate.

Most areas of this soil are used as woodland. Some areas are used for cultivated crops or pasture or are in urban use.

This soil is fairly well suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Artificial drainage allows timely tillage and improves crop production. In some places the channers in the surface layer interfere with the seeding and harvesting of some crops.

This soil is well suited to pasture. Overgrazing is the main concern in pasture management. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is high for trees. About 40 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

The moderately slow permeability and the seasonal high water table are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIe and in woodland ordination group 2o.

LdC—Laidig channery silt loam, 8 to 15 percent slopes. This is a sloping, deep, well drained soil on the lower slopes of mountains. Slopes generally are smooth or concave and are 200 to 1,000 feet long. Individual areas are rectangular in shape and range mainly from 2 to 50 acres.

Typically, the surface layer is very dark gray channery silt loam about 3 inches thick. The subsurface layer is light yellowish brown channery loam about 5 inches thick. The subsoil is 57 inches thick. In the upper 8 inches it is yellowish brown channery loam. In the next 14 inches it is brown and strong brown, friable and firm channery sandy loam and channery sandy clay loam. In the lower 35 inches it is a mottled, brown, very firm layer of channery sandy loam called a fragipan.

Included with this soil in mapping are small areas of the gently sloping and moderately steep Laidig soils and the deep, well drained Allenwood soils, which do not have a fragipan. Also included are small areas of the deep, moderately well drained Buchanan and Watson soils and small areas of soils that are similar to this Laidig soil except for a gravelly surface layer. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Laidig soil is moderately slow in the fragipan. The available water capacity is moderate. Runoff is medium to rapid. The fragipan restricts the root zone at a depth of about 30 to 50 inches. The seasonal high water table is at a depth of about 30 to 48 inches. In unlimed areas the soil is strongly acid to extremely acid throughout. The hazard of erosion is severe.

Most areas of this soil are used as woodland. Some areas are used for pasture or cultivated crops or are in urban use.

This soil is well suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to

maintain the organic matter content and the soil tilth. Keeping natural drainageways open helps to remove excess surface runoff. Artificial drainage allows timely tillage and improves crop production. The channers in the surface layer interfere with the seeding and harvesting of some crops.

This soil is well suited to pasture. Overgrazing is the main concern in pasture management. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is high for trees. About 60 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

The moderately slow permeability and the seasonal high water table are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIIe and in woodland ordination group 2o.

LgB—Laidig very stony loam, 0 to 8 percent slopes. This is a nearly level and gently sloping, deep, well drained soil on benches and the lower slopes of mountains. Slopes generally are smooth or slightly concave and are 200 to 600 feet long. Individual areas are irregular in shape and range mainly from 5 to 600 acres. Large stones cover about 3 to 10 percent of the surface.

Typically, the surface layer is very dark gray channery loam about 3 inches thick. The subsurface layer is light yellowish brown channery loam about 5 inches thick. The subsoil is 57 inches thick. In the upper 8 inches it is yellowish brown channery loam. In the next 14 inches it is brown and strong brown, friable and firm channery sandy loam and channery sandy clay loam. In the lower 35 inches it is a mottled, brown, very firm layer of channery sandy loam called a fragipan.

Included with this soil in mapping are small areas of the sloping Laidig soils. Also included are small areas of the deep, moderately well drained Buchanan and Watson soils. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Laidig soil is moderately slow in the fragipan. The available water capacity is moderate. Runoff is slow to medium. The fragipan restricts the root zone at a depth of about 30 to 50 inches. The seasonal high water table is at a depth of about 30 to 48 inches. In unlimed areas the soil is strongly acid to extremely acid throughout.

Most areas of this soil are used as woodland.

This soil is poorly suited to cultivated crops and pasture. The stones in the surface layer interfere with the seeding and harvesting of cultivated crops and with pasture management.

The potential productivity of this soil is high for trees. Most of the areas of this soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices.

The moderately slow permeability and the seasonal high water table are limitations to use of this soil for onsite waste disposal, as sites for buildings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass VIs and in woodland ordination group 2o.

LgD—Laidig very stony loam, 8 to 25 percent slopes. This is a sloping and moderately steep, deep, well drained soil on the lower slopes of mountains. Slopes generally are smooth or slightly concave and are 200 to 1,500 feet long. Individual areas are rectangular in shape and range mainly from 5 to 700 acres. Large stones cover about 3 to 10 percent of the surface.

Typically, the surface layer is very dark gray channery loam about 3 inches thick. The subsurface layer is light yellowish brown channery loam about 5 inches thick. The subsoil is 57 inches thick. In the upper 8 inches it is yellowish brown channery loam. In the next 14 inches it is brown and strong brown, friable and firm channery sandy loam and channery sandy clay loam. In the lower 35 inches it is a mottled, brown, very firm layer of channery sandy loam called a fragipan.

Included with this soil in mapping are small areas of the gently sloping and steep Laidig soils. Also included are small areas of the deep, moderately well drained Buchanan and Watson soils. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Laidig soil is moderately slow in the fragipan. The available water capacity is moderate. Runoff is medium to rapid. The fragipan restricts the root zone at a depth of about 30 to 50 inches. The seasonal high water table is at a depth of about 30 to 48 inches. In unlimed areas the soil is strongly acid to extremely acid throughout.

Most areas of this soil are used as woodland.

This soil is poorly suited to cultivated crops and pasture. The stones in the surface layer interfere with the seeding and harvesting of cultivated crops and with pasture management.

The potential productivity of this soil is high for trees. Most of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management

practices. In some places the use of equipment is restricted by slope.

The seasonal high water table, slope, and the moderately slow permeability are limitations to use of this soil for onsite waste disposal and most other urban uses. Slope is a limitation for buildings with basements. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass VIs and in woodland ordination group 2r.

LgE—Laidig very stony loam, 25 to 70 percent slopes. This is a steep and very steep, deep, well drained soil on the lower slopes of mountainsides. Slopes generally are smooth or concave and are 200 to 1,000 feet long. Individual areas are rectangular in shape and range from 5 to 300 acres. Large stones cover about 3 to 10 percent of the surface.

Typically, the surface layer is very dark gray channery loam about 3 inches thick. The subsurface layer is light yellowish brown channery loam about 5 inches thick. The subsoil is 57 inches thick. In the upper 8 inches it is yellowish brown channery silt loam. In the next 14 inches it is brown and strong brown, friable and firm channery sandy loam and channery sandy clay loam. In the lower 35 inches it is a mottled, brown, very firm layer of channery sandy loam called a fragipan.

Included with this soil in mapping are small areas of the moderately steep Laidig soils. Also included are small areas of the moderately deep, well drained Dekalb soils and small areas of the deep, moderately well drained Buchanan and Watson soils. The included soils make up 15 to 25 percent of the map unit.

Permeability of this Laidig soil is moderately slow in the fragipan. The available water capacity is moderate. Runoff is very rapid. The fragipan restricts the root zone at a depth of about 30 to 50 inches. In unlimed areas the soil is strongly acid to extremely acid throughout.

Most areas of this soil are used as woodland.

This soil is not suited to cultivated crops and pasture. The stones in the surface layer and slope interfere with the seeding and harvesting of crops and with pasture management.

The potential productivity of this soil is high for trees. Most of the areas of the soil are wooded. The main limitation is slope. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. The use of equipment is restricted by slope.

Slope is a limitation to use of this soil for onsite waste disposal, as sites for buildings with basements, and for most other urban uses. In addition, the moderately slow permeability is a limitation for onsite waste disposal.

This soil is in capability subclass VIIs and in woodland ordination group 2r.

LkB—Leck Kill channery silt loam, 3 to 8 percent slopes. This is a gently sloping, deep, well drained soil on the tops of shale ridges. Slopes generally are smooth to convex and are 200 to 800 feet long. Individual areas are irregular in shape and range mainly from 5 to 300 acres.

Typically, the surface layer is reddish brown channery silt loam about 9 inches thick. The subsoil is 26 inches thick. In the upper 11 inches it is reddish brown, friable and firm channery silt loam. In the lower 15 inches it is dark reddish brown and reddish brown, firm channery silty clay loam. The substratum is reddish brown, firm very channery loam to a depth of 60 inches. Dusky red interbedded sandstone and shale bedrock is at a depth of 60 inches.

Included with this soil in mapping are small areas of the nearly level and sloping Leck Kill soils. Also included are small areas of the shallow, well drained Klinesville soils, the deep, well drained Lackawanna soils, and the deep, moderately well drained Albrights soils. Also included are small areas of soils that are similar to this Leck Kill soil but that have more sand in the subsoil. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Leck Kill soil is moderate to moderately rapid, and the available water capacity is high. Runoff is medium. In unlimed areas the soil ranges from neutral to very strongly acid in the surface layer and subsoil and from moderately acid to very strongly acid in the substratum. The hazard of erosion is moderate.

Most areas of this soil are used as cropland. Some areas are used as pasture or woodland or are in urban use.

This soil is well suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places the channers in the surface layer interfere with the seeding and harvesting of some crops.

This soil is well suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 20 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

In places depth to bedrock is a limitation to use of this soil for onsite waste disposal and some other urban uses.

This soil is in capability subclass IIe and in woodland ordination group 3o.

LkC—Leck Kill channery silt loam, 8 to 15 percent slopes. This is a sloping, deep, well drained soil on side slopes of shale ridges. Slopes generally are smooth to convex and are 100 to 700 feet long. Individual areas are irregular in shape and range from 5 to 300 acres.

Typically, the surface layer is reddish brown channery silt loam about 9 inches thick. The subsoil is 26 inches thick. In the upper 11 inches it is reddish brown, friable and firm channery silt loam. In the lower 15 inches it is dark reddish brown and reddish brown, firm channery silty clay loam. The substratum is reddish brown, firm very channery loam to a depth of 60 inches. Dusky red interbedded sandstone and shale bedrock is at a depth of 60 inches.

Included with this soil in mapping are small areas of the gently sloping and moderately steep Leck Kill soils. Also included are small areas of the shallow, well drained Klinesville soils, the deep, well drained Lackawanna soils, and the deep, moderately well drained Albrights soils. Also included are small areas of soils that are similar to this Leck Kill soil but that have more sand in the subsoil. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Leck Kill soil is moderate to moderately rapid, and the available water capacity is high. Runoff is medium to rapid. In unlimed areas the soil ranges from neutral to very strongly acid in the surface layer and subsoil and from moderately acid to very strongly acid in the substratum. The hazard of erosion is severe.

Most areas of this soil are used as cropland. Some areas are used for pasture or woodland or are in urban use.

This soil is suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places the channers in the surface layer interfere with the seeding and harvesting of some crops.

This soil is suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 30 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

Depth to bedrock and slope are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for some other urban uses.

This soil is in capability subclass IIIe and in woodland ordination group 3o.

LkD—Leck Kill channery silt loam, 15 to 25 percent slopes. This is a moderately steep, deep, well drained soil on side slopes of shale ridges. Slopes generally are smooth to convex and are 100 to 300 feet long. Individual areas are irregular in shape and range mainly from 3 to 100 acres.

Typically, the surface layer is reddish brown channery silt loam about 9 inches thick. The subsoil is 26 inches thick. In the upper 11 inches it is reddish brown, friable and firm channery silt loam. In the lower 15 inches it is dark reddish brown and reddish brown, firm channery silty clay loam. The substratum is reddish brown, firm very channery loam to a depth of 60 inches. Dusky red interbedded sandstone and shale bedrock is at a depth of 60 inches.

Included with this soil in mapping are small areas of the sloping and steep Leck Kill soils. Also included are small areas of the shallow, well drained Klinesville soils and the deep, well drained Lackawanna soils. Also included are small areas of soils that are similar to this Leck Kill soils but that have more sand in the subsoil. The included soils make up 10 to 15 percent of the map unit.

Permeability of this Leck Kill soil is moderate to moderately rapid. The available water capacity is high. Runoff is rapid. In unlimed areas the soil ranges from neutral to very strongly acid in the surface layer and subsoil and from moderately acid to very strongly acid in the substratum. The hazard of erosion is very severe.

Most areas of this soil are used as woodland. Some areas are used for pasture and cultivated crops.

This soil is suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places the channers in the surface layer interfere with the seeding and harvesting of some crops.

This soil is suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 60 percent of the areas of this soil are wooded. The main limitation is the moderately steep slopes. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. In some places the use of equipment is restricted by slope.

Slope is a limitation to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

This soil is in capability subclass IVe and in woodland ordination group 3r.

Lm—Linden loam. This is a nearly level, deep, well drained soil on flood plains. The surface layer is loam, silt loam, or fine sandy loam. Slopes generally are smooth. Individual areas are irregular in shape and range mainly from 3 to 150 acres. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark brown loam about 9 inches thick. The subsoil is 28 inches thick. In the upper 22 inches it is reddish brown loam. In the lower 6 inches it is reddish brown fine sandy loam. The substratum is reddish brown and brown, very friable and loose fine sandy loam and loamy fine sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the nearly level, deep, well drained Barbour soils and the deep, moderately well drained and somewhat poorly drained Basher soils. The included soils make up 10 to 15 percent of the map unit.

Permeability of this Linden soil above a depth of 40 inches is moderately rapid and below that depth is rapid. The available water capacity is high. Runoff is slow. In late winter or early spring this soil is subject to frequent flooding. The apparent seasonal high water table is at a depth of about 3 to 6 feet. In unlimed areas the soil is very strongly acid to medium acid throughout. The hazard of erosion is slight.

Most areas of this soil are used as cropland. Some areas are used as pasture or woodland or are in urban use.

This soil is well suited to cultivated crops. Flooding, which occurs, on the average, more than once in 2 years, may cause severe crop damage. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth.

This soil is well suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is very high for trees. About 10 percent of the areas of this soil are wooded. Thinning and removing undesirable species are suitable management practices. In some places the use of equipment is restricted briefly by flooding. Machine planting is practical on larger areas.

Flooding is a limitation to use of this soil as sites for buildings with basements and for most other urban uses. Flooding and the rapid permeability are limitations for onsite waste disposal.

This soil is in capability subclass Iw and in woodland ordination group 1o.

Ln—Linden loam, occasionally flooded. This is a nearly level, deep, well drained soil on flood plains. The surface layer is loam, silt loam, or fine sandy loam. Slopes generally are smooth. Individual areas are irregular in shape and range from 10 to 500 acres. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark brown loam about 9 inches thick. The subsoil is 28 inches thick. In the upper 22 inches it is reddish brown loam. In the lower 6 inches it is reddish brown fine sandy loam. The substratum is reddish brown and brown, very friable and loose fine sandy loam and loamy fine sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the nearly level, deep, well drained Barbour soils and the deep, moderately well drained and somewhat poorly drained Basher soils. The included soils make up 10 to 15 percent of the map unit.

Permeability of this Linden soil above a depth of 40 inches is moderately rapid and below that depth is rapid. The available water capacity is high. Runoff is slow. Mainly in late winter and early spring this soil is subject to occasional flooding. The apparent seasonal high water table is at a depth of about 3 to 6 feet. In unlimed areas the soil is very strongly acid to moderately acid throughout. The hazard of erosion is slight.

Most areas of this soil are used as cropland. Some areas are used for pasture or woodland or are in urban use.

This soil is well suited to cultivated crops. Flooding, which occurs, on the average, no more than once in 2 years, may cause severe crop damage. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth.

This soil is well suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is very high for trees. About 5 percent of the areas of the soil are wooded. Thinning and removing undesirable species are suitable management practices. In some places the use of equipment is restricted briefly by occasional flooding. Machine planting is practical on larger areas.

Occasional flooding is a limitation to use of this soil as sites for dwellings with basements and for most other urban uses. Flooding and the rapid permeability are limitations for onsite waste disposal.

This soil is in capability class I and in woodland ordination group 1o.

MoB—Morris channery silt loam, 3 to 8 percent slopes. This is a gently sloping, deep, somewhat poorly drained soil on broad ridgetops and in drainageways. Slopes generally are smooth to slightly concave and are 100 to 1,500 feet long. Individual areas are irregular in shape and range mainly from 2 to 80 acres.

Typically, the surface layer is dark reddish brown channery silt loam about 9 inches thick. The subsoil is 51 inches thick. In the upper 10 inches it is mottled, dark

brown, reddish brown, and reddish gray loam, channery loam, and silt loam. In the lower 41 inches it is a mottled, reddish brown and weak red, firm and very firm layer of channery loam, channery sandy clay loam, and channery sandy loam called a fragipan.

Included with this soil in mapping are small areas of the nearly level and sloping Morris soils, the deep, moderately well drained Wellsboro soils, and the deep, poorly drained and very poorly drained Norwich soils. Also included are small areas of soils that are similar to this Morris soil but that have a surface layer of sandy loam. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Morris soil is slow in the fragipan. The available water capacity is moderate. Runoff is medium. The fragipan in the subsoil restricts the root zone at a depth of 10 to 22 inches. The seasonal high water table is perched above the fragipan at a depth of about 6 to 18 inches. In unlimed areas the soil ranges from very strongly acid to moderately acid in the surface layer and the upper part of the subsoil and from strongly acid to slightly acid in the lower part of the subsoil. The hazard of erosion is moderate.

Most areas of this soil are used for cultivated crops or as hayland. Some areas are used as pasture or woodland or are in urban use.

This soil is suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, utilizing crop residue, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Keeping natural drainageways open helps to remove excess surface runoff. Artificial drainage allows timely tillage and improves crop production.

This soil is suited to pasture. Overgrazing and grazing when the soil is wet are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 25 percent of the areas of the soil are wooded. The main limitation is the seasonal high water table. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. The use of equipment is restricted by the seasonal high water table. Machine planting is practical on larger areas except when the soil is too wet.

The seasonal high water table and the slow permeability are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIIw and in woodland ordination group 3w.

MoC—Morris channery silt loam, 8 to 15 percent slopes. This is a sloping, deep, somewhat poorly drained soil on broad ridgetops and in drainageways. Slopes generally are smooth to slightly concave and are 200 to 1,000 feet long. Individual areas are irregular in shape and range mainly from 2 to 20 acres.

Typically, the surface layer is dark reddish brown channery silt loam about 9 inches thick. The subsoil is 51 inches thick. In the upper 10 inches it is mottled, dark brown, reddish gray, and reddish brown loam, channery loam, and silt loam. In the lower 41 inches it is a mottled, reddish brown and weak red, firm and very firm layer of channery loam, channery sandy clay loam, and channery sandy loam called a fragipan.

Included with this soil in mapping are small areas of the moderately steep and gently sloping Morris soils, the deep, moderately well drained Wellsboro soils, and the moderately deep, well drained to excessively drained Oquaga soils. Also included are some areas of soils that are similar to this Morris soil but that have a surface layer of sandy loam. The included soils make up 15 to 20 percent of the map unit.

Permeability of this Morris soil is slow in the fragipan. The available water capacity is moderate. Runoff is medium. The fragipan restricts the root zone at a depth of 10 to 22 inches. The seasonal high water table is perched above the fragipan at a depth of about 6 to 18 inches. In unlimed areas the soil ranges from very strongly acid to moderately acid in the surface layer and the upper part of the subsoil and from very strongly acid to slightly acid in the lower part of the subsoil. The hazard of erosion is severe.

Most areas of this soil are used for cultivated crops or as hayland. Some areas are used as pasture or woodland or are in native vegetation.

This soil is suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to protect this soil from erosion. Leaving crop residue on the surface and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Keeping natural drainageways open helps to remove excess surface runoff. Artificial drainage allows for timely tillage and improves crop production.

This soil is suited to pasture. Overgrazing and grazing when the soil is wet are the major concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 40 percent of the areas of the soil are wooded. The main limitation is the seasonal high water table. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. The use of equipment is restricted by the seasonal high water table. Machine planting is practical on larger areas except when the soil is too wet.

The seasonal high water table and the slow permeability are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIIe and in woodland ordination group 3w.

MrB—Morris very stony silt loam, 0 to 8 percent slopes. This is a nearly level and gently sloping, deep, somewhat poorly drained soil on broad ridgetops and drainageways. Slopes generally are smooth to slightly concave and are 100 to 1,000 feet long. Individual areas are irregular in shape and range mainly from 5 to 50 acres. Large stones cover about 3 to 15 percent of the surface.

Typically, the surface layer is dark reddish brown channery silt loam about 9 inches thick. The subsoil is 51 inches thick. In the upper 10 inches it is mottled, dark brown, reddish brown, and reddish gray loam, channery loam, and silt loam. In the lower 41 inches it is a mottled, reddish brown and weak red, firm and very firm layer of channery loam, channery sandy clay loam, and channery sandy loam called a fragipan.

Included with this soil in mapping are small areas of the sloping Morris soils, the deep, moderately well drained Wellsboro soils, and the deep, poorly drained and very poorly drained Norwich soils. Also included are soils that are similar to this Morris soil but that have more clay in the subsoil and are not as red in the fragipan. Also included are a few small areas of soils that are similar to this Morris soil but that have a surface layer of sandy loam. The included soils make up 5 to 10 percent of the map unit.

Permeability of this Morris soil is slow in the fragipan. The available water capacity is moderate. Runoff is medium. The fragipan restricts the root zone at a depth of 10 to 22 inches. The seasonal high water table is perched above the fragipan at a depth of about 6 to 18 inches. In unlimed areas the soil ranges from very strongly acid to moderately acid in the surface layer and the upper part of the subsoil and from strongly acid to slightly acid in the lower part of the subsoil.

Most areas of this soil are used as woodland. Some areas are used for pasture or are in native vegetation.

This soil is not suited to cultivated crops or pasture. The stones in the surface layer interfere with the seeding and harvesting of most crops and with pasture management.

The potential productivity of this soil is moderately high for trees. Most areas of the soil are wooded. Management problems are caused by the seasonal high water table. Thinning and removing undesirable species are suitable management practices. The use of equipment is restricted by the seasonal high water table.

The seasonal high water table and the slow permeability are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass VIs and in woodland ordination group 3w.

NoB—Nolo very stony loam, 0 to 8 percent slopes. This is a nearly level and gently sloping, deep, poorly drained soil in depressions on mountaintops. Slopes generally are concave and are 100 to 1,000 feet long. Individual areas are irregular in shape and range mainly from 5 to 60 acres. Large stones cover about 3 to 15 percent of the surface.

Typically, the surface layer is very dark grayish brown loam about 2 inches thick. The subsurface layer is mottled, gray sandy loam about 3 inches thick. The subsoil is 37 inches thick. In the upper 11 inches it is mottled, gray channery clay loam. In the lower 26 inches it is a mottled, brownish yellow, firm layer of channery clay loam called a fragipan. The substratum is mottled, brown, firm very channery loam to a depth of 51 inches. Gray sandstone bedrock is at a depth of 51 inches.

Included with this soil in mapping are small areas of the deep, moderately well drained Clymer soils. Also included are some areas of soils that are similar to this Nolo soil but that are very poorly drained. The included soils make up 5 to 10 percent of the map unit.

Permeability of this Nolo soil is slow in the fragipan. The available water capacity is moderate. In some areas runoff is slow to ponded. The fragipan restricts the root zone at a depth of 18 to 30 inches. The seasonal high water table is at a depth of about 0 to 6 inches. In unlimed areas the soil is very strongly acid or extremely acid throughout.

Most areas of this soil are used as woodland.

This soil is not suited to cultivated crops or pasture. The stones in the surface layer and the seasonal high water table interfere with the seeding and harvesting of most crops and with pasture management.

The potential productivity of this soil is moderately high for trees. Nearly all areas of the soil are wooded. Management problems are caused by the seasonal high water table. Thinning and removing undesirable species

are suitable management practices. The use of equipment is restricted by the seasonal high water table.

The seasonal high water table and the slow permeability are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

This soil is in capability subclass VIIs and in woodland ordination group 3w.

NrA—Norwich silt loam, 0 to 3 percent slopes. This is a nearly level, deep, poorly drained and very poorly drained soil along drainageways and in depressions. Slopes generally are smooth or slightly concave and are 100 to 500 feet long. Individual areas are irregular in shape and range mainly from 3 to 80 acres.

Typically, the surface layer is dark brown silt loam about 3 inches thick. The subsurface layer is pinkish gray channery silt loam about 3 inches thick. The subsoil is 42 inches thick. In the upper 7 inches it is mottled, dark reddish gray channery loam. In the lower 35 inches it is a mottled, reddish gray and weak red, firm layer of channery loam and channery silt loam called a fragipan. The substratum is mottled, reddish gray, firm channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the gently sloping Norwich soils and the deep, somewhat poorly drained Morris soils. Also included are some areas of soils that are similar to this Norwich soil but that are very poorly drained and are not reddish in the fragipan. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Norwich soil is slow or very slow in the fragipan. The available water capacity is low. Runoff is slow, or in places water is ponded. The fragipan is at a depth of 12 to 24 inches. The depth of the root zone is restricted by the seasonal high water table, which is at or near the surface for most of the year. In unlimed areas the soil is strongly acid to slightly acid in the surface layer and subsoil. The hazard of erosion is slight.

Most areas of this soil are used as woodland. Some areas are used as pasture or are in native vegetation.

This soil is poorly suited to cultivated crops. Keeping natural drainageways open helps to remove excess surface runoff. Wetness and the slow permeability interfere with the seeding and harvesting of crops.

This soil is suited to pasture. Overgrazing and grazing when the soil is wet are the major concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is low for trees. Most areas of the soil are wooded. Some management problems are the equipment limitation, the seedling mortality rate, and the windthrow hazard. Thinning and removing undesirable species are suitable management practices. The use of equipment is restricted by the seasonal high water table. Machine planting is not practical.

The slow permeability and the seasonal high water table are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

This soil is in capability subclass IVw and in woodland ordination group 5w.

NxB—Norwich very stony silt loam, 0 to 8 percent slopes. This is a nearly level and gently sloping, deep, poorly drained and very poorly drained soil along drainageways and in depressions. Slopes generally are smooth or slightly concave and are 100 to 300 feet long. Individual areas are irregular in shape and range from 5 to 20 acres. Large stones cover about 3 to 15 percent of the surface.

Typically, the surface layer is dark brown channery silt loam about 3 inches thick. The subsurface layer is pinkish gray channery silt loam about 3 inches thick. The subsoil is 42 inches thick. In the upper 7 inches it is mottled, dark reddish gray channery loam. In the lower 35 inches it is a mottled, reddish gray and weak red, firm layer of channery loam and channery silt loam called a fragipan. The substratum is mottled, reddish gray, firm channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the deep, somewhat poorly drained Morris soils and the deep, moderately well drained Wellsboro soils. Also included are some areas of very poorly drained soils that are similar to this Norwich soil but that are very poorly drained and are not reddish in the fragipan. The included soils make up 10 to 15 percent of the map unit.

Permeability of this Norwich soil is slow or very slow in the fragipan. The available water capacity is low. Runoff is slow to ponded for brief periods. The fragipan is at a depth of 12 to 24 inches. The depth of the root zone is restricted by the seasonal high water table, which is at or near the surface for most of the year. In unlimed areas the soil is strongly acid to slightly acid in the surface layer, subsurface layer, and subsoil.

Most areas of this soil are used as woodland.

This soil is not suited to cultivated crops or pasture. The seasonal high water table and stoniness are limitations.

The potential productivity of this soil is low for trees. Nearly all areas of the soil are wooded. Some management problems are the equipment limitation, the seedling mortality rate, and the windthrow hazard. Thinning and removing undesirable species are suitable management practices. The use of equipment is restricted by the seasonal high water table. Machine planting is not practical.

The slow permeability and the seasonal high water table are limitations to use of this soil for onsite waste

disposal, as sites for dwellings with basements, and for most other urban uses.

This soil is in capability subclass VIIs and in woodland ordination group 5w.

OgB—Oquaga channery loam, 3 to 8 percent slopes. This is a gently sloping, moderately deep, well drained to excessively drained soil on broad mountaintops and ridgetops. Slopes are generally smooth or slightly convex and are 100 to 400 feet long. Individual areas are irregular in shape and range mainly from 2 to 75 acres.

Typically, the surface layer is dark brown channery loam about 5 inches thick. The subsoil is reddish brown channery silt loam to a depth of 15 inches. The substratum is reddish brown very channery loam to a depth of 27 inches. Weak red sandstone and shale bedrock is at a depth of 27 inches.

Included with this soil in mapping are small areas of the nearly level and sloping Oquaga soils and areas of soils that are similar to this Oquaga soil but that contain more stones. Also included are small areas of the deep, well drained Lackawanna soils, the deep, moderately well drained Wellsboro soils, and the moderately deep, well drained, brownish Lordstown soils. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Oquaga soil is moderate, and the available water capacity is low. Runoff is medium. In unlimed areas the soil is very strongly acid or strongly acid throughout. The hazard of erosion is moderate.

Most areas of this soil are used as cropland. Some areas are used as pasture or woodland or are in urban use.

This soil is suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places the channers in the surface layer interfere with the seeding and harvesting of some crops.

This soil is well suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 30 percent of the areas of this soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

Depth to bedrock is a limitation to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

This soil is in capability subclass IIe and in woodland ordination group 3o.

OgC—Oquaga channery loam, 8 to 15 percent slopes. This is a sloping, moderately deep, well drained to excessively drained soil on mountaintops and ridgetops. Slopes generally are smooth or slightly convex and are 100 to 400 feet long. Individual areas are irregular in shape and range mainly from 2 to 70 acres.

Typically, the surface layer is dark brown channery loam about 5 inches thick. The subsoil is reddish brown channery silt loam to a depth of 15 inches. The substratum is reddish brown very channery loam to a depth of 27 inches. Weak red sandstone and shale bedrock is at a depth of 27 inches.

Included with this soil in mapping are small areas of the gently sloping and moderately steep channery Oquaga soils and the very stony Oquaga soils. Also included are small areas of the deep, well drained Lackawanna soils, the deep, moderately well drained Wellsboro soils, and the moderately deep, well drained, brownish Lordstown soils. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Oquaga soil is moderate, and the available water capacity is low. Runoff is medium to rapid. In unlimed areas the soil is very strongly acid or strongly acid throughout. The hazard of erosion is severe.

Most areas of this soil are used as cropland. Some areas are used as pasture or woodland or are in native vegetation.

This soil is suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places the channers in the surface layer interfere with the seeding and harvesting of some crops.

This soil is suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 30 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

Depth to bedrock is a limitation to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

This soil is in capability subclass IIIe and in woodland ordination group 3o.

OgD—Oquaga channery loam, 15 to 25 percent slopes. This is a moderately steep, moderately deep, well drained to excessively drained soil on side slopes of ridges. Slopes generally are smooth or convex and are

100 to 300 feet long. Individual areas are irregular in shape and range mainly from 5 to 50 acres.

Typically, the surface layer is dark brown channery loam about 5 inches thick. The subsoil is reddish brown channery silt loam to a depth of 15 inches. The substratum is reddish brown very channery loam to a depth of 27 inches. Weak red sandstone and shale bedrock is at a depth of 27 inches.

Included with this soil in mapping are small areas of the sloping and steep Oquaga soils. Also included are some areas of soils that are deeper to bedrock, contain more stones, or are wetter than this Oquaga soil. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Oquaga soil is moderate, and the available water capacity is low. Runoff is rapid. In unlimed areas the soil is very strongly acid or strongly acid throughout. The hazard of erosion is very severe.

Most areas of this soil are used as pasture or are in native vegetation. Some areas are used as woodland.

This soil is suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places the channers in the surface layer interfere with the seeding and harvesting of some crops.

This soil is suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 20 percent of the areas of the soil are wooded. Management problems are caused by the moderately steep slopes. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. In some places the use of equipment is restricted by slope.

Slope and depth to bedrock are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

This soil is in capability subclass IVe and in woodland ordination group 3r.

OxB—Oquaga and Lordstown very stony loams, 0 to 8 percent slopes. This map unit consists of level and gently sloping, moderately deep soils on ridgetops, mountaintops, and benches. Oquaga soils make up about 55 percent of the total acreage of this map unit, Lordstown soils make up about 25 percent, and the included soils make up about 20 percent. Some areas are mostly Oquaga soils, some are mostly Lordstown soils, and some consist of both. Of the areas that consist of both soils, Oquaga soils generally make up the greater percentage. The Oquaga and Lordstown soils were mapped together because they are similar in use and management. Slopes generally are smooth to slightly convex and are 200 to 1,000 feet long. Individual areas are irregular in shape and range mainly from 5 to 300 acres. Large stones cover about 3 to 15 percent of the surface.

Typically, the surface layer of the Oquaga soils is dark brown channery loam about 5 inches thick. The subsoil is 10 inches thick. It is reddish brown channery silt loam. The substratum is reddish brown very channery loam to a depth of 27 inches. Weak red sandstone and shale bedrock is at a depth of 27 inches.

Typically, the surface layer of the Lordstown soils is dark grayish brown channery loam about 4 inches thick. The subsoil is 18 inches thick. In the upper 6 inches it is dark yellowish brown channery silt loam. In the lower 12 inches it is yellowish brown channery silt loam. The substratum is brown channery silt loam to a depth of 34 inches. Gray sandstone and siltstone bedrock is at a depth of 34 inches.

Included with these soils in mapping are small areas of the sloping Oquaga soils and the extremely stony and channery Oquaga and Lordstown soils. Also included are small areas of the deep, moderately well drained Wellsboro soils and the moderately deep, well drained Dekalb soils.

Permeability of these Oquaga and Lordstown soils is moderate, and the available water capacity is low. Runoff is slow to medium. In unlimed areas the soil is very strongly acid or strongly acid throughout.

Most areas of these soils are used as woodland. Some areas are used as native pasture or are in native vegetation.

These soils are not suited to cultivated crops or pasture. The stones in the surface layer interfere with the seeding and harvesting of crops and with pasture management.

The potential productivity of these soils is moderately high for trees. Nearly all areas are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices.

Depth to bedrock is a limitation to use of these soils for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

This soil is in capability subclass VIs and in woodland ordination group 3o.

OxD—Oquaga and Lordstown very stony loams, 8 to 25 percent slopes. This map unit consists of sloping and moderately steep soils on ridgetops, mountaintops, and benches. Oquaga soils make up about 65 percent of the total acreage of this map unit, Lordstown soils make up about 20 percent, and the included soils make up 15 percent. Oquaga soils generally make up the greater percentages. The Oquaga and Lordstown soils were mapped together because they are similar in use and management. Slopes generally are smooth to slightly

convex and are 100 to 800 feet long. Individual areas are irregular in shape and range mainly from 5 to 400 acres. Large stones cover about 3 to 15 percent of the surface.

Typically, the surface layer of the Oquaga soils is dark brown channery loam about 5 inches thick. The subsoil is reddish brown channery silt loam to a depth of 15 inches. The substratum is reddish brown very channery loam to a depth of 27 inches. Weak red sandstone and shale bedrock is at a depth of 27 inches.

Typically, the surface layer of the Lordstown soils is dark grayish brown channery loam about 4 inches thick. The subsoil is 18 inches thick. In the upper 6 inches it is dark yellowish brown channery silt loam. In the lower 12 inches it is yellowish brown channery silt loam. The substratum is brown channery silt loam to a depth of 34 inches. Gray sandstone and siltstone bedrock is at a depth of 34 inches.

Included with these soils in mapping are small areas of the gently sloping Oquaga and Lordstown soils and the extremely stony Oquaga and Lordstown soils. Also included are some small areas of the deep, moderately well drained Wellsboro soils and the moderately deep, well drained Dekalb soils. The included soils make up 15 percent of the map unit.

Permeability of these Oquaga and Lordstown soils is moderate. The available water capacity is low. Runoff is medium to rapid. In unlimed areas the soil is very strongly acid or strongly acid throughout.

Most areas of these soils are used as woodland. Some areas are used as native pasture or are in native vegetation.

These soils are not suited to cultivated crops or pasture. The stones in the surface layer interfere with the seeding and harvesting of crops and with pasture management.

The potential productivity of these soils is moderately high for trees. Nearly all areas of the soils are wooded. Some management problems are caused by the stony surface and the moderately steep slopes. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. In some places the use of equipment is restricted by slope.

Depth to bedrock and slope are limitations to use of these soils for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

These soils are in capability subclass VIs and in woodland ordination group 3r.

OxE—Oquaga and Lordstown very stony loams, 25 to 70 percent slopes. This map unit consists of steep and very steep soils on mountainsides. Oquaga soils make up about 60 percent of the total acreage of this map unit, Lordstown soils make up about 30 percent, and the included soils make up 10 percent. Oquaga soils generally make up the greater percentage. The Oquaga and Lordstown soils were mapped together because they are similar in use and management. Slopes generally are smooth to convex and are 100 to 1,500 feet long. Individual areas are irregular in shape and range mainly from 10 to 500 acres. Large stones cover about 3 to 15 percent of the surface.

Typically, the surface layer of the Oquaga soils is dark brown channery loam about 5 inches thick. The subsoil is reddish brown channery silt loam to a depth of 15 inches. The substratum is reddish brown very channery loam to a depth of 27 inches. Weak red sandstone and shale bedrock is at a depth of 27 inches.

Typically, the surface layer of the Lordstown soils is dark grayish brown channery loam about 4 inches thick. The subsoil is 18 inches thick. In the upper 6 inches it is dark yellowish brown channery silt loam. In the lower 12 inches it is yellowish brown channery silt loam. The substratum is brown channery silt loam to a depth of 34 inches. Gray sandstone and siltstone bedrock is at a depth of 34 inches.

Included with this soil in mapping are small areas of the moderately steep Oquaga and Lordstown soils. Also included are areas of the moderately deep, well drained Dekalb soils, the deep, well drained Leck Kill soils, the deep, well drained Lackawanna soils, and the shallow, well drained Klinesville soils. The included soils make up 10 percent of the map unit.

Permeability of these Oquaga and Lordstown soils is moderate, and the available water capacity is low. Runoff is rapid. In unlimed areas the soil is moderately acid to very strongly acid throughout.

Most areas of this soil are used as woodland.

These soils are not suited to cultivated crops or pasture because of slope and stoniness.

The potential productivity of these soils is moderately high for trees. Nearly all areas of these soils are wooded. Management problems are caused by slope. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. The use of equipment is restricted by slope.

Slope and depth to bedrock are limitations to use of these soils for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

These soils are in capability subclass VIIs and in woodland ordination group 3r.

Pt—Pits. This map unit consists of areas from which gravel, shale, limestone, and sandstone have been excavated and the spoil material surrounding these areas.

The spoil material was excavated and stored in piles adjacent to or within the excavations. It ranges from 2 to 15 feet in thickness. The texture ranges from sand to clay. The content of rock fragments ranges from 10 to

50 percent. Reaction ranges from extremely acid to alkaline throughout.

Included with this unit in mapping are small areas of water and Laidig, Berks, Weikert, Hartleton, Hagerstown, Washington, Clarksburg, Chenango, Tunkhannock, and Allenwood soils. The water areas and the included soils make up about 25 percent of the unit.

Permeability, runoff, and drainage of Pits differ from area to area.

The areas of Pits are barren or are sparsely covered with vegetation. These areas are poorly suited to farming and most nonfarm uses because of slope, stones, and rock fragments.

This unit is not assigned to a capability subclass or woodland ordination group.

Re—Rexford gravelly loam. This is a nearly level, deep, somewhat poorly drained and poorly drained soil on glacial outwash terraces. Slopes generally are smooth and are 100 to 1,000 feet long. Individual areas are irregular in shape and range mainly from 2 to 300 acres. Slopes range from 0 to 3 percent.

Typically, the surface layer is dark grayish brown gravelly loam about 7 inches thick. The subsoil is 42 inches thick. In the upper 11 inches it is dark grayish brown and brown, friable and firm gravelly loam and is mottled between depths of 11 and 18 inches. In the lower 31 inches it is a mottled, pinkish gray and reddish brown, very firm layer of gravelly silt loam and gravelly sandy loam called a fragipan. The substratum is dark brown gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of a moderately well drained soil that has a fragipan. Also included are some small areas of very poorly drained soils. The included soils make up 20 to 25 percent of the map unit.

Permeability of this Rexford soil is slow in the fragipan. The available water capacity is moderate. Runoff is slow. The fragipan is at a depth of about 15 to 24 inches. The depth of the root zone is restricted by the perched high water table, which is between the surface and a depth of 18 inches from October through May. In unlimed areas the soil ranges from strongly acid to slightly acid in the surface layer and subsoil and from strongly acid to slightly acid in the substratum. The hazard of erosion is slight.

Most areas of this soil are used for cultivated crops or pasture. Some areas are used for permanent hay or as woodland or are in native vegetation.

This soil is suited to cultivated crops. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Keeping natural drainageways open helps to remove the excess surface runoff. Artificial drainage allows timely tillage and improves crop production. In some places the gravel in the surface layer interferes with the seeding and harvesting of some crops.

This soil is suited to pasture. Overgrazing and grazing when the soil is wet are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 10 percent of the areas of the soil are wooded. Some management problems, which are caused by the high water table, are the equipment limitation, the seedling mortality rate, and the windthrow hazard. Thinning and removing undesirable species are suitable management practices. Machine planting is practical on larger areas but in some places is restricted by the high water table.

The seasonal high water table and the slow permeability are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. If the soil is used for onsite waste disposal, the ground water can be polluted because of the seasonal high water table and the slow permeability in the fragipan. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIIw and in woodland ordination group 3w.

Ru—Rubble land-Dystrochrepts complex, 15 to 80 percent slopes. This complex consists of Rubble land and moderately well drained to excessively drained Dystrochrepts on moderately steep to very steep slopes on mountain ridges and plateaus. It is about 50 percent Rubble land, about 30 percent Dystrochrepts, and about 20 percent other soils. Rubble land and Dystrochrepts are in such an intricate pattern that it was not practical to separate them in mapping. Numerous stones and boulders are on the surface. Slopes are both convex and concave and range from 100 to 1,200 feet in length. Areas are irregular in shape and range mainly from 5 to 300 acres.

Rubble land consists of areas of stones and boulders 10 to 36 inches in diameter on more than 90 percent of the surface. Channers, stones, and boulders are 3 to 12 feet thick over bedrock or soil material. The soil material below the rock mantle is sandy loam or loamy sand.

Dystrochrepts differ from area to area; thus, a typical pedon is not given. Generally, they consist of areas that have stones and boulders 10 to 36 inches in diameter on 50 to 90 percent of the surface. The stones and boulders extend to a depth of 1 to 3 feet. The surface layer is loam or sandy loam. The subsoil is loam or sandy loam. The substratum is loam, sandy loam, or loamy sand.

Included with this complex in mapping are areas of the moderately deep, well drained Dekalb, Oquaga, and Lordstown soils, the deep, well drained Laidig soils, and some wetter soils.

Permeability and the available water capacity of the soil material under Rubble differ from area to area. Runoff also differs from area to area. The soil material is extremely acid or very strongly acid throughout.

Permeability of Dystrochrepts is moderately rapid, and the available water capacity is low. Runoff is medium to rapid. The root zone is more than 40 inches deep. The soil is extremely acid to strongly acid throughout.

Areas of Dystrochrepts have a sparse canopy of poor quality trees, generally chestnut oak. Rubble land is mostly barren.

Areas of this complex are not suited to use as open space, as a source of building stone, and to watershed protection. Onsite investigation is needed to determine the suitability and limitations for these and other uses.

This soil is not assigned to a capability subclass or a woodland ordination group.

ShA—Shelmadine silt loam, 0 to 3 percent slopes. This is a nearly level, deep, poorly drained soil in depressions, along drainageways, and near stream heads. Slopes generally are smooth to slightly concave and are 100 to 800 feet long. Individual areas are irregular in shape and range mainly from 3 to 100 acres.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is 33 inches thick. In the upper 11 inches it is mottled, grayish brown, firm silty clay loam. In the lower 22 inches it is a mottled, brown and dark yellowish brown, firm layer of silty clay loam and shaly silt loam called a fragipan. The substratum is mottled, dark brown shaly silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the gently sloping Shelmadine soils and small areas of the deep, somewhat poorly drained Alvira soils. Also included are some areas of soils that formed in stream alluvium and some areas of soils that are similar to this Shelmadine soil but that have fewer coarse fragments. The included soils make up 10 to 15 percent of the map unit.

Permeability of this Shelmadine soil is slow in the fragipan. The available water capacity is moderate. Runoff is slow to occasionally ponded. The fragipan is at a depth of about 18 to 30 inches. Root growth is restricted by the perched high water table, which is between the surface and a depth of 6 inches. In unlimed areas the soil is very strongly acid or extremely acid throughout. The hazard of erosion is slight.

Most areas of this soil are used as pasture or hayland. Some areas are used as woodland or cropland.

This soil is suited to cultivated crops that are moisture tolerant. Keeping natural drainageways open helps to remove excess surface runoff. Artificial drainage allows timely tillage and improves crop production.

This soil is suited to pasture. Overgrazing and grazing when the soil is wet are the major concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 40 percent of the areas of this soil are wooded. The main limitations, which are caused by the high water table, are the equipment limitations, seedling mortality rate, and the windthrow hazard. Thinning and removing undesirable species are suitable management practices.

The high water table and the slow permeability are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IVw and in woodland ordination group 3w.

ShB—Shelmadine silt loam, 3 to 8 percent slopes. This is a gently sloping, deep, poorly drained soil in depressions, along drainageways, and near stream heads. Slopes generally are smooth and are 100 to 500 feet long. Individual areas are irregular in shape and range mainly from 2 to 50 acres.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is 33 inches thick. In the upper 11 inches it is mottled, grayish brown, firm silty clay loam. In the lower 22 inches it is a mottled, brown and dark yellowish brown, firm layer of silty clay loam and shaly silt loam called a fragipan. The substratum is mottled, dark brown shaly silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the nearly level and sloping Shelmadine soils and small areas of the deep, somewhat poorly drained Alvira soils. Also included are some areas of soils that are similar to this Shelmadine soil but that have fewer coarse fragments. The included soils make up 10 to 15 percent of the map unit.

Permeability of this Shelmadine soil is slow in the fragipan. The available water capacity is moderate. Runoff is slow to medium. The fragipan is at a depth of about 18 to 30 inches. Root growth is restricted by the perched high water table, which is at a depth of about 0 to 6 inches. In unlimed areas the soil is very strongly acid or extremely acid throughout. The hazard of erosion is moderate.

Most areas of this soil are used as pasture or hayland. Some areas are used as woodland or cropland.

This soil is suited to cultivated crops that are moisture tolerant. Keeping natural drainageways open helps to remove excess surface runoff. Artificial drainage allows timely tillage and improves crop production.

This soil is suited to pasture. Overgrazing and grazing when the soil is wet are the major concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 30 percent of the areas of this soil are wooded. The main limitations, which are caused by the high water table, are the equipment limitation, the seedling mortality rate, and the windthrow hazard. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices.

The high water table and the slow permeability are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IVw and in woodland ordination group 3w.

SvB—Shelmadine very stony silt loam, 0 to 8 percent slopes. This is a nearly level and gently sloping, deep, poorly drained soil along small drainageways. Slopes generally are smooth and are 100 to 400 feet long. Individual areas are long and narrow and range mainly from 3 to 50 acres. Large stones cover about 3 to 10 percent of the surface.

Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is 33 inches thick. In the upper 11 inches it is mottled, grayish brown, firm silty clay loam. In the lower 22 inches it is a mottled, brown and dark yellowish brown, firm layer of silty clay loam and shaly silt loam called a fragipan. The substratum is mottled, dark brown shaly silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the deep, somewhat poorly drained Alvira soils. Also included are small areas of soils that are wetter or that contain fewer coarse fragments. The included soils make up 10 to 15 percent of the map unit.

Permeability of this Shelmadine soil is slow in the fragipan. The available water capacity is moderate. Runoff is occasionally ponded to medium. The fragipan is at a depth of about 18 to 30 inches. Root growth is restricted by the perched high water table, which is between the surface and a depth of 6 inches. In unlimed areas the soil is very strongly acid or extremely acid throughout.

Most areas of this soil are used as woodland. Some areas are used as pasture or are in native vegetation.

This soil is not suited to cultivated crops or pasture. The stones in the surface layer interfere with the seeding and harvesting of cultivated crops and with pasture management.

The potential productivity of this soil is moderately high for trees. Most areas of this soil are wooded. The main limitations, which are caused by the high water table, are the equipment limitation, the seedling mortality rate, and the windthrow hazard. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices.

The high water table and the slow permeability are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass VIIs and in woodland ordination group 3w.

SxD—Swartswood very stony sandy loam, 8 to 25 percent slopes. This is a sloping and moderately steep, deep, well drained soil on mountaintops and side slopes. Slopes generally are smooth or slightly convex and are 200 to 1,200 feet long. Individual areas are irregular in shape and range mainly from 2 to 100 acres. Large stones cover about 3 to 10 percent of the surface.

Typically, the surface layer is covered by 2 inches of fresh leaf litter and 1 inch of black, partly decomposed leaf litter. The surface layer is very dark grayish brown gravelly sandy loam about 4 inches thick. The subsurface layer is light brownish gray gravelly loam about 5 inches thick. The subsoil is 51 inches thick. In the upper 21 inches it is strong brown gravelly loam, dark brown channery sandy loam, and firm channery loam. In the lower 30 inches it is a mottled, dark brown and reddish brown, very firm and brittle layer of channery sandy loam called a fragipan.

Included with this soil in mapping are small areas of the gently sloping Swartswood soils. Also included are some areas of the moderately deep, well drained Lordstown soils and the deep, well drained Lackawanna soils. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Swartswood soil is moderately slow to slow in the fragipan. The available water capacity is moderate. Runoff is moderate to rapid. The fragipan restricts the root zone at a depth of about 24 to 36 inches. The perched high water table is at a depth of about 24 to 48 inches. In unlimed areas the soil is strongly acid or very strongly acid throughout.

Most areas of this soil are used as woodland. Some areas are used as native pasture.

This soil is not suited to cultivated crops or pasture. The stones in the surface layer interfere with the seeding and harvesting of crops and with pasture management.

The potential productivity of this soil is moderately high for trees. Nearly all areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. In some places the use of equipment is restricted by large stones. In some places machine planting is restricted because of slope.

Slope and the slow permeability are limitations to use of this soil for onsite waste disposal and to most other urban uses. Slope is a limitation for dwellings with basements. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains.

This soil is in capability subclass VIs and in woodland ordination group 3r.

TuA—Tunkhannock gravelly loam, 0 to 3 percent slopes. This is a nearly level, deep, well drained and somewhat excessively drained soil on glacial outwash terraces. Slopes generally are smooth to slightly concave and are 100 to 1,000 feet long. Individual areas are irregular in shape and range mainly from 2 to 100 acres.

Typically, the surface layer is brown gravelly loam about 8 inches thick. The subsoil is 22 inches thick. In the upper 18 inches it is brown and reddish brown gravelly loam. In the lower 4 inches it is reddish brown very gravelly sandy loam. The substratum is reddish brown, loose very gravelly loamy sand and lenses of loamy fine sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the gently sloping, gravelly Tunkhannock soils and the stony Tunkhannock soils. Also included are small areas of a moderately well drained soil and the deep, somewhat poorly drained and poorly drained Rexford soils. The included soils make up 5 to 10 percent of the map unit.

Permeability of this Tunkhannock soil is moderately rapid in the subsoil. The available water capacity is moderate. Runoff is slow. In unlimed areas the soil is extremely acid to moderately acid throughout. The hazard of erosion is slight.

Most areas of this soil are used as cropland. Some areas are used as woodland or are in urban use.

This soil is well suited to cultivated crops. Growing cover crops, utilizing crop residue, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places the gravel in the surface layer interferes with the seeding and harvesting of some crops.

This soil is suited to pasture. Overgrazing is the main concern in pasture management. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 10 percent of the areas of the soil are wooded. Thinning and removing undesirable species are suitable management practices. Machine planting is practical on larger areas.

The gravelly surface and the moderately rapid permeability are limitations to use of this soil for some urban uses. If the soil is used for onsite waste disposal, the ground water can be polluted because of the moderately rapid permeability in the subsoil.

This soil is in capability subclass IIs and in woodland ordination group 3o.

TuB—Tunkhannock gravelly loam, 3 to 8 percent slopes. This is a gently sloping, deep, well drained and somewhat excessively drained soil on glacial outwash terraces. Slopes generally are smooth to slightly concave and are 200 to 1,500 feet long. Individual areas are irregular in shape and range mainly from 2 to 60 acres.

Typically, the surface layer is brown gravelly loam about 8 inches thick. The subsoil is 22 inches thick. In the upper 18 inches it is brown and reddish brown gravelly loam. In the lower 4 inches it is reddish brown very gravelly sandy loam. The substratum is reddish brown, loose very gravelly loamy sand and lenses of loamy fine sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the nearly level and sloping Tunkhannock soils. Also included are small areas of soils that are similar to this Tunkhannock soil but that are moderately well drained. The included soils make up 5 to 10 percent of the map unit.

Permeability of this Tunkhannock soil is moderately rapid in the subsoil. The available water capacity is moderate. Runoff is slow. In unlimed areas the soil is extremely acid to moderately acid throughout. The hazard of erosion is moderate.

Most areas of this soil are used as cropland. Some areas are used as pasture or woodland or are in urban use.

This soil is well suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Utilizing crop residue and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places the gravel surface layer interferes with the seeding and harvesting of some crops.

This soil is suited to pasture. Overgrazing is the main concern in pasture management. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 15 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

The gravel in the surface layer and the moderately rapid permeability are limitations to use of this soil for some urban uses. If the soil is used for onsite waste disposal, the ground water can be polluted because of the moderately rapid permeability in the subsoil.

This soil is in capability subclass IIs and in woodland ordination group 3o.

TuC—Tunkhannock gravelly loam, 8 to 15 percent slopes. This is a sloping, deep, well drained and somewhat excessively drained soil on glacial outwash terraces. Slopes generally are smooth to slightly concave and are 100 to 500 feet long. Individual areas are irregular in shape and range mainly from 2 to 80 acres.

Typically, the surface layer is brown gravelly loam about 8 inches thick. The subsoil is 22 inches thick. In the upper 18 inches it is brown and reddish brown gravelly loam. In the lower 4 inches it is reddish brown very gravelly sandy loam. The substratum is reddish brown, loose very gravelly loamy sand and lenses of loamy fine sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the gently sloping and moderately steep Tunkhannock soils. Also included are small areas of the deep, well drained Oquaga soils. The included soils make up 5 to 10 percent of the map unit.

Permeability of this Tunkhannock soil is moderately rapid in the subsoil. The available water capacity is moderate. Runoff is slow to rapid. In unlimed areas the soil is extremely acid to moderately acid throughout. The hazard of erosion is severe.

Most areas of this soil are used as pasture or hayland. Some areas are used for cultivated crops or as woodland or are in urban use.

This soil is suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Leaving crop residue on the surface and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places the gravel in the surface layer interferes with the seeding and harvesting of some crops.

This soil is suited to pasture. Overgrazing is the main concern in pasture management. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 25 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

Slope, gravel in the surface layer, and the moderately rapid permeability are limitations to use of this soil for some urban uses. Slope is a limitation for onsite waste disposal and to use as sites for dwellings with basements. If the soil is used for onsite waste disposal, slope can cause the effluent to seep to the surface in places downslope.

This soil is in capability subclass IIIe and in woodland ordination group 3o.

TuD—Tunkhannock gravelly loam, 15 to 25 percent slopes. This is a moderately steep, deep, well drained and somewhat excessively drained soil on glacial outwash terraces. Slopes generally are smooth to slightly convex and are 100 to 1,200 feet long. Individual areas are irregular in shape and range mainly from 2 to 25 acres.

Typically, the surface layer is brown gravelly loam about 8 inches thick. The subsoil is 22 inches thick. In the upper 18 inches it is brown and reddish brown gravelly loam. In the lower 4 inches it is reddish brown very gravelly sandy loam. The substratum is reddish brown very gravelly loamy sand and lenses of loamy fine sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the stony Tunkhannock soils and the sloping and steep Tunkhannock soils. Also included are small areas of the moderately deep, well drained Oquaga soils. The included soils make up 10 to 15 percent of the map unit.

Permeability of this Tunkhannock soil is moderately rapid in the subsoil. The available water capacity is moderate. Runoff is rapid. In unlimed areas the soil is extremely acid to moderately acid throughout. The hazard of erosion is very severe.

Most areas of this soil are used as woodland or pasture. Some areas are used as hayland or are in urban use.

This soil is suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, utilizing crop residue, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. In some places gravel in the surface layer interferes with the seeding and harvesting of some crops.

This soil is suited to pasture. Overgrazing is the main concern in pasture management. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 75 percent of the areas of the soil are

wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. The use of equipment is restricted by slope. Machine planting is practical on larger areas but in some places is restricted by slope.

Slope is a limitation to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. If the soil is used for onsite waste disposal, slope can cause the effluent to seep to the surface in places downslope.

This soil is in capability subclass IVe and in woodland ordination group 3r.

Ud—Udifluvents, loamy. This map unit consists of nearly level, deep, moderately well drained to excessively drained soils on flood plains. Areas are rectangular to irregular in shape and range from 2 to 100 acres. Slopes range from 0 to 3 percent.

Udifluvents, loamy, differ from area to area. Generally, the surface layer consists of brownish deposits of silt loam, loam, or fine sandy loam 2 to 10 inches thick. The substratum to a depth of 60 inches is reddish brownish loam, sandy loam, loamy sand, or sand and differing amounts of gravel and cobblestones.

Included with these soils in mapping are small areas of Holly, Barbour, Basher, Linden, and Wyoming soils. Also included in areas adjacent to uplands are Berks, Weikert, Leck Kill, Oquaga, and Dekalb soils. Also included are areas of very stony soils and areas of soils that are similar to these Udifluvents but that are poorly drained. The included soils make up 10 to 25 percent of the map unit.

Permeability and the available water capacity of Udifluvents, loamy, differ from area to area. The frequency of flooding ranges from rare to frequent. In unlimed areas the soils are very strongly acid to neutral.

These soils are poorly suited to most uses other than as woodland. These soils are fairly well suited to trees. Nearly all areas of the soils are wooded. Thinning and removing undesirable species are suitable management practices. The use of equipment is restricted by flooding, the high water table, and the many channels cut by previous flooding. Machine planting is not practical on most areas.

This soil is not assigned to a capability subclass or a woodland ordination group.

Uo—Udorthents, sandstone. This map unit consists of soil material mixed with various amounts of shale and sandstone rock fragments placed over upland soils and bedrock. This material was removed in surface mining for coal. Areas range from about 2 to 250 acres. Slopes are complex and irregular and range from undulating to very steep. Slopes are dominantly hilly on the fill material and steep and very steep on the excavated areas. Some areas have been backfilled and graded. Slopes range from 0 to 100 percent.

Udorthents, sandstone, differ from area to area. Generally, the soil is various shades of brown, red, or yellow and is loamy material that has various amounts of shale and sandstone rock fragments.

Included with these soils in mapping are areas of Dekalb, Clymer, Cookport, Lordstown, and Wurtsboro soils. The included soils make up 10 to 20 percent of the map unit.

Permeability and the available water capacity of Udorthents, sandstone, differ from area to area. Some areas have been highly compacted, and in places water is ponded. Runoff and the erosion hazard differ from area to area. In unlimed areas the soils are extremely acid to strongly acid throughout.

Most areas of these soils are in native vegetation, but some areas have been planted to trees and grasses.

These soils are poorly suited for most uses. Onsite investigation is needed to determine the suitability and the limitations for each proposed use.

These soils are not assigned to a capability subclass or woodland ordination group.

Ur—Urban land. This map unit consists of nearly level to moderately steep areas along the Susquehanna River and its major tributaries and on the hills adjacent to the flood plain. More than 85 percent of the areas are covered by buildings, streets, and other structures. Slopes generally have been smoothed, and range from 0 to 25 percent. Areas of the map unit range from about 5 to 400 acres.

Urban land consists of parking lots, sidewalks, buildings, roads, and other structures.

Mapped with this unit are small areas of the deep, well drained Linden soils, the deep, moderately well drained and somewhat poorly drained Basher soils, the deep, moderately well drained Watson soils, and the moderately deep, well drained Berks soils. Also included are areas of Udorthents.

The soil properties of Urban land differ greatly because of the many different soils underlying the developed areas and because of the amount of alteration done during construction on these areas. Onsite investigation is needed to determine the soil properties and the limitations in a particular area.

This unit is not assigned to a capability subclass or woodland ordination group.

UsB—Urban land-Udorthents complex, 0 to 8 percent slopes. This complex consists of nearly level and gently sloping areas of Urban land and Udorthents. It is 60 percent Urban land, 20 percent somewhat poorly drained to excessively drained Udorthents, and 20 percent other soils. Udorthents are areas that were disturbed during grading or excavating for roads, housing developments, recreation areas, and similar uses. Urban land and Udorthents are in such an intricate pattern that

it was not practical to separate them in mapping. Areas of this complex range from 2 to 1,000 acres.

Urban land consists of parking lots, sidewalks, roads, buildings, and other urban structures.

The soil properties of Udorthents differ greatly from area to area. Generally, the soil is shades of brown, red, or yellow. It is generally loamy material that has various amounts of shale and sandstone fragments.

Included with this complex in mapping are areas of the deep, well drained Hartleton and Allenwood soils, the deep, somewhat poorly drained Alvira soils, and the deep, moderately well drained Watson soils. Also included are areas of soils that have slopes of 8 to 20 percent.

Permeability and the available water capacity of Udorthents differ from area to area. In most unlimed areas the soils are very strongly acid to moderately acid throughout.

In a few areas this complex is not covered by urban structures; for example, narrow areas between streets and sidewalks, very narrow front yards and backyards of houses, and a few small parks. These areas are generally less than 1,000 square feet. They are poorly suited to use as building sites because of their relatively small size and their proximity to structures. Most construction is on sites where old buildings have been razed. Onsite investigation is needed to determine the potential and limitations of areas of this complex for any proposed use.

This map unit is not assigned to a capability subclass or woodland ordination group.

UsD—Urban land-Udorthents complex, 8 to 25 percent slopes. This complex consists of sloping and moderately steep areas of Urban land and Udorthents. It is 60 percent Urban land, 20 percent somewhat poorly drained to excessively drained Udorthents, and 20 percent other soils. Udorthents consist of areas that have been cut or filled during grading or excavation for roads, housing developments, recreation areas, and similar uses. Urban land and Udorthents are in such an intricate pattern that it was not practical to separate them in mapping. Areas generally are irregular or long and narrow in shape and range mainly from 2 to 140 acres.

Urban land consists of parking lots, sidewalks, roads, buildings, and other urban structures.

Udorthents differ greatly from area to area. Generally, the soils are shades of brown, red, or yellow and are loamy material that has various amounts of shale and sandstone fragments.

Included with this complex in mapping are areas of the deep, well drained Hartleton and Allenwood soils, the moderately deep, well drained Berks soils, the deep, somewhat poorly drained Alvira soils, and the deep, moderately well drained Watson soils. Also included are some areas that have slopes of less than 8 percent.

Permeability and the available water capacity of Udorthents differ from area to area. In most unlimed areas the soils are very strongly acid to moderately acid throughout.

In a few areas this complex is not covered by urban structures; for example, narrow areas between streets and sidewalks, narrow front yards and backyards of houses, and a few small parks. These areas are generally less than 1,000 square feet. They are poorly suited to use as building sites because of slope, their relatively small size, and their proximity to structures. Most construction is on sites where old buildings have been razed. Onsite investigation is needed to determine the potential and limitations of this complex for any proposed use.

This map unit is not assigned to a capability subclass or woodland ordination group.

WaA—Washington silt loam, 0 to 3 percent slopes. This is a nearly level, deep, well drained soil on broad hilltops and valley floors. Slopes generally are smooth and are 100 to 500 feet long. Individual areas are irregular in shape and range mainly from 2 to 150 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is 39 inches thick. In the upper 14 inches it is brown silt loam. In the lower 25 inches it is strong brown, brown, firm clay loam and gravelly clay loam. The substratum is yellowish red, firm clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the gently sloping Washington soils. Also included are small areas of the deep, well drained Hagerstown soils, the deep, well drained Allenwood soils, the deep, moderately well drained Clarksburg soils, and areas of soils that are similar to this Washington soil but that have more coarse fragments throughout. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Washington soil is moderate in the subsoil. The available water capacity is high. Runoff is slow. In unlimed areas the soil is moderately acid to neutral throughout. The hazard of erosion is slight.

Most areas of this soil are used as cropland. Some areas are used as pasture or woodland or are in urban use.

This soil is well suited to cultivated crops. Where slopes are long, conservation tillage, grassed waterways, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, utilizing crop residue, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth.

This soil is well suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is very high for trees. About 5 percent of the areas of the soil are

wooded. Thinning and removing undesirable species are suitable management practices. Machine planting is practical on larger areas.

This soil has few limitations for most urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability class I and in woodland ordination group 1o.

WaB—Washington silt loam, 3 to 8 percent slopes. This is a gently sloping, deep, well drained soil on broad hilltops and valley side slopes. Slopes generally are smooth and are 100 to 700 feet long. Individual areas are irregular in shape and range mainly from 3 to 300 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is 39 inches thick. In the upper 14 inches it is brown silt loam. In the lower 25 inches it is strong brown and brown, firm clay loam and gravelly clay loam. The substratum is yellowish red, firm clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the nearly level and sloping Washington soils. Also included are areas of the deep, well drained Hagerstown soils, the deep, well drained Allenwood soils, the deep, moderately well drained Clarksburg soils, and areas of soils that are similar to this Washington soil but that have more coarse fragments throughout. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Washington soil is moderate in the subsoil. The available water capacity is high. Runoff is medium. In unlimed areas the soil is moderately acid to neutral throughout. The hazard of erosion is moderate.

Most areas of this soil are used as cropland. Some areas are used as pasture or woodland or are in urban use.

This soil is well suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, utilizing crop residue, and including grasses and legumes in the cropping system help maintain the organic matter content and the soil tilth.

This soil is well suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is very high for trees. About 5 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

This soil has few limitations for most urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIe and in woodland ordination group 1o.

WaC—Washington silt loam, 8 to 15 percent slopes. This is a sloping, deep, well drained soil on valley side slopes. Slopes generally are smooth and are 100 to 400 feet long. Individual areas are irregular in shape and range mainly from 2 to 50 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is 39 inches thick. In the upper 14 inches it is brown silt loam. In the lower 25 inches it is strong brown and brown, firm clay loam and gravelly clay loam. The substratum is yellowish red, firm clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the gently sloping and moderately steep Washington soils. Also included are areas of the deep, well drained Hagerstown soils, the deep, well drained Allenwood soils, the deep, moderately well drained Clarksburg soils, and areas of soils that are similar to this Washington soil but that have more coarse fragments throughout. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Washington soil is moderate in the subsoil. The available water capacity is high. Runoff is medium. In unlimed areas the soil is moderately acid to neutral throughout. The hazard of erosion is severe.

Most areas of this soil are used as cropland. Some areas are used as pasture and woodland.

This soil is well suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and control erosion. Growing cover crops, utilizing crop residue, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth.

This soil is well suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is very high for trees. About 5 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

Slope is a limitation to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for some other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIIe and in woodland ordination group 1o.

WbA—Watson silt loam, 0 to 3 percent slopes. This is a nearly level, deep, moderately well drained soil on

hills and ridgetops. Slopes generally are smooth to slightly concave and are 100 to 400 feet long. Individual areas are irregular in shape and range mainly from 2 to 50 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is 43 inches thick. In the upper 17 inches it is brown and yellowish red, friable and firm silt loam and mottled, light reddish brown, firm silty clay loam. In the lower 26 inches it is a mottled, yellowish red, very firm layer of shaly clay loam and shaly loam called a fragipan. The substratum is dark yellowish brown, firm very shaly loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the gently sloping Watson soils, the deep, well drained Allenwood and Hartleton soils, and the deep, somewhat poorly drained Alvira soils. Also included are small areas of soils that are similar to this Watson soil but that have more coarse fragments on the surface. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Watson soil is slow in the fragipan. The available water capacity is moderate. Runoff is slow. The fragipan restricts the root zone at a depth of about 20 to 30 inches. The seasonal high water table is at a depth of about 18 to 36 inches. In unlimed areas the soil is very strongly acid or strongly acid throughout. The hazard of erosion is slight.

Most areas of this soil are used as cropland. Some areas are used as pasture or woodland or are in urban use.

This soil is well suited to cultivated crops. Growing cover crops, utilizing crop residue, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Keeping natural drainageways open helps to remove excess surface runoff. Artificial drainage allows timely tillage and improves crop production.

This soil is well suited to pasture. Overgrazing and grazing when the soil is wet are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 10 percent of the areas of the soil are wooded. Thinning and removing undesirable species are suitable management practices. The use of equipment may be restricted briefly by the seasonal high water table. Machine planting is practical on larger areas.

The seasonal high water table and the slow permeability are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for some other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIw and in woodland ordination group 3o.

WbB—Watson silt loam, 3 to 8 percent slopes. This is a gently sloping, deep, moderately well drained soil on dissected hills and ridges. Slopes generally are smooth and are 100 to 1,000 feet long. Individual areas are irregular in shape and range mainly from 2 to 150 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is 43 inches thick. In the upper 17 inches it is brown and yellowish red, friable and firm silt loam and mottled, light reddish brown, firm silty clay loam. In the lower 26 inches it is a mottled, yellowish red, very firm layer of shaly clay loam and shaly loam called a fragipan. The substratum is dark yellowish brown, firm, very shaly loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the nearly level and sloping Watson soils, the deep, well drained Allenwood and Hartleton soils, and the deep, somewhat poorly drained Alvira soils. Also included are small areas of soils that are similar to this Watson soil but that have more coarse fragments on the surface. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Watson soil is slow in the fragipan. The available water capacity is moderate. Runoff is medium. The fragipan restricts the root zone at a depth of about 20 to 30 inches. The seasonal high water table is at a depth of about 18 to 36 inches. In unlimed areas the soil is very strongly acid or strongly acid throughout. The hazard of erosion is slight to moderate.

Most areas of this soil are used as cropland. Some areas are used as pasture or woodland or are in urban use.

This soil is well suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, utilizing crop residue, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Keeping natural drainageways open helps to remove excess surface runoff. Artificial drainage allows timely tillage and improves crop production.

This soil is well suited to pasture. Overgrazing and grazing when the soil is wet are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 10 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. In some places the use

of equipment is restricted briefly by the seasonal high water table. Machine planting is practical on larger areas.

The seasonal high water table and the slow permeability are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for some other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIe and in woodland ordination group 3o.

WbC—Watson silt loam, 8 to 15 percent slopes. This is a sloping, deep, moderately well drained soil on dissected hills. Slopes generally are smooth and are 100 to 400 feet long. Individual areas are irregular to elongated in shape and range mainly from 2 to 50 acres.

Typically, the surface layer is dark brown silt loam about 9 inches thick. The subsoil is 43 inches thick. In the upper 17 inches it is brown and yellowish red, friable and firm silt loam and mottled, light reddish brown, firm silty clay loam. In the lower 26 inches it is a mottled, yellowish red, very firm layer of shaly clay loam and shaly loam called a fragipan. The substratum is dark yellowish brown, firm very shaly loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the gently sloping and moderately steep Watson soils, the deep, well drained Allenwood and Hartleton soils, the moderately deep, well drained Berks soils, and the deep, somewhat poorly drained Alvira soils. Also included are small areas of soils that are similar to this Watson soil but that have more coarse fragments on the surface. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Watson soil is slow in the fragipan. The available water capacity is moderate. Runoff is medium to rapid. The fragipan restricts the root zone at a depth of 20 to 30 inches. The seasonal high water table is at a depth of about 18 to 36 inches. In unlimed areas the soil is very strongly acid or strongly acid throughout. The hazard of erosion is severe.

Most areas of this soil are used as cropland. Some areas are used as pasture or woodland.

This soil is suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, utilizing crop residue, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Keeping natural drainageways open helps to remove excess surface runoff. Artificial drainage allows timely tillage and improves crop production.

This soil is suited to pasture. Overgrazing and grazing when the soil is wet are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderately high for trees. About 10 to 20 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. In some places the use of equipment is restricted by the seasonal high water table. Machine planting is practical on larger areas.

The seasonal high water table and the slow permeability are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIIe and in woodland ordination group 3o.

WeB—Weikert shaly silt loam, 3 to 8 percent slopes. This is a gently sloping, shallow, well drained soil on narrow ridge tops. Slopes generally are convex and are 100 to 400 feet long. Individual areas are irregular in shape and range mainly from 2 to 30 acres.

Typically, the surface layer is dark grayish brown shaly silt loam about 6 inches thick. The subsoil is 8 inches thick. It is light yellowish brown channery silt loam. The substratum is light yellowish brown very channery silt loam to a depth of 20 inches. Very dark grayish brown fractured shale bedrock is below a depth of 20 inches.

Included with this soil in mapping are small areas of the nearly level and sloping Weikert soils, the moderately deep, well drained Berks soils, the deep, moderately well drained Watson soils, and the deep, somewhat poorly drained Alvira soils. Also included are small areas where shale bedrock is within 10 inches of the surface and areas of soils that have a surface layer of silty clay loam and limestone rock outcrops. The included soils make up 15 to 20 percent of the map unit.

Permeability of this Weikert soil is moderately rapid, and the available water capacity is very low. Runoff is medium. The depth of the root zone is restricted by bedrock. In unlimed areas the soil is very strongly acid to moderately acid throughout. The hazard of erosion is moderate.

Most areas of this soil are used as pasture or cropland. Some areas are used as woodland.

This soil is suited to cultivated crops. The very low available water capacity and the shale fragments in the surface layer interfere with the seeding, growing, and harvesting of cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, utilizing crop residue, and including grasses and legumes in the

cropping system help to maintain the organic matter content and the soil tilth.

This soil is suited to pasture. The very low available water capacity is a limitation. Some suitable management practices are the use of proper stocking rates, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderate for trees. About 40 percent of the areas of the soil are wooded. Management problems are related to the very low available water capacity. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

Shallowness to bedrock is a limitation to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

This soil is in capability subclass IIIe and in woodland ordination group 4d.

WeC—Weikert shaly silt loam, 8 to 15 percent slopes. This is a sloping, shallow, well drained soil on hillsides. Slopes generally are convex and are 100 to 600 feet long. Individual areas are irregular in shape and range mainly from 2 to 50 acres.

Typically, the surface layer is dark grayish brown shaly silt loam about 6 inches thick. The subsoil is 8 inches thick. It is light yellowish brown channery silt loam. The substratum is light yellowish brown very channery silt loam to a depth of 20 inches. Very dark grayish brown, fractured shale bedrock is below a depth of 20 inches.

Included with this soil in mapping are small areas of the gently sloping and moderately steep Weikert soils, the moderately deep, well drained Berks soils, the deep, moderately well drained Watson soils, and the deep, somewhat poorly drained Alvira soils. Also included are small areas of soils where shale bedrock is within 10 inches of the surface and areas of soils that have a surface layer of silty clay loam and limestone rock outcrops. The included soils make up 15 to 20 percent of the map unit.

Permeability of this Weikert soil is moderately rapid, and the available water capacity is very low. Runoff is medium to rapid. The depth of the root zone is restricted by bedrock. In unlimed areas the soil is very strongly acid to moderately acid throughout. The hazard of erosion is very severe.

Most areas of this soil are used as pasture. Some areas are used as cropland or woodland.

This soil is not suited to cultivated crops because erosion is a very severe hazard and because the available water capacity is very low.

This soil is suited to pasture because of the very low available water capacity. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and the application of fertilizers.

The potential productivity of this soil is moderate for trees. About 40 percent of the areas of the soil are wooded. Management problems are caused by the very low available water capacity and slope. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

Shallowness to rock is a limitation to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

This soil is in capability subclass IVe and in woodland ordination group 4d.

WeD—Weikert shaly silt loam, 15 to 25 percent slopes. This is a moderately steep, shallow, well drained soil on hillsides. Slopes generally are convex and are 100 to 500 feet long. Individual areas are irregular or long and narrow in shape and range mainly from 2 to 50 acres.

Typically, the surface layer is dark grayish brown shaly silt loam about 6 inches thick. The subsoil is 8 inches thick. It is light yellowish brown channery silt loam. The substratum is light yellowish brown very channery silt loam to a depth of 20 inches. Very dark grayish brown, fractured shale bedrock is at a depth of 20 inches.

Included with this soil in mapping are small areas of the sloping and steep Weikert soils, the moderately deep, well drained Berks soils, and the deep, well drained Hartleton soils. Also included are small areas of soils where shale bedrock is within 10 inches of the surface and areas of soils that have a surface layer of silty clay loam and limestone rock outcrops. The included soils make up 15 to 20 percent of the map unit.

Permeability of this Weikert soil is moderately rapid, and the available water capacity is very low. Runoff is rapid. The depth of the root zone is restricted by bedrock. In unlimed areas the soil is very strongly acid to moderately acid throughout.

Most areas of this soil are used as pasture. Some areas are used as cropland or woodland.

This soil is not suited to cultivated crops because of the erosion hazard and slope.

This soil is poorly suited to pasture because of the very low available water capacity. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderate for trees. About 40 percent of the areas of the soil are wooded. The main limitations are the very low available water capacity and slope. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. In some places the use of equipment is restricted by slope.

Slope and shallowness to rock are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

This soil is in capability subclass VIe and in woodland ordination group 4d.

WkE—Weikert and Klinesville shaly silt loams, 25 to 80 percent slopes. This map unit consists of steep and very steep, shallow soils on side slopes. Weikert soils make up about 55 percent of the total acreage of this map unit, Klinesville soils make up about 35 percent, and the included soils make up about 10 percent. Some areas are mostly Weikert soils, some are mostly Klinesville soils, and some consist of both. Of the areas that consist of both soils, Weikert soils generally make up the greater percentage. The Weikert and Klinesville soils were mapped together because they are similar in use and management. Slopes generally are convex and are 100 to 1,000 feet long. Individual areas are irregular in shape and range mainly from 5 to 500 acres.

Typically, the surface layer of the Weikert soils is dark grayish brown shaly silt loam about 6 inches thick (fig. 10). The subsoil is 8 inches thick. It is light yellowish brown channery silt loam. The substratum is light yellowish brown very channery silt loam to a depth of 20 inches. Very dark grayish brown, fractured shale bedrock is below a depth of 20 inches.

Typically, the surface layer of the Klinesville soils is reddish brown shaly silt loam about 4 inches thick. The subsoil is weak red shaly silt loam about 8 inches thick. The substratum is weak red, firm, very shaly silt loam to a depth of 19 inches. Dusky red fractured shale bedrock is at a depth of 19 inches.

Included with this soil in mapping are small areas of the moderately steep Weikert and Klinesville soils. Also included on lower slopes are some areas of soils that are similar to these Weikert and Klinesville soils but that are deeper to bedrock. Also included are some areas of the deep, well drained Leck Kill and Hartleton soils and the moderately deep, well drained Berks and Oquaga soils. The included soils make up 10 percent of the map unit.

Permeability of these Weikert and Klinesville soils is moderately rapid, and the available water capacity is very low. Runoff is very rapid. The depth of the root zone is restricted by bedrock. In unlimed areas the soil is very strongly acid to moderately acid throughout.

Most areas of these soils are used as woodland. These soils are not suited to cultivated crops or pasture because of the steep and very steep slopes.

The potential productivity of these soils is moderate or low for trees. About 90 percent of the areas of these soils are wooded. Management problems are caused by the very low available water capacity and slope. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. The use of equipment is restricted by slope.

Slope is a limitation to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses.

This soil is in capability subclass VIIe and in woodland ordination group 4d, north aspect, and 5d, south aspect.

WlB—Wellsboro channery silt loam, 3 to 8 percent slopes. This is a gently sloping, deep, moderately well drained soil on broad, glaciated mountaintops and lower foot slopes. Slopes generally are smooth and are 100 to 900 feet long. Individual areas are irregular in shape and range mainly from 2 to 180 acres.

Typically, the surface layer is dark reddish gray channery silt loam about 8 inches thick. The subsoil is 40 inches thick. In the upper 16 inches it is reddish brown channery silt loam and mottled, brown channery loam. In the lower 24 inches it is a mottled, reddish brown, firm layer of channery loam called a fragipan. The substratum is weak red, very firm very channery silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the nearly level and sloping Wellsboro soils and areas of the deep, somewhat poorly drained Morris soils and the deep, moderately well drained Wurtsboro soils. Also included are small areas of soils that are similar to this Wellsboro soil but that have fewer coarse fragments in the surface layer or a very stony surface layer. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Wellsboro soil is slow in the fragipan, and the available water capacity is moderate. Runoff is medium. The fragipan in the subsoil restricts the root zone at a depth of about 18 to 24 inches. The seasonal high water table is at a depth of about 18 to 36 inches. In unlimed areas the soil is very strongly acid to moderately acid throughout. The hazard of erosion is moderate.

Most areas of this soil are used as cropland. Some areas are used as pasture or woodland.

This soil is well suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, utilizing crop residue, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Keeping natural drainageways open helps to remove excess surface runoff. Artificial drainage allows timely tillage and improves crop production. In some places the channers in the surface layer interfere with the seeding and harvesting of some crops.

This soil is well suited to pasture. Overgrazing and grazing when the soil is wet are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper

Figure 10.—Road cut in Weikert shaly silt loam, in an area of Weikert and Klinesville shaly silt loams, 25 to 80 percent slopes. The bedrock is 20 inches below the surface.

stocking rates to maintain key plant species, rotational grazing, and the application of fertilizers.

The potential productivity of this soil is high for trees. About 15 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas but in some places is restricted by the seasonal high water table.

The seasonal high water table and the slow permeability are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements,

and for some other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIw and in woodland ordination group 2o.

WlC—Wellsboro channery silt loam, 8 to 15 percent slopes. This is a sloping, deep, moderately well drained soil on glaciated lower foot slopes. Slopes generally are smooth or slightly convex and are 100 to 700 feet long. Individual areas are irregular in shape and range mainly from 2 to 50 acres.

Typically, the surface layer is dark reddish gray channery silt loam about 8 inches thick. The subsoil is 40 inches thick. In the upper 16 inches it is reddish brown channery silt loam and mottled, brown channery loam. In the lower 24 inches it is a mottled, reddish brown, firm layer of channery loam called a fragipan. The substratum is weak red, very firm very channery silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the gently sloping and moderately steep Wellsboro soils and areas of the deep, somewhat poorly drained Morris soils, the deep, moderately well drained Wurtsboro soils, and the deep, well drained Lackawanna soils. Also included are some small areas of soils that are similar to this Wellsboro soil but that have fewer coarse fragments in the surface layer or a very stony surface layer. The included soils make up 10 to 20 percent of the map unit.

Permeability of this Wellsboro soil is slow in the fragipan. The available water capacity is moderate. Runoff is medium. The fragipan in the subsoil restricts the root zone at a depth of about 18 to 24 inches. The seasonal high water table is at a depth of about 18 to 36 inches. In unlimed areas the soil is very strongly acid to moderately acid throughout. The hazard of erosion is severe.

Most areas of this soil are used as cropland. Some areas are used as pasture or woodland.

This soil is well suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, utilizing crop residue, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. Keeping natural drainageways open helps to remove excess surface runoff. Artificial drainage allows timely tillage and improves crop production. In some places the channers in the surface layer interfere with the seeding and harvesting of some crops.

This soil is suited to pasture. Overgrazing and grazing when the soil is wet are the main concerns in pasture management. If the pasture is grazed when the soil is wet, the surface layer becomes compacted. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is high for trees. About 15 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas but in some places is restricted by the seasonal high water table.

The seasonal high water table, the slow permeability, and slope are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for some other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass IIIe and in woodland ordination group 2o.

WmB—Wellsboro very stony silt loam, 0 to 8 percent slopes. This is a nearly level and gently sloping, deep, moderately well drained soil on glaciated mountaintops, on broad benches, and along drainageways. Slopes generally are smooth and are 100 to 1,500 feet long. Individual areas are irregular in shape and range mainly from 5 to 150 acres. Large stones cover 3 to 15 percent of the surface.

Typically, the surface layer is dark reddish gray channery silt loam about 8 inches thick. The subsoil is 40 inches thick. In the upper 16 inches it is reddish brown channery silt loam and mottled, brown channery loam. In the lower 24 inches it is a mottled, reddish brown, firm layer of channery loam called a fragipan. The substratum is weak red, very firm very channery silt loam to a depth of 60 inches of more.

Included with this soil in mapping are small areas of the sloping Wellsboro soils. Also included are some small areas of the channery Wellsboro soils, the deep, somewhat poorly drained Morris soils, the deep, moderately well drained Wurtsboro soils, and the moderately deep, well drained Oquaga soils. The included soils make up 15 to 20 percent of the map unit.

Permeability of this Wellsboro soil is slow in the fragipan. The available water capacity is moderate. Runoff is slow to medium. The fragipan restricts the root zone at a depth of about 18 to 24 inches. The seasonal high water table is at a depth of about 18 to 36 inches. In unlimed areas the soil is very strongly acid to moderately acid throughout.

Most areas of this soil are used as woodland. Some areas are used as pasture or are in native vegetation.

This soil is not suited to cultivated crops or pasture. The stones in the surface layer interfere with the seeding and harvesting of cultivated crops and with pasture management.

The potential productivity of this soil is high for trees. About 90 percent of the areas of the soil are wooded.

Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. The use of equipment may be restricted briefly by the seasonal high water table.

The slow permeability and the seasonal high water table are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass VIs and in woodland ordination group 2o.

WmD—Wellsboro very stony silt loam, 8 to 25 percent slopes. This is a sloping and moderately steep, deep, moderately well drained soil on glaciated ridges and mountainsides. Slopes generally are smooth to slightly convex and are 100 to 2,000 feet long. Individual areas are irregular in shape and range mainly from 5 to 200 acres. Large stones cover 3 to 15 percent of the surface.

Typically, the surface layer is dark reddish gray channery silt loam about 8 inches thick. The subsoil is 40 inches thick. In the upper 16 inches it is reddish brown channery silt loam and mottled, brown channery loam. In the lower 24 inches it is a mottled, reddish brown, firm layer of channery loam called a fragipan. The substratum is weak red, very firm, very channery silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the gently sloping and steep Wellsboro soils. Also included are some small areas of the channery Wellsboro soils, the deep, somewhat poorly drained Morris soils, the deep, moderately well drained Wurtsboro soils, and the moderately deep, well drained Oquaga soils. Small seepage areas are in some mapped areas. The included areas make up 15 to 20 percent of the map unit.

Permeability of this Wellsboro soil is slow in the fragipan. The available water capacity is moderate. Runoff is medium to rapid. The fragipan restricts the root zone at a depth of about 18 to 24 inches. The seasonal high water table is at a depth of about 18 to 36 inches. In unlimed areas the soil is very strongly acid to moderately acid throughout.

Most areas of this soil are used as woodland or are in native vegetation.

This soil is not suited to cultivated crops or pasture. The stones in the surface layer interfere with the seeding and harvesting of crops and with pasture management.

The potential productivity of this soil is high for trees. Most areas of the soil are wooded. Management problems are caused by slope and the seasonal high water table. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. In some places the use of equipment is restricted briefly by the seasonal high water table and slope.

Slope, the slow permeability, and the seasonal high water table are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass VIs and in woodland ordination group 2r.

WsA—Wheeling silt loam, 0 to 3 percent slopes. This is a nearly level, deep, well drained soil on terraces along streams and rivers. Slopes generally are smooth and are 100 to 1,000 feet long. Individual areas are irregular in shape and range mainly from 5 to 200 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil is 49 inches thick. It is dark brown, friable and firm silt loam and loam. The substratum is brown and pale brown, loose gravelly sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the gently sloping Wheeling soils. Also included are small areas of the deep, well drained Allenwood soil, the deep, poorly drained Shelmadine soils, and deep, moderately well drained soils. The included soils make up 5 to 10 percent of the map unit.

Permeability of this Wheeling soil is moderate in the subsoil. The available water capacity is moderate. Runoff is slow. In unlimed areas the soil is strongly acid to moderately acid throughout. The hazard of erosion is slight.

Most areas of this soil are used as cropland. Some areas are in urban use or are used as woodland.

This soil is well suited to cultivated crops. Growing cover crops, utilizing crop residue, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth.

This soil is well suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is high for trees. About 5 percent of the areas of the soil are wooded. Thinning and removing undesirable species are suitable management practices. Machine planting is practical on larger areas.

The rapid permeability in the substratum is a limitation to use of this soil for onsite waste disposal. If the soil is used for onsite waste disposal, the ground water can be polluted because of the rapid permeability in the substratum. There are few limitations for most other uses.

This soil is in capability class I and in woodland ordination group 2o.

WsB—Wheeling silt loam, 3 to 8 percent slopes. This is a gently sloping, deep, well drained soil on terraces along streams and rivers. Slopes generally are smooth to slightly convex and are 100 to 1,000 feet long. Individual areas are irregular in shape and range mainly from 2 to 150 acres.

Typically, the surface layer is brown silt loam about 10 inches thick. The subsoil is 49 inches thick. It is dark brown, friable and firm silt loam and loam. The substratum is brown and pale brown, loose gravelly sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the nearly level and sloping Wheeling soils. Also included are small areas of the deep, well drained Allenwood and Duncannon soils and areas of deep, moderately well drained soils. The included soils make up 5 to 10 percent of the map unit.

Permeability of this Wheeling soil is moderate in the subsoil. The available water capacity is moderate. Runoff is medium. In unlimed areas the soil is strongly acid to moderately acid throughout. The hazard of erosion is moderate.

Most areas of this soil are used as cropland. Some areas are in urban use or are used as woodland.

This soil is well suited to cultivated crops. Contour stripcropping, conservation tillage, grassed waterways, diversions, and the use of cover crops help to reduce runoff and to control erosion. Growing cover crops, utilizing crop residue, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth.

This soil is well suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is high for trees. About 5 percent of the areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. Machine planting is practical on larger areas.

The rapid permeability in the substratum is a limitation to use of this soil for onsite waste disposal. If the soil is used for onsite waste disposal, the ground water can be polluted because of the rapid permeability in the substratum. There are few limitations for most other uses.

This soil is in capability subclass IIe and in woodland ordination group 2o.

WxB—Wurtsboro very stony sandy loam, 0 to 8 percent slopes. This is a nearly level and gently sloping, deep, moderately well drained soil on glaciated mountaintops and the lower slopes. Slopes generally are smooth to slightly concave and are 100 to 1,000 feet long. Individual areas are irregular in shape and range mainly from 2 to 125 acres. Large stones cover about 3 to 15 percent of the surface.

Typically, the surface layer is brown channery sandy loam about 5 inches thick. The subsoil is 55 inches thick. In the upper 14 inches it is dark brown channery very fine sandy loam and mottled, brown channery loam. In the lower 41 inches it is a mottled, yellowish brown, firm layer of channery fine sandy loam and a mottled, brown, very firm layer of channery loam that together make up a fragipan.

Included with this soil in mapping are small areas of the sloping Wurtsboro soils, the moderately deep, well drained Lordstown and Oquaga soils, the deep, well drained Swartswood soils, and the deep, somewhat poorly drained Morris soils. Also included are some areas of moderately well drained soils that are similar to this Wurtsboro soil but that have fewer coarse fragments throughout. The included soils make up 15 to 20 percent of the map unit.

Permeability of this Wurtsboro soil is slow in the fragipan. The available water capacity is moderate. Runoff is slow to medium. The fragipan restricts the root zone at a depth of about 17 to 28 inches. The seasonal high water table is at a depth of about 18 to 36 inches. In unlimed areas the soil is very strongly acid or strongly acid throughout.

Most areas of this soil are used as woodland.

This soil is not suited to cultivated crops or pasture. The stones in the surface layer interfere with the seeding and harvesting of most crops and with pasture management.

The potential productivity of this soil is moderately high for trees. Most areas of the soil are wooded. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices.

The slow permeability and the seasonal high water table are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass VIs and in woodland ordination group 3o.

WxD—Wurtsboro very stony sandy loam, 8 to 25 percent slopes. This is a sloping and moderately steep, deep, moderately well drained soil on glaciated lower slopes. Slopes generally are smooth to slightly concave and are 100 to 900 feet long. Individual areas are irregular in shape and range mainly from 5 to 150 acres. Large stones cover about 3 to 15 percent of the surface.

Typically, the surface layer is brown channery sandy loam about 5 inches thick. The subsoil is 55 inches thick. In the upper 14 inches it is dark brown channery very fine sandy loam and mottled, brown channery loam. In the lower 41 inches it is a mottled, yellowish brown and

brown, firm layer of channery fine sandy loam and channery loam called a fragipan.

Included with this soil in mapping are small areas of the gently sloping and steep Wurtsboro soils and a soil that is similar to this Wurtsboro soil but that has fewer coarse fragments throughout. Also included are small areas of the deep, moderately well drained Wellsboro soils, the moderately deep, well drained Lordstown soils, and the deep, somewhat poorly drained Morris soils. The included soils make up 15 to 20 percent of the map unit.

Permeability of this Wurtsboro soil is slow in the fragipan. The available water capacity is moderate. Runoff is medium to rapid. The fragipan restricts the root zone at a depth of about 17 to 28 inches. The seasonal high water table is at a depth of about 18 to 36 inches. In unlimed areas the soil is very strongly acid or strongly acid throughout.

Most areas of this soil are used as woodland.

This soil is not suited to cultivated crops or pasture. The stones in the surface layer interfere with the seeding and harvesting of most crops and with pasture management.

The potential productivity of this soil is moderately high for trees. Most areas of the soil are wooded. Management problems are caused by slope. Thinning, removing undesirable species, and constructing roads on the contour to reduce erosion are suitable management practices. The use of equipment is restricted by slope.

Slope and the slow permeability are limitations to use of this soil for onsite waste disposal, as sites for dwellings with basements, and for most other urban uses. Seepage into the basements of dwellings constructed on this soil can be prevented by installing foundation drains with proper outlets.

This soil is in capability subclass VIs and in woodland ordination group 3o.

Wy—Wyoming gravelly sandy loam, occasionally flooded. This is a nearly level, deep, somewhat excessively drained soil on low-lying outwash terraces. Slopes generally are smooth and are 100 to 300 feet long. Individual areas are rectangular in shape and range mainly from 2 to 80 acres. Slopes range from 0 to 3 percent.

Typically, the surface layer is brown gravelly sandy loam about 8 inches thick. The subsoil is 17 inches thick. In the upper 9 inches it is reddish brown gravelly sandy loam. In the lower 8 inches it is reddish brown very gravelly sandy loam. The substratum is reddish brown, nonconforming, stratified, loose very gravelly coarse sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of the deep, well drained Barbour soils and the deep, well drained to somewhat excessively drained Tunkhannock soils. Also included are some areas of soils that are similar to this Wyoming soil but that have a surface layer of loamy sand. The included soils make up 10 to 15 percent of the map unit.

Permeability of this Wyoming soil is rapid in the subsoil. The available water capacity is low. This soil is occasionally flooded. Runoff is slow. In unlimed areas the soil is moderately acid to very strongly acid throughout. The hazard of erosion is slight.

Most areas of this soil are used as cropland or pasture. Some areas are in urban use, are used as woodland, or are in native vegetation.

This soil is suited to cultivated crops. Growing cover crops, leaving crop residue on the surface, and including grasses and legumes in the cropping system help to maintain the organic matter content and the soil tilth. The low available water capacity limits productions. The gravel in the surface layer interferes with the seeding and harvesting of some crops.

This soil is suited to pasture. Some suitable management practices are the use of proper stocking rates to maintain key plant species, rotational grazing, and application of fertilizers.

The potential productivity of this soil is moderate for trees. About 30 percent of the areas of the soil are wooded. Seedling mortality is a hazard caused by the low available water capacity. Thinning and removing undesirable species are suitable management practices. Machine planting is practical on larger areas.

Occasional flooding is a limitation to use of this soil for most urban uses. The rapid permeability and flooding are limitations for onsite waste disposal. If the soil is used for onsite waste disposal, the ground water can be polluted because of the rapid permeability in the subsoil and flooding.

This soil is in capability subclass IIIs and in woodland ordination group 4f.

Prime Farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. Identification of prime farmland is a major step in meeting the Nation's needs for food and fiber.

The U.S. Department of Agriculture defines prime farmland as the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to produce a sustained high yield of crops while using acceptable farming methods. Prime farmland produces the highest yields and requires minimal amounts of energy and economic resources, and farming it results in the least damage to the environment.

An area identified as prime farmland must be used for producing food or fiber or must be available for those uses. Thus, urban and built-up land and water areas are not classified as prime farmland.

The general criteria for prime farmland are as follows: a generally adequate and dependable supply of moisture from precipitation or irrigation, favorable temperature and growing-season length, acceptable levels of acidity or alkalinity, few or no rocks, and permeability to air and water. Prime farmland is not excessively erodible, is not saturated with water for long periods, and is not flooded during the growing season. The slope range is mainly from 0 to 6 percent. For more detailed information on the criteria for prime farmland, consult the local staff of the Soil Conservation Service.

The survey area contains about 102,650 acres of prime farmland. That acreage makes up about 13 percent of the total acreage in the survey area and is mainly in the General Soil Map associations 2, 3, 5, and 9. Most prime farmland soils are used for crops. The main crops are corn and soybeans.

The following map units, or soils, that make up prime farmland in Lycoming County. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4, and the location of each unit is shown on the detailed soil maps at the back of this publication. The soil properties and characteristics that affect use and management of the units are described in the section "Detailed Soil Map Units."

AbB Albrights silt loam, 3 to 8 percent slopes
AlB Allenwood gravelly silt loam, 3 to 8 percent slopes
Bb Barbour fine sandy loam, occasionally flooded
Bd Basher silt loam, occasionally flooded
ChA Chenango gravelly loam, 0 to 3 percent slopes
ClA Clarksburg silt loam, 0 to 3 percent slopes
ClB Clarksburg silt loam, 3 to 8 percent slopes
CmB Clymer channery loam, 3 to 8 percent slopes
CoB Cookport loam, 3 to 8 percent slopes
DuB Duncannon loam, 3 to 8 percent slopes
HaA Hagerstown silt loam, 0 to 3 percent slopes
HaB Hagerstown silt loam, 3 to 8 percent slopes
HhB Hartleton channery silt loam, 3 to 8 percent slopes
LaB Lackawanna channery silt loam, 3 to 8 percent slopes
LdB Laidig channery silt loam, 3 to 8 percent slopes
LkB Leck Kill channery silt loam, 3 to 8 percent slopes
Ln Linden loam, occasionally flooded
TuA Tunkhannock gravelly loam, 0 to 3 percent slopes
TuB Tunkhannock gravelly loam, 3 to 8 percent slopes
WaA Washington silt loam, 0 to 3 percent slopes
WaB Washington silt loam, 3 to 8 percent slopes
WbA Watson silt loam, 0 to 3 percent slopes
WbB Watson silt loam, 3 to 8 percent slopes
WlB Wellsboro channery silt loam, 3 to 8 percent slopes
WsA Wheeling silt loam, 0 to 3 percent slopes
WsB Wheeling silt loam, 3 to 8 percent slopes

Use and Management of the Soils

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

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

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

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

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

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

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

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

Farming is a major land use in Lycoming County. In 1975, according to the Conservation Needs Inventory, more than 109,914 acres was used for crops and pasture. Of this, according to the 1982 Pennsylvania Crop and Livestock Annual Summary, 18,000 acres was used for permanent pasture. In addition, 33,100 acres was used for corn; 11,900 acres was used for small grain; 44,100 acres was used for hay; approximately 600 acres was used for orchards and vineyards; and the rest was used for other cropland and pasture.

Soil erosion is the major management problem on most of the cropland and pasture in the county.

Loss of topsoil by erosion results in reduced production. The soils that are especially susceptible to this problem are shallow or moderately deep to bedrock, have a fragipan, and have a low available water capacity. Such soils are the shallow and moderately deep Weikert and Berks soils, which have a low available water capacity, and the Watson, Alvira, and Shelmadine soils, which have a fragipan.

Soil erosion may result in sedimentation of streams and reservoirs, pollution of streams, and reduced water quality for all uses.

On many sloping soils that have been eroded, tillage and preparing a good seedbed are difficult because the original surface soil has been lost and many coarse fragments cover the surface. Such areas are common on Hartleton and Weikert soils.

Wheeling, Hagerstown, and Washington soils are among the most productive in the county, but are highly susceptible to erosion. Conservation practices on these and other soils help to reduce the hazard of erosion and to increase production.

Conservation and erosion control practices provide a protective cover, reduce surface runoff, reduce sedimentation, and increase water infiltration. A cropping system that maintains a vegetative cover is needed. On pasture and hayland, rotational grazing and the use of grasses and legumes help to reduce erosion, add nitrogen to the soil, and improve soil tilth. Contour farming, terraces, conservation tillage, cover crops, and

crop residue left on the surface help to increase water infiltration and to control erosion. These practices can be used on most soils except those that have steep and irregular slopes, which are not suited to terraces.

Terraces and diversions reduce the length of slopes and help to reduce runoff and to control erosion. These practices are most practical on the deep, well drained soils that have gently sloping, uniform slopes. Leck Kill and Hartleton soils are generally suitable for terraces and diversions. Less suitable for terraces and diversions are soils that have steep or irregular slopes, are excessively wet, have a clayey subsoil, or are shallow to bedrock.

Contour farming and stripcropping are common erosion control practices in the survey area. They are best suited to soils that have uniform slopes, such as Leck Kill, Hartleton, and Hagerstown soils.

Information and assistance regarding the design or installation of erosion control practices in Lycoming County are available from the Lycoming County Conservation District and the Williamsport field office of the Soil Conservation Service.

Soil drainage is a major management problem on some of the soils in the county. Some soils are so wet that crop production is not practical or economically feasible without artificial drainage. Examples of such soils are the poorly drained Shelmadine soils and the poorly drained and very poorly drained Holly soils.

The somewhat poorly drained soils are so wet that in most years crops are damaged unless artificial drainage is installed. Alvira soils are somewhat poorly drained.

Some small, wet areas are in drainageways and swales. These areas generally are soils included in the moderately well drained soils, such as Watson and Albrights soils. Installing artificial drainage can improve productivity on most of these areas, but this management practice may not be economical.

The design of both surface and subsurface drainage systems varies with the kind of soil. A combination of surface drainage and tile drainage generally is needed on the poorly drained soils that are intensively cropped. The drains must be more closely spaced on soils that have slow permeability than on those that have moderate or rapid permeability. In addition, on such soils as Holly and Shelmadine soils, establishing adequate outlets for tile drainage systems commonly is difficult.

Naturally fertility is low on many soils in the survey area. Many upland soils are acid. On upland soils, applications of ground limestone are needed to supply calcium and to raise the pH sufficiently for good growth of alfalfa and other crops. On most soils, the levels of available phosphorus and magnesium are naturally low. Additions of soil amendments should be based on soil tests, requirements of the crop, and expected or desired yields. The Cooperative Extension Service can help in determining the application rate of fertilizers and lime.

Soil tilth is an important factor in seed germination, plant growth, and infiltration of water. Soils that have good tilth are granular and porous. Wheeling and Linden soils have good tilth.

On many soils used for crop production in the survey area, the organic matter content in the surface layer is relatively low. Generally, the structure of such soils is weak, and intensive rainfall usually results in crusting of the surface. The crust generally is hard and nearly impervious to water when the soil is dry. Such a crust usually reduces infiltration and increases runoff. Regular additions of crop residue, manure, and other organic material help to improve the soil structure and to reduce crust formation.

Generally, fall plowing is not a good practice on soils that have a surface layer of light colored silt loam. On many of these soils the surface layer is nearly as dense and hard at planting time after fall plowing as it was before the soils were plowed. In addition, in sloping areas these soils are subject to accelerated erosion if they are plowed in fall.

Corn is the main row crop, and soybeans and some tomatoes are also grown. Wheat, oats, and barley are common close-growing crops. Yields are generally best on the deep, well drained soils. However, under adequate management, yields are also good on many other soils.

Special crops grown in the survey area are apples, vegetables, and nursery plants.

Soils that are deep, have good natural drainage, and warm up early in spring are best suited to the special crops, such as fruit trees. Good air drainage is needed to reduce frost damage to apples and peaches. Soils that are well suited to fruit trees are Allenwood, Hartleton, and Leck Kill soils.

The latest information about growing special crops can be obtained from 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. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting

and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

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

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

Land Capability Classification

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

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. The levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

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

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

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

The acreage of soils in each capability class and subclass is shown in table 6. The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

Paxton G. Wolfe, woodland conservationist, Soil Conservation Service, helped to prepare this section.

Approximately 651,300 acres, or 84 percent of the county, is woodland (*16*). Approximately 642,700 acres is commercial woodland. Of this amount, 12 percent is owned by farmers, 52 percent, by private concerns; 2 percent, by forest industry; and 34 percent is public owned.

The woodland consists of stands of second and third growth trees. The principal forest cover types (*11*) that make up the woodland at present in the county and the extent of each, according to the Forest Service, are as follows.

The oak-hickory type makes up 61 percent of the woodland in the county. This cover type consists mainly of white oak, red oak, and hickories, but, in some places, black oak is predominant. The principal associates are yellow-poplar, pignut hickory, shagbark hickory, white ash, red maple, and beech and an understory of flowering dogwood.

The elm-ash-red maple type makes up 8 percent of the woodland. This cover type consists mainly of white ash, American elm, and red maple. The principal associates are slippery elm, yellow birch, sycamore, and hemlock.

The aspen-birch type makes up 6 percent of the woodland. This cover type consists mainly of quaking aspen, bigtooth aspen, and gray birch. The principal associates are pin cherry, red maple, red oak, white oak, yellow birch, paper birch, white pine, ash, and sugar maple.

The maple-beech-birch type makes up 16 percent of the woodland. This cover type consists of sugar maple, beech, and yellow birch. The associated species are various mixtures of basswood, red maple, hemlock, red oak, white ash, white pine, black birch, black cherry, yellow-poplar, and cucumbertree.

The chestnut oak type makes up 1 percent of the woodland. Chestnut oak grows in pure stands or is predominant in stands. The common associates are red oak, white oak, black oak, scarlet oak, pitch pine, blackgum, and red maple.

The white pine type makes up 6 percent of the woodland. White pine grows in pure stands or is predominant in stands. The principal associates are Virginia and pitch pine, ash, sugar and red maple, hemlock, red and white oak, quaking and bigtooth aspen, and paper, yellow, and black birch.

The Virginia pine-pitch pine type makes up 2 percent of the woodland. This cover type consists mainly of Virginia pine and pitch pine. The principal associates are red oak, black oak, scarlet oak, chestnut oak, and hickories.

Sawtimber makes up approximately 43 percent of the acreage in commercial woodland, poletimber makes up 44 percent, seedlings and saplings make up 12 percent, and areas where growing stock trees cover less than 10 percent of the surface make up 1 percent.

Generally, the soils in the county can support good stands of red oak, sugar maple, ash, and white pine. Trees grow better on the deeper, well drained soils than on the shallow, poorly drained soils.

The growth of desirable trees can be achieved by using woodland management practices on soils rated very high, high, and moderately high for potential productivity of trees. Site index is a measure of site quality based on the average height in feet of the dominant and codominant commercial species at 50 years of age. A professional forester can recommend management practices for use in a woodland improvement program.

The soils rated low for potential productivity of trees generally are not economically suitable for management practices used to increase the yields of wood crops. The soils rated moderate for potential productivity of trees are the most difficult to appraise for management of wood crops. A thorough inventory of the growing stock and their quality on the site is needed. The market potential for the species and the possibility that the soils rated moderate are mixed with larger areas of the more productive soils should be determined in deciding if woodland management is economical.

The woodland in Lycoming County provides watershed protection, recreation, and habitat for wildlife. It has aesthetic value besides being a source of income from wood crops. The better sites should return a good profit to the owner if properly managed for wood crops and if protected from fire, disease, insects, and livestock grazing.

Table 7 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed in the tables. The table gives the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The high densities of deer often browse on tree sprouts and seedlings. Consequently, to the extent that the species of high palatability are browsed, forest revegetation following a timber harvest is limited to species of low palatability. In areas of high densities of deer, special protection and management is needed for an adequate regeneration.

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; *c*, clay in the upper part of the soil; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: x, w, d, c, f, and r.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that erosion can occur as a result of site preparation or following cutting operations and where the soil is exposed, for example, roads, skid trails, fire lanes, and log handling areas. Forests that are abused by fire or overgrazing are also subject to erosion. The ratings for the erosion hazard are based on the percent of the slope and on the erosion factor K shown in table 15. A rating of *slight* indicates that no particular measures to prevent erosion are needed under ordinary conditions. A rating of *moderate* indicates that erosion control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

The proper construction and maintenance of roads, trails, landings, and fire lanes will help overcome the erosion hazard.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or

harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *Slight* indicates that equipment use normally is not restricted either in kind of equipment that can be used or time of year because of soil factors. If soil wetness is a factor, equipment use can be restricted for a period not to exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If soil wetness is a factor, equipment use is restricted for 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either in kind of equipment or season of use. If soil wetness is a factor, equipment use is restricted for more than 3 months.

Choosing the most suitable equipment and timing harvesting and other management operations to avoid seasonal limitations help overcome the equipment limitation.

Seedling mortality refers to the probability of death of naturally occuring or planted tree seedlings as influenced by kinds of soil or topographic conditions. The factors considered in rating the soils for seedling mortality are texture of the surface layer, depth and duration of the water table, rock fragments in the surface layer, rooting depth, and aspect of the slope. A rating of *slight* indicates that under usual conditions the expected mortality is less than 25 percent. A rating of *moderate* indicates that the expected mortality is 25 to 50 percent. Extra precautions are advisable. A rating of *severe* indicates that the expected mortality is more than 50 percent. Extra precautions are important. Replanting may be necessary.

The use of special planting stock and special site preparation, such as bedding, furrowing, or surface drainage, can help reduce seedling mortality.

Windthrow hazard is the likelihood of trees being uprooted (tipped over) by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions are a seasonal high water table and bedrock or a fragipan or other limiting layer. A rating of *slight* indicates that normally no trees are blown down by the wind. Strong winds may break trees but do not uproot them. A rating of *moderate* indicates that moderate or strong winds occasionally blow down a few trees during periods of soil wetness. A rating of *severe* indicates that moderate or strong winds may blow down many trees during periods of soil wetness.

The use of specialized equipment that does not damage surficial root systems during partial cutting operations can help reduce windthrow. Care in thinning or no thinning also can help reduce windthrow.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Common trees are those that woodland managers generally favor to grow for wood crop production. They are the most important tree species in regard to growth rate, quality, value, and marketability. Other tree species that commonly occur on the soil are also listed regardless of potential value and growth potential.

Trees to plant are those that are suited to the soil and are planted for commercial wood production.

Recreation

The undeveloped areas of woodland, the adjoining farmland, streams, and the Susquehanna River provide the major sources of recreation activities in the county. These activities include hunting, fishing, camping, hiking, boating, and nature study. Most of the woodland and other areas through which the streams flow are privately owned, but a large acreage along streams is publicly owned or controlled. State Game Lands 252, 133, 134, 126, 114, 75, and 68, which are managed by the Pennsylvania Game Commission, are available to the public for hunting. These lands take in approximately 42,000 acres. Approximately 189,000 acres of publicly owned land is managed by the Pennsylvania Bureau of Forestry. Public parks and picnic areas are also available for recreation activities.

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table

11 and interpretations for dwellings without basements and for local roads and streets in table 10.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

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

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

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Richard D. Heaslip, biologist, Soil Conservation Service, helped to prepare this section.

The principal game species in Lycoming County are white-tailed deer, black bear, wild turkey, gray squirrel, cottontail rabbit, ruffed grouse, and mourning dove. The more abundant furbearers are muskrat, raccoon, and fox. There is also a wide variety of songbirds, reptiles, amphibians, and small mammals.

The distribution of wildlife in the county is related to land use and can be identified by the soil associations on the general soil map. White-tailed deer, for example, inhabit all areas of the county, but are probably most numerous in the Dekalb-Laidig-Buchanan, Clymer-Cookport, and Oquaga-Lackawanna-Wellsboro associations. The wooded or partially wooded areas of these associations provide food and cover. Ruffed grouse also inhabit these associations in wooded areas or along field edges where these associations join the Weikert-Berks-Hartleton and Leck Kill-Klinesville-Albrights associations.

Doves and cottontail are found in areas that are farmed or were recently farmed in the Washington-Hagerstown-Clarksburg and Linden-Holly-Wheeling associations.

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

In table 9, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features

that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, timothy, bromegrass, clover, and alfalfa.

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

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, birch, cherry, maple, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are gray dogwood, autumn-olive, and hazlenut.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, yew, cedar, and hemlock.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, cattail, arrowhead, burreed, reed canerygrass, rushes, sedges, and bulrush.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, swamps, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas.

Engineering

John Mank, assistant state conservation engineer, Soil Conservation Service, assisted in preparing this section.

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

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

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

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and

topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

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

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

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost-action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

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

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that

part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

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

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

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

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

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability

of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

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

Water Management

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

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

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

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil

material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

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

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

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

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

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

Soil Properties

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

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

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

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

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

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

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

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

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

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

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

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The

estimates are based on test data from the survey area or from nearby areas and on field examination.

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

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

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

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

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

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

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

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

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

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

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

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

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 15, the estimated content of organic matter is expressed as a

percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

Some soils in table 16 are assigned to two hydrologic soil groups. Dual grouping is used for one of two reasons: (1) Some soils have a seasonal high water table but can be drained. In this instance the first letter applies to the drained condition of the soil and the second letter to the undrained condition. (2) In some soils that are less than 20 inches deep to bedrock, the first letter applies to areas where the bedrock is cracked and pervious and the second letter to areas where the bedrock is impervious or where exposed bedrock makes up more than 25 percent of the surface of the soil.

The four hydrologic soil groups are:

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

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

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

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

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

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

Frequency, duration, and probable period of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional, common,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (there is a near 0 to 5 percent chance of flooding in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (there is a 5 to 50 percent chance of flooding in any year). *Frequent* means that flooding occurs often under normal weather conditions (there is more than a 50 percent chance of flooding in any year). *Common* is used when classification as occasional or frequent does not affect interpretations. Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. November-May, for example, means that flooding can occur during the period November through May. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely, thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely, grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table, that is, *perched, artesian,* or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 16.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An *artesian* water table is under hydrostatic head, generally

below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

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

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

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

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

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

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

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*17*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 17 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

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

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

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

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

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is loamy-Skeletal, mixed, mesic Typic Haplaudults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*4*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*17*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Albrights Series

The soils of the Albrights series are fine-loamy, mixed, mesic Aquic Fragiudalfs. They are deep, moderately well drained soils on the lower slopes of ridges. They formed in material weathered from shale, siltstone, and fine-grained sandstone. Slopes range from 3 to 15 percent.

Albrights soils are near the deep, well drained Leck Kill soils and the shallow, well drained Klinesville soils.

Typical pedon of Albrights silt loam, 3 to 8 percent slopes, in Woodward Township, 2 miles north of Linden, 300 yards east of Woodward Township Cemetery, 50 feet west of pond, in a pasture:

Ap—0 to 9 inches; dark reddish gray (5YR 4/2) silt loam; weak fine granular structure; friable; 5 percent coarse fragments; neutral; abrupt smooth boundary.
B1—9 to 15 inches; reddish brown (5YR 4/3) silty clay loam; weak medium subangular blocky structure; friable; slightly sticky and slightly plastic; few thin patchy clay films in pores; 5 percent coarse fragments; slightly acid; gradual wavy boundary.
B2t—15 to 20 inches; reddish brown (2.5YR 4/4) silty clay loam; few fine faint weak red (2.5YR 5/2) mottles; moderate medium subangular blocky structure; firm, sticky and slightly plastic; common thin patchy clay films on faces of peds; 5 percent coarse fragments; slightly acid; gradual wavy boundary.
Bx1—20 to 32 inches; weak red (2.5YR 5/2) silty clay loam; common medium distinct light gray (5YR 7/1), yellowish red (5YR 5/6), and red (2.5YR 5/8) mottles; moderate very coarse prismatic structure parting to moderate medium platy; firm and brittle, slightly sticky and slightly plastic; common thin patchy clay films on faces of peds; 10 percent coarse fragments; medium acid; gradual wavy boundary.
Bx2—32 to 52 inches; reddish gray (5YR 5/2) silty clay loam; common medium distinct light gray (5YR 7/1) and pale red (2.5YR 6/2) mottles; moderate coarse prismatic structure parting to moderate fine blocky; very firm and brittle, slightly sticky and slightly plastic; few thin patches of clay films on faces of peds; 10 percent coarse fragments; medium acid; gradual wavy boundary.
C—52 to 64 inches; weak red (2.5YR 5/2) channery loam; common medium distinct reddish brown (5YR 4/4), yellowish red (5YR 4/6), and pinkish gray (5YR 6/2) mottles; massive; firm, slightly sticky; 15 percent coarse fragments; medium acid.

The solum is 40 to 65 inches thick. Bedrock is at a depth of 5 feet or more. The fragipan is at a depth of 18 to 30 inches. Coarse fragments make up 5 to 30 percent of the solum above the Bx horizon and 10 to 50 percent of the Bx and C horizons. In unlimed areas reaction ranges from extremely acid to strongly acid in the upper part of the solum and from very strongly acid to slightly acid in the lower part and in the C horizon.

The A horizon has hue of 5YR or 7.5YR, value of 3 through 5, and chroma of 2 through 4. Fine earth texture is silt loam or loam.

The B1 and B2 horizons have hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 through 6. Fine earth texture ranges from silt loam to clay loam.

The Bx horizon has hue of 2.5YR through 10R, value of 4 or 5, and chroma of 2 through 6. Fine earth texture ranges from loam to silty clay loam.

The C horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 2 through 6. Fine earth texture ranges from loam to clay loam.

Allenwood Series

The soils of the Allenwood series are fine-loamy, mixed, mesic Typic Hapludults. They are deep, well drained soils on lower slopes of ridges. They formed in glacial till derived from shale, siltstone, and sandstone. Slopes range from 3 to 15 percent.

Allenwood soils are near the deep, well drained Hartleton soils, the moderately deep, well drained Berks soils, and the deep, moderately well drained Watson soils. Allenwood soils have fewer coarse fragments in the Bt horizon than Berks and Hartleton soils.

Typical pedon of Allenwood gravelly silt loam, 3 to 8 percent slopes, in Upper Fairfield Township, about 1,320 feet northeast of Loyalsockville bridge on Township Route 627, 300 feet east of Pennsylvania Route 87, on the north side of the road, in a roadbank:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) gravelly silt loam; weak fine granular structure; very friable; slightly sticky; 15 percent coarse fragments; slightly acid; abrupt smooth boundary.
B1—9 to 13 inches; yellowish red (5YR 4/6) silt loam; weak very fine and fine subangular blocky structure; friable; slightly sticky and slightly plastic; 5 percent coarse fragments; slightly acid; gradual boundary.
B21t—13 to 17 inches; yellowish red (5YR 4/6) gravelly silt loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; common thin patchy clay films on faces of peds; 20 percent coarse fragments; medium acid; gradual wavy boundary.
B22t—17 to 21 inches; red (2.5YR 4/6) silty clay loam; moderate fine and medium subangular blocky structure; friable, slightly sticky and plastic; common thin continuous clay films on faces of peds; 10 percent coarse fragments; strongly acid; clear wavy boundary.
B23t—21 to 30 inches; red (2.5YR 4/8) silty clay loam; strong medium blocky structure; firm, sticky and plastic; many thick continuous clay films on faces of peds; 10 percent coarse fragments; very strongly acid; gradual wavy boundary.
B24t—30 to 40 inches; red (2.5YR 4/8) silty clay loam; strong medium and coarse blocky structure; very firm, sticky and plastic; many thick continuous clay films on faces of peds and in pores; 10 percent coarse fragments; very strongly acid; gradual wavy boundary.
C—40 to 64 inches; red (2.5YR 4/6) gravelly sandy clay loam; strong thick platy structure; very firm, sticky and plastic; few thin patchy clay films on coarse

fragments; 40 percent coarse fragments; very strongly acid.

The solum is 40 to 75 inches thick. Bedrock is at a depth of 5 feet or more. Coarse fragments make up 10 to 25 percent of the A horizon, 5 to 40 percent of the B horizon, and 10 to 80 percent of the C horizon. In unlimed areas reaction ranges from strongly acid to extremely acid throughout.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 through 5, and chroma of 2 through 4.

The B horizon has hue of 2.5YR or 5YR, value of 4 through 6, and chroma of 6 through 8. Fine earth structure is silt loam, silty clay loam, clay loam, or loam.

The C horizon has hue of 2.5YR or 5YR, value of 4 through 6, and chroma of 6 through 8. Fine earth texture ranges from sand to clay.

Alvira Series

The soils of the Alvira series are fine-loamy, mixed, mesic Aeric Fragiaquults. They are deep, somewhat poorly drained soils on foot slopes and in depressions. They formed in glacial till derived from sandstone, siltstone, shale, and quartzite. Slopes range from 0 to 15 percent.

Alvira soils are near the deep, well drained Allenwood and Hartleton soils, the deep, moderately well drained Watson soils, and the deep, poorly drained Shelmadine soils.

Typical pedon of Alvira silt loam, 8 to 15 percent slopes, in Old Lycoming Township, about 1 1/2 miles west of U.S. Route 15 on Township Route 395, 100 yards north of Township Route 393 on the west side of the road, in a roadbank:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable, slightly sticky; 5 percent coarse fragments; very strongly acid; abrupt wavy boundary.

B1—8 to 11 inches; brown (10YR 4/3) silt loam; few fine faint grayish brown (10YR 5/2) mottles; weak thin platy structure; friable, slightly sticky; 10 percent coarse fragments; strongly acid; gradual wavy boundary.

B21t—11 to 15 inches; brown (10YR 5/3) channery silty clay loam; common fine and medium distinct light gray (10YR 7/2) mottles; moderate fine and medium subangular blocky structure; firm, sticky and plastic; few thin patchy clay films on faces of peds; 20 percent coarse fragments; strongly acid; clear wavy boundary.

B22t—15 to 23 inches; brown (7.5YR 5/2) channery silty clay loam; few fine faint light yellowish brown (10YR 6/4) and strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common thick continuous clay films on faces of peds; 20 percent coarse fragments; strongly acid; clear wavy boundary.

Bx1—23 to 28 inches; yellowish brown (10YR 5/4) channery silty clay loam; many fine distinct pale brown (10YR 6/3) and strong brown (7.5YR 5/8) mottles; strong medium and coarse prismatic structure; very firm and brittle, sticky and plastic; common thick continuous clay films on faces of prisms; some black concretions and coatings on peds and coarse fragments; 20 percent coarse fragments; very strongly acid; clear wavy boundary.

Bx2—28 to 46 inches; reddish brown (5YR 5/4) channery silty clay loam; many medium prominent gray (10YR 6/1), strong brown (7.5YR 5/8), and light reddish brown (5YR 6/3) mottles; strong coarse prismatic structure parting to strong coarse blocky; very firm and brittle, sticky and plastic; common thick continuous clay films on faces of prisms; many black concretions and coatings on peds and coarse fragments; 35 percent coarse fragments; strongly acid; gradual wavy boundary.

C—46 to 60 inches; yellowish brown (10YR 5/4) very channery silt loam; few fine distinct gray (10YR 6/1) and yellowish red (5YR 4/6) mottles; massive; firm, slightly sticky; 50 percent coarse fragments; very strongly acid.

The solum is 40 to 60 inches thick. Bedrock is at a depth of more than 40 inches. The fragipan is at a depth of 16 to 28 inches. Coarse fragments make up 5 to 20 percent of the surface layer and the upper part of the subsoil, 20 to 35 percent of the lower part of the subsoil, and 40 to 80 percent of the C horizon. In unlimed areas reaction ranges from strongly acid to very strongly acid throughout.

The A horizon has hue of 7.5YR through 2.5Y, value of 3 or 4, and chroma of 2 through 4. Fine earth texture is silt loam or loam.

The B2 horizon has hue of 7.5YR through 2.5Y, value of 5 through 7, and chroma of 1 through 6. Fine earth texture is silt loam or silty clay loam.

The Bx horizon has hue of 5YR through 10YR, value of 5, and chroma of 2 through 6. Fine earth texture ranges from loam to silty clay loam.

The C horizon has hue of 5YR through 10YR, value of 4 through 6, and chroma of 1 through 8. Fine earth texture ranges from silty clay loam to loam.

Barbour Series

The soils of the Barbour series are coarse-loamy over sandy or sandy-skeletal, mixed, mesic Fluventic Dystrochrepts. They are deep, well drained soils on flood plains. They formed in alluvial deposits derived from reddish sandstone, siltstone, and shale. Slopes range from 0 to 3 percent.

Barbour soils are near the deep, well drained Linden soils that do not have a sandy substratum, the deep, somewhat excessively drained Wyoming soils, the deep, moderately well drained and somewhat poorly drained Basher soils, and the deep, poorly drained and very poorly drained Holly soils.

Typical pedon of Barbour fine sandy loam, in Wolfe Township, about 1/2 mile south of Picture Rocks, 150 feet west of U.S. Route 220, in a pipeline ditch:

Ap—0 to 9 inches; dark reddish gray (5YR 4/2) fine sandy loam; weak fine granular structure; friable; 5 percent coarse fragments; medium acid; clear smooth boundary.

B2—9 to 16 inches; dark reddish brown (5YR 3/4) fine sandy loam; moderate fine subangular blocky structure; friable; medium acid; abrupt wavy boundary.

B3—16 to 28 inches; reddish brown (5YR 4/3) fine sandy loam; weak fine subangular blocky structure; friable; strongly acid; gradual wavy boundary.

IIC—28 to 60 inches; reddish brown (5YR 4/3) sand; single grained; loose; 5 percent coarse fragments; strongly acid.

The solum is 18 to 30 inches thick. Bedrock is at a depth of more than 60 inches. Coarse fragments make up 0 to 30 percent of the A and B horizons and 0 to 60 percent of the IIC horizon. In unlimed areas reaction ranges from very strongly acid to medium acid in the solum and from very strongly acid to slightly acid in the substratum.

The Ap horizon has hue of 5YR through 2.5Y, value of 3 or 4, and chroma of 2 through 4. Fine earth texture ranges from fine sandy loam to silt loam.

The B horizon has hue of 2.5YR through 7.5YR, value of 3 through 5, and chroma of 3 through 6. Fine earth texture ranges from fine sandy loam to silt loam.

Some pedons have a C horizon that has hue of 2.5YR through 7.5YR, value of 3 through 5, and chroma of 3 through 6. Fine earth texture is fine sandy loam to silt loam.

The IIC horizon has the same colors as the C horizon. Fine earth texture is loamy fine sand or coarser.

Basher Series

The soils of the Basher series are coarse-loamy, mixed, mesic Fluvaquentic Dystrochrepts. They are deep, moderately well drained and somewhat poorly drained soils on flood plains. They formed in alluvial deposits derived from reddish sandstone, siltstone, and shale. Slopes range from 0 to 3 percent.

Basher soils are near the deep, well drained Barbour and Linden soils and the deep, poorly drained and very poorly drained Holly soils.

Typical pedon of Basher silt loam, in Piatt Township, 0.7 mile east of Jersey Shore along old U.S. Route 220, 300 feet north of road, in the side of a drainage ditch:

Ap—0 to 10 inches; reddish brown (5YR 4/3) silt loam; weak fine granular structure; friable; medium acid; clear wavy boundary.

B21—10 to 16 inches; reddish brown (5YR 4/4) fine sandy loam; weak fine subangular blocky structure; friable; medium acid; clear wavy boundary.

B22—16 to 25 inches; reddish brown (5YR 5/3) silt loam; many medium distinct red (2.5YR 4/8), pinkish gray (5YR 6/2), and yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; firm, slightly sticky; medium acid; clear wavy boundary.

B23—25 to 40 inches; dark reddish brown (5YR 4/3) silt loam; many medium distinct red (2.5YR 4/8), strong brown (7.5YR 5/6), and weak red (2.5YR 4/2) mottles; weak, fine and medium subangular blocky structure; friable; medium acid; gradual wavy boundary.

IIC—40 to 65 inches; reddish brown (5YR 4/3) stratified gravelly sand; massive; loose; 50 percent coarse fragments; medium acid.

The solum is 30 to 40 inches thick. Bedrock is at a depth of more than 60 inches. Coarse fragments make up 0 to 20 percent of the solum above a depth of 30 inches and 0 to 60 percent of each layer below that depth. In unlimed areas reaction ranges from very strongly acid to medium acid throughout.

The Ap horizon has hue of 2.5YR through 10YR, value of 3 or 4, and chroma of 2 through 4. Fine earth texture is silt loam, loam, or fine sandy loam.

The B horizon has hue of 2.5YR through 7.5YR, value of 3 through 5, and chroma of 3 through 6. Within 24 inches of the surface it has mottles that have chroma of 2 or less. Fine earth texture ranges from fine sandy loam to silt loam.

The C horizon has hue of 5YR through 10YR, value of 3 through 5, and chroma of 1 through 4. Fine earth texture is loam or fine sandy loam above a depth of 40 inches and ranges from loam to sand below that depth.

Berks Series

The soils of the Berks series are loamy-skeletal, mixed, mesic, Typic Dystrochrepts. They are moderately deep, well drained soils on broad ridges, benches, and hillsides. They formed in material weathered from shale, siltstone, and sandstone. Slopes range from 3 to 25 percent.

Berks soils are near the deep, well drained Hartleton soils, the shallow, well drained Weikert soils, and the deep, moderately well drained Watson soils.

Typical pedon of Berks channery silt loam, 15 to 25 percent slopes, in Old Lycoming Township, about 50 yards east of Township Route 410 and 0.5 mile north of Legislative Route 41033, in a pipeline ditch:

Ap—0 to 7 inches; dark brown (10YR 3/3) channery silt loam; weak fine granular structure; friable; 25 percent coarse fragments; slightly acid; clear smooth boundary.
B1—7 to 14 inches; brown (10YR 5/3) channery silt loam; weak fine and medium subangular blocky structure; friable; 35 percent coarse fragments; slightly acid; abrupt wavy boundary.
B2—14 to 21 inches; yellowish brown (10YR 5/4) very channery silt loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few thin patchy clay films in pores; 60 percent coarse fragments; strongly acid; irregular boundary.
C—21 to 28 inches; yellowish brown (10YR 5/6) very channery loam; massive; firm; 80 percent coarse fragments; strongly acid; gradual wavy boundary.
R—28 inches; dark grayish brown (2.5Y 4/2) and light olive brown (2.5Y 5/4) fractured shale bedrock.

The solum is 18 to 30 inches thick. Bedrock is at a depth of 20 to 40 inches. Coarse fragments make up 15 to 35 percent of the A horizon, 25 to 60 percent of the B horizon, and 40 to 80 percent of the C horizon. In unlimed areas reaction is very strongly acid or strongly acid throughout.

The A horizon has hue of 10YR, value of 3 through 5, and chroma of 3. Fine earth texture is silt loam or loam.

The B horizon has hue of 10YR through 5YR, value of 4 or 5, and chroma of 3 through 8. Fine earth texture is silt loam or loam.

The C horizon has hue of 10YR through 5YR, value of 4 or 5, and chroma of 4 through 6.

Buchanan Series

The soils of the Buchanan series are fine-loamy, mixed, mesic Aquic Fragiudults. They are deep, moderately well drained soils on side slopes and foot slopes of mountains. They formed in colluvium derived from siltstone, sandstone, and shale. Slopes range from 0 to 25 percent.

Buchanan soils are near the deep, well drained Laidig soils and the deep, moderately well drained Watson soils. Buchanan and Laidig soils formed in colluvium, and Watson soils formed in glacial till.

Typical pedon of Buchanan channery loam, in an area of Buchanan very stony loam, 8 to 25 percent slopes, in Armstrong Township, 1 mile east of Little League Headquarters, 50 yards south of U.S. Route 15, in a borrow pit:

O1—2 inches to 1 inch; hardwood leaf litter.
O2—1 inch to 0; very dark gray (10YR 3/1) partly decomposed organic matter.
A1—0 to 5 inches; yellowish brown (10YR 5/4) channery loam; weak fine granular structure; friable; slightly sticky; 30 percent coarse fragments; very strongly acid; gradual wavy boundary.
B1—5 to 10 inches; yellowish brown (10YR 5/6) channery silt loam; weak, fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; thin patchy clay films in pores; 15 percent coarse fragments; very strongly acid; gradual wavy boundary.
B21t—10 to 16 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; few thin patchy clay films on faces of peds; 5 percent coarse fragments; very strongly acid; gradual wavy boundary.
B22t—16 to 20 inches; light yellowish brown (10YR 6/4) sandy clay loam; common fine faint light gray (10YR 7/2) and pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common thin continuous clay films on faces of peds; 5 percent coarse fragments; very strongly acid; abrupt wavy boundary.
Bx—20 to 42 inches; pale brown (10YR 6/3) sandy clay loam; many medium prominent yellowish brown (10YR 5/8), yellowish red (5YR 5/8), and light gray (10YR 7/2) mottles; strong very coarse prismatic structure parting to strong fine and medium blocky; very firm and brittle, very sticky and plastic; common thick patchy clay films on prism faces; 10 percent coarse fragments; very strongly acid; abrupt wavy boundary.
C—42 to 85 inches; strong brown (7.5YR 5/6) very channery sandy clay loam; common medium prominent very pale brown (10YR 7/3) and yellowish brown (10YR 5/6) mottles; massive; very firm and brittle, slightly sticky and slightly plastic; few thin patchy clay films in pores; 60 percent coarse fragments; strongly acid.

The solum is 40 to 60 inches thick. Bedrock is at a depth of 60 to 96 inches or more. The fragipan is at a depth of 20 to 36 inches. Coarse fragments make up 5 to 40 percent of each layer above the fragipan and 10 to 60 percent of the fragipan and the C horizon. In unlimed areas reaction ranges from extremely acid to strongly acid throughout.

The A horizon has hue of 7.5YR or 10YR, value of 3 through 6, and chroma of 1 through 4. Fine earth texture is loam or silt loam.

The B1 and B2 horizons have hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 through 6. Fine earth texture ranges from silt loam to sandy clay loam.

The Bx horizon has hue of 5YR through 10YR, value of 4 through 6, and chroma of 3 through 6. Fine earth texture ranges from sandy clay loam to loam.

The C horizon has hue of 5YR through 10YR, value of 5 or 6, and chroma of 1 through 8. Fine earth texture ranges from sandy clay loam to loam.

Chenango Series

The soils of the Chenango series are loamy-skeletal, mixed, mesic Typic Dystrochrepts. They are deep, well drained and somewhat excessively drained soils on stream terraces and on kames. They formed in gravelly, glacial outwash material. Slopes range from 0 to 3 percent.

Chenango soils are near the deep, somewhat poorly drained Rexford soils, and, on nearby floodplains, the deep, well drained Linden and Barbour soils, the deep, moderately well drained and somewhat poorly drained Basher soils, and the deep, poorly drained and very poorly drained Holly soils.

Typical pedon of Chenango gravelly loam, 0 to 3 percent slopes, in Muncy Creek Township, about 1/2 mile southwest of Lime Bluff quarry, at intersection of Legislative Routes 41040 and 41065, in a gravel pit:

Ap—0 to 9 inches; dark grayish brown (2.5Y 4/2) gravelly loam; weak fine and medium granular structure; friable; 15 percent coarse fragments; neutral; abrupt smooth boundary.

B21—9 to 19 inches; dark brown (7.5YR 4/4) gravelly silt loam; weak fine subangular blocky structure; friable, slightly sticky; 35 percent coarse fragments; slightly acid; gradual wavy boundary.

B22—19 to 22 inches; dark brown (10YR 4/3) gravelly silt loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; 30 percent coarse fragments; medium acid; abrupt wavy boundary.

B23—22 to 26 inches; dark brown (7.5YR 4/4) gravelly sandy loam; weak fine granular structure; friable; 40 percent coarse fragments; strongly acid; abrupt smooth boundary.

IIC1—26 to 38 inches; dark brown (10YR 4/3) very gravelly coarse sand; single grained; loose; 50 percent coarse fragments; strongly acid; abrupt smooth boundary.

IIC2—38 to 64 inches; brown (10YR 5/3) very gravelly coarse sand; single grained; loose; 70 percent coarse fragments; strongly acid.

The solum is 24 to 34 inches. Bedrock is at a depth of more than 60 inches. Coarse fragments make up 15 to 35 percent of the A horizon, 20 to 55 percent of the B horizon, and 40 to 70 percent of the C horizon. On the average, they make up more than 35 percent of the particle-size control section. In unlimed areas reaction is strongly acid or moderately acid in the solum and ranges from strongly acid to neutral in the C horizon.

The Ap horizon has hue of 2.5Y, value of 3 through 5, and chroma of 2 or 3.

The B horizon has hue of 7.5YR through 2.5Y, value of 4 or 5, and chroma of 3 through 6. Fine earth texture ranges from sandy loam to silt loam.

The C horizon has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 2 through 4.

Clarksburg Series

The soils of the Clarksburg series are fine-loamy, mixed, mesic Typic Fragiudalfs. They are deep, moderately well drained soils on concave, lower slopes of hills and ridges. They formed in colluvium, glacial till, or residuum. Slopes range from 0 to 8 percent.

Clarksburg soils are near the deep, well drained Washington and Hagerstown soils.

Typical pedon of Clarksburg silt loam, 3 to 8 percent slopes, located in Muncy Township, about 400 yards south of Chippewa Lime Quarry, west side of Legislative Route 41061, in a roadbank:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable, slightly sticky; 2 percent coarse fragments; neutral; gradual wavy boundary.

B1—9 to 13 inches; strong brown (7.5YR 5/6) silt loam; weak fine subangular blocky structure; friable, slightly sticky; 2 percent coarse fragments; neutral; clear wavy boundary.

B21t—13 to 23 inches; brown (7.5YR 5/4) silt loam; moderate medium subangular blocky structure; firm, sticky and plastic; few thin patchy clay films on faces of peds; 2 percent coarse fragments; neutral; gradual wavy boundary.

B22t—23 to 36 inches; brown (7.5YR 5/4) silty clay loam; common medium distinct light brownish gray (10YR 6/2) mottles; moderate fine and medium subangular blocky structure; firm, sticky and plastic; common thick continuous clay films on faces of peds; 2 percent coarse fragments; medium acid; clear wavy boundary.

Bx1—36 to 41 inches; strong brown (7.5YR 5/6) silty clay loam; common fine distinct pinkish gray (7.5YR 7/2) and yellowish red (5YR 5/6) mottles; moderate very coarse prismatic structure parting to moderate medium platy; very firm and brittle, sticky and plastic; common thick continuous clay films on prism faces; 5 percent coarse fragments; strongly acid; gradual wavy boundary.

Bx2—41 to 50 inches; strong brown (7.5YR 5/6) silty clay loam; many fine distinct light gray (N 7/0) and yellowish red (5YR 5/6) mottles; moderate coarse prismatic structure parting to strong medium blocky; very firm and brittle, sticky and slightly plastic; few

thick patchy clay films on prism faces; 5 percent coarse fragments; strongly acid; gradual wavy boundary.
C—50 to 60 inches; strong brown (7.5YR 5/8) gravelly clay loam; many medium prominent light gray (N 7/0), pinkish gray (7.5YR 7/2) and reddish yellow (7.5YR 6/8) mottles; massive; extremely firm, slightly sticky; 30 percent coarse fragments; medium acid.

The solum is 40 to 60 inches thick. Bedrock is at a depth of more than 60 inches. The fragipan is at a depth of 22 to 36 inches. Coarse fragments make up 0 to 20 percent of the layers above the fragipan, 5 to 30 percent of the fragipan, and 5 to 80 percent of the C horizon. In limed areas reaction ranges from slightly acid to strongly acid throughout.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3.

The B1 and B2t horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 8. Fine earth texture is silt loam or silty clay loam.

The Bx horizon has hue of 5YR through 10YR, value of 4 or 5, and chroma of 3 through 6. Fine earth texture is silt loam or silty clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 4 through 8. Fine earth texture is silt loam, silty clay loam, clay loam, or clay.

Clymer Series

The soils of the Clymer series are fine-loamy, mixed, mesic Typic Hapludults. They are deep, well drained soils on mountaintops and benches. They formed in material weathered from sandstone, siltstone, and shale. Slopes range from 0 to 25 percent.

Clymer soils are near Dekalb and Cookport soils. Clymer soils are deeper to bedrock than Dekalb soils and are better drained than Cookport soils.

Typical pedon of Clymer channery loam, 8 to 15 percent slopes, in Watson Township, 100 yards east of Big Spring Road, about 200 yards north of Gamble Trail, in woodland:

O1—1 inch to 0; hardwood leaf litter.
A1—0 to 3 inches; very dark brown (10YR 2/2) channery loam; weak medium granular structure; friable; 15 percent coarse fragments; strongly acid; clear wavy boundary.
A2—3 to 7 inches; yellowish brown (10YR 5/4) channery loam; weak fine granular and weak fine subangular blocky structure; friable; 15 percent coarse fragments; strongly acid; abrupt wavy boundary.
B21t—7 to 15 inches; brownish yellow (10YR 6/6) channery loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; common thin continuous clay films on faces of peds; 20 percent coarse fragments; strongly acid; clear wavy boundary.
B22t—15 to 24 inches; dark brown (7.5YR 4/4) channery sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and plastic; common thin continuous clay films on faces of peds and lining pores; 30 percent coarse fragments; strongly acid; clear wavy boundary.
B23t—24 to 30 inches; strong brown (7.5YR 5/6) very channery sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few thin discontinuous clay films on faces of peds and lining pores; 50 percent coarse fragments; strongly acid; gradual wavy boundary.
C—30 to 44 inches; yellowish brown (10YR 5/6) very channery sandy loam; massive; very friable; 70 percent coarse fragments; strongly acid; gradual wavy boundary.
R—44 inches; gray (10YR 5/1) and brown (10YR 5/3) sandstone bedrock.

The solum is 24 to 40 inches thick. Bedrock is at a depth of 42 to 60 inches. Coarse fragments make up 15 to 30 percent of the A horizon, 5 to 50 percent of the B horizon, and 40 to 75 percent of the C horizon. On average they make up less than 35 percent of the control section. In unlimed areas reaction is strongly acid or very strongly acid throughout.

The A horizon has hue of 10YR, value of 2 through 5, and chroma of 2 through 4.

The B horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 4 through 8. Fine earth texture ranges from sandy clay loam to loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 4 through 6. Fine earth texture is loam or sandy loam.

Cookport Series

The soils of the Cookport series are fine-loamy, mixed, mesic Aquic Fragiudults. They are deep, moderately well drained soils on broad ridgetops of the Allegheny Plateau. They formed in material weathered from sandstone, siltstone, and shale. Slopes range from 0 to 25 percent.

Cookport soils are near the deep, well drained Clymer soils, the moderately deep, well drained Dekalb soils, and the deep, poorly drained Nolo soils.

Typical pedon of Cookport channery loam, in an area of Cookport very stony loam, 0 to 8 percent slopes, in McHenry Township, 1.5 miles north of Okome on Township Route 760, 300 feet east of Barrens Road, in State Forest Land:

O1—2 inches to 1 inch; hardwood leaf litter.
O2—1 inch to 0; dark brown (10YR 4/3) partly decomposed leaf litter.
A1—0 to 4 inches; very dark grayish brown (10YR 3/2) channery loam; weak fine granular structure; friable;

30 percent coarse fragments; strongly acid; abrupt smooth boundary.
A2—4 to 6 inches; brown (10YR 5/3) channery loam; weak fine granular structure; friable; 30 percent coarse fragments; very strongly acid; abrupt smooth boundary.
B21—6 to 15 inches; dark brown (7.5YR 4/4) channery clay loam; weak fine subangular blocky structure; friable, slightly sticky; 30 percent coarse fragments; very strongly acid; gradual wavy boundary.
B22t—15 to 22 inches; yellowish brown (10YR 5/8) sandy clay loam; common fine faint pinkish gray (7.5YR 6/2) and light brownish gray (10YR 6/2) mottles; weak and moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few thin patchy clay films on faces of peds; 10 percent coarse fragments; strongly acid; gradual wavy boundary.
Bx1—22 to 31 inches; strong brown (7.5YR 5/8) channery sandy clay loam; many medium prominent pinkish gray (7.5YR 6/2) and light brownish gray (10YR 6/2) mottles; strong very coarse prismatic structure parting to moderate fine subangular blocky; very firm and brittle, slightly sticky; few thin discontinuous clay films on faces of peds; 15 percent coarse fragments; very strongly acid; clear wavy boundary.
Bx2—31 to 39 inches; strong brown (7.5YR 5/6) channery clay loam; many fine distinct pale brown (10YR 6/3) and light gray (N 7/0) mottles; moderate coarse prismatic structure parting to moderate thin platy; very firm and brittle, slightly sticky; 20 percent coarse fragments; very strongly acid; clear wavy boundary.
C—39 to 48 inches; grayish brown (10YR 5/2) channery sandy loam; few fine faint strong brown (7.5YR 5/6) mottles; massive; firm; 35 percent coarse fragments; very strongly acid; abrupt smooth boundary.
R—48 inches; pale brown (10YR 6/3) and dark grayish brown (10YR 4/2) sandstone bedrock.

The solum is 28 to 40 inches thick. Bedrock is at a depth of 40 to 72 inches. The fragipan is at a depth of 16 to 27 inches. Coarse fragments make up from 0 to 30 percent of the A and B horizons and from 10 to 40 percent of the C horizon. In unlimed areas reaction is very strongly acid or strongly acid throughout.

The A horizon has hue of 10YR or 2.5Y, value of 2 through 5, and chroma of 2 through 6. Fine earth texture is loam or sandy loam.

The B2 and Bx horizons have hue of 7.5YR through 2.5Y, value of 4 or 5, and chroma of 4 through 8. Fine earth texture is loam, clay loam, or sandy clay loam.

The C horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 through 4. Fine earth texture is loam or sandy loam.

Dekalb Series

The soils of the Dekalb series are loamy-skeletal, mixed, mesic Typic Dystrochrepts. They are moderately deep, well drained, gently sloping to very steep soils on mountainsides and ridges. They formed in material weathered from sandstone. Slopes range from 0 to 80 percent.

Dekalb soils are near the deep, well drained Clymer and Laidig soils, the moderately deep, well drained Lehew soils, and the deep, moderately well drained Cookport soils.

Typical pedon of Dekalb very channery sandy loam, in an area of Dekalb and Lehew very stony sandy loams, 25 to 80 percent slopes, in Armstrong Township, about 200 feet north of Pennsylvania Route 554, 550 feet northeast of Skyline Drive, in woodland:

O1—2 inches to 1 inch; hardwood leaf litter.
O2—1 inch to 0; black (N 2/) organic mat of partly decomposed leaf litter, twigs, and fine roots.
A1—0 to 3 inches; very dark grayish brown (10YR 3/2) very channery sandy loam; weak fine granular structure; very friable; 50 percent coarse fragments; strongly acid; abrupt smooth boundary.
A2—3 to 9 inches; pale brown (10YR 6/3) very channery sandy loam; weak fine granular structure; very friable; 60 percent coarse fragments; strongly acid; abrupt smooth boundary.
B1—9 to 14 inches; yellowish brown (10YR 5/4) very channery loam; weak fine subangular blocky structure; friable; 60 percent coarse fragments; strongly acid; gradual wavy boundary.
B2—14 to 22 inches; brown (7.5YR 5/4) very channery loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; 40 percent coarse fragments; strongly acid; gradual wavy boundary.
B3—22 to 32 inches; yellowish brown (10YR 5/6) very channery sandy loam; weak medium subangular blocky structure; friable; 60 percent coarse fragments; strongly acid; abrupt smooth boundary.
C—32 to 36 inches; strong brown (7.5YR 5/6) very channery loamy sand; single grained; loose; 80 percent coarse fragments; strongly acid; abrupt wavy boundary.
R—36 inches; gray (10YR 5/1) sandstone bedrock.

The solum is 20 to 40 inches thick. Bedrock is at a depth of 20 to 40 inches. Coarse fragments make up 15 to 60 percent of the solum and 50 to 90 percent of the C horizon. On average, they make up more than 35 percent of the control section. In unlimed areas reaction ranges from strongly acid to extremely acid throughout.

The A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. Fine earth texture is loam or sandy loam.

The A2 horizon has hue of 10YR, value of 5 or 6, and chroma of 1 through 4. Fine earth texture is dominantly loam or sandy loam.

The B horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 through 8. Fine earth texture is loam or sandy loam.

The C horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 4 through 6. Fine earth texture is sandy loam or loamy sand.

Duncannon Series

The soils of the Duncannon series are coarse-silty, mixed, mesic Ultic Hapludalfs. They are deep, well drained soils on hilltops and terraces. They formed in wind-transported, loamy material overlying a variety of other material. Slopes range from 3 to 8 percent.

Duncannon soils are near the deep, well drained Allenwood and Washington soils and the deep, moderately well drained Watson soils.

Typical pedon of Duncannon loam, 3 to 8 percent slopes, in Porter Township, about 400 yards west of Township Route 312 and 500 yards north of Legislative Route 41017, in a field:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; neutral; abrupt smooth boundary.

B1—9 to 15 inches; yellowish brown (10YR 5/4) silt loam; weak coarse blocky structure; friable, slightly sticky and slightly plastic; neutral; clear smooth boundary.

B21t—15 to 24 inches; brown (7.5YR 5/4) silt loam; weak medium and coarse blocky structure; friable, slightly sticky and plastic; few thin patchy clay films on faces of peds and few moderately thick clay films in pores; neutral; clear smooth boundary.

IIB22t—24 to 30 inches; yellowish red (5YR 4/6) silt loam; moderate medium and coarse blocky structure; friable, slightly sticky and plastic; common thin continuous clay films on faces of peds; common moderately thick clay films in pores; very strongly acid; clear smooth boundary.

IIB23t—30 to 38 inches; yellowish red (5YR 4/6) silt loam; moderate fine and medium blocky structure; firm, sticky and plastic; common moderately thick continuous clay films on faces of peds and in pores; very strongly acid; clear smooth boundary.

IIB24t—38 to 47 inches; reddish brown (2.5YR 4/4) silt loam; moderate fine and medium blocky structure; friable, sticky and plastic; common moderately thick continuous clay films on faces of peds and in pores; strongly acid; abrupt wavy boundary.

IIC1—47 to 60 inches; reddish brown (5YR 4/4) silt loam; moderate thin platy structure; friable, slightly sticky and slightly plastic; few thin discontinuous clay films on faces of peds; strongly acid; abrupt wavy boundary.

IIC2—60 to 65 inches; reddish brown (5YR 4/4) very fine sandy loam with thin bands of strong brown (7.5YR 5/6) loamy fine sand; weak thin platy structure; friable; very strongly acid; abrupt wavy boundary.

IIC3—65 to 70 inches; reddish brown (5YR 4/4) silt loam; moderate thin platy structure; friable, slightly sticky and slightly plastic; very strongly acid; abrupt wavy boundary.

The solum is 40 to 60 inches thick. Bedrock is at a depth of more than 60 inches. Coarse fragments make up 0 to 10 percent of the solum and 0 to 50 percent of the substratum. In unlimed areas reaction ranges from very strongly acid to moderately acid in the solum and from very strongly acid to slightly acid in the substratum.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 through 4. Fine earth texture is loam, very fine sandy loam, or silt loam.

The B horizon has hue of 2.5YR through 10YR, value of 4 or 5, and chroma of 2 through 8. Fine earth texture is silt loam or fine sandy loam.

The C horizon has hue of 10R through 10YR, value of 3 through 5, and chroma of 2 through 8. Fine earth texture is silt loam or very fine sandy loam.

The Duncannon soils in Lycoming County are taxadjuncts to the Duncannon series because they have more sand in the solum and a lower base saturation than defined for the series. These differences do not significantly affect use or management of the soils.

Dystrochrepts

Dystrochrepts are shallow to deep, moderately well drained to excessively drained soils. They formed in material derived mainly from sandstone and, in some places, shale. These soils are on mountain ridgetops and side slopes. Slopes are nearly level to very steep.

Dystrochrepts are near the moderately deep, well drained Dekalb and Oquaga soils, the deep, well drained Laidig soils, and Rubble land.

Dystrochrepts differ from area to area; thus, a typical pedon is not given. Generally, the solum ranges from 10 to 60 inches in thickness. Depth to bedrock is 18 inches to more than 60 inches. The content of rock fragments, which consist mainly of stones and boulders, ranges from 15 to 90 percent throughout. In unlimed areas the soil ranges from strongly acid to extremely acid throughout. Base saturation is less than 60 percent in the B and C horizons.

The A horizon dominantly has hue of 2.5YR through 10YR, value of 2 through 4, and chroma of 2 through 6. Fine earth texture is loam or sandy loam.

The B horizon is a cambric horizon. In some pedons, below a depth of 8 inches, it has mottles that have chroma of 2 or less. In most pedons it has hue of 5YR

through 10YR; in a few places it is 2.5Y. It has value of 4 through 7 and chroma of 2 through 6. Fine earth texture is loam or sandy loam.

The colors of the C horizon differ from area to area. Fine earth texture ranges from loam through loamy sand.

Hagerstown Series

The soils of the Hagerstown series are fine, mixed, mesic Typic Hapludalfs. They are deep, well drained soils on valley floors and adjacent hills. They formed in material weathered from hard limestone. Slopes range from 0 to 30 percent.

Hagerstown soils are near the deep, well drained Washington soils, which formed in till, and the deep, moderately well drained Clarksburg soils.

Typical pedon of Hagerstown silt loam, 3 to 8 percent slopes, in Limestone Township, about 1,320 feet north of Pennsylvania Route 44, on the west side of Township Route 348, in a cultivated field:

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam; moderate medium granular structure; friable, slightly sticky and slightly plastic; neutral; abrupt smooth boundary.

B1—8 to 16 inches; dark brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; neutral; clear wavy boundary.

B21t—16 to 24 inches; yellowish red (5YR 5/6) clay; moderate fine and medium subangular blocky structure; friable, sticky and plastic; many thin patchy clay films on faces of peds; neutral; diffuse wavy boundary.

B22t—24 to 34 inches; yellowish red (5YR 5/8) clay; strong fine and medium blocky structure; firm, sticky and plastic; many thick continuous clay films on faces of peds; 10 percent weathered limestone fragments; neutral; gradual wavy boundary.

B23t—34 to 44 inches; yellowish red (5YR 5/8) clay; strong fine and medium subangular blocky structure; firm, sticky and plastic; many thick continuous clay films on faces of peds; neutral; diffuse wavy boundary.

B3t—44 to 60 inches; yellowish red (5YR 5/8) silty clay loam; moderate medium subangular blocky structure; friable, sticky and plastic; many thick discontinuous clay films on faces of peds; neutral.

The solum is 40 to 72 inches thick. Bedrock is at a depth of more than 42 inches. The content of coarse fragments ranges from 0 to 15 percent in each layer in the profile. In unlimed areas reaction is strongly acid or very strongly acid in the upper part of the solum and ranges from strongly acid to neutral in the lower part.

The Ap horizon has hue of 10YR through 5YR, value of 3 or 4, and chroma of 3 or 4. Fine earth texture is silt loam, silty clay loam, or clay loam.

The B1 horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 through 8. Fine earth texture ranges from silt loam to clay.

The Bt horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 4 through 8. Fine earth texture ranges from silty clay loam to clay.

Some pedons have a C horizon that has hue of 10YR through 2.5YR, value of 3 through 6, and chroma of 4 through 8. Fine earth texture ranges from silt loam to clay.

Hartleton Series

The soils of the Hartleton series are loamy-skeletal, mixed, mesic Typic Hapludults. They are deep, well drained soils on low hills and ridges. They formed in glacial till derived from sandstone and shale. Slopes are convex and range from 3 to 25 percent.

Hartleton soils are near the deep, well drained Allenwood soils, which have fewer coarse fragments than Hartleton soils, the moderately deep, well drained Berks soils, the shallow, well drained Weikert soils, and Alvira, Shelmadine, and Watson soils, all three of which have fragipans.

Typical pedon of Hartleton channery silt loam, 15 to 25 percent slopes, in Old Lycoming Township, along Township Route 393, 75 feet west of intersection of Township Routes 393, 395, and 406, in a roadbank:

O1—2 inches to 1 inch; leaf litter, twigs, and branches.

O2—1 inch to 0; very dark brown (10YR 2/2) partly decomposed leaf litter.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) channery silt loam; weak fine granular structure; friable; 15 percent coarse fragments; strongly acid; gradual wavy boundary.

B1—2 to 6 inches; light yellowish brown (10YR 6/4) channery silt loam; weak fine subangular blocky structure; friable, slightly sticky; 25 percent coarse fragments; strongly acid; clear wavy boundary.

B21t—6 to 14 inches; light yellowish brown (10YR 6/4) channery silt loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few thin patchy clay films on faces of peds; 35 percent coarse fragments; strongly acid; gradual wavy boundary.

B22t—14 to 25 inches; yellowish brown (10YR 5/4) channery silt loam; moderate medium subangular blocky structure; friable, sticky and plastic; common thin discontinuous clay films on faces of peds; few thick, patchy clay films in pores; 40 percent coarse fragments; strongly acid; clear wavy boundary.

B3—25 to 32 inches; yellowish brown (10YR 5/4) channery silt loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few thin, patchy clay films in pores; 45

percent coarse fragments; strongly acid; abrupt smooth boundary.
C1—32 to 43 inches; yellowish brown (10YR 5/6) very channery silt loam; massive; friable, slightly sticky and slightly plastic; 60 percent coarse fragments; strongly acid; abrupt smooth boundary.
C2—43 to 52 inches; light yellowish brown (10YR 6/4) very channery loam; massive; friable; 90 percent coarse fragments; strongly acid; abrupt wavy boundary.
R—52 inches; olive brown (2.5Y 4/4) fractured sandstone and shale bedrock.

The solum is 30 to 40 inches thick. Bedrock is at a depth of more than 40 inches. Coarse fragments make up 15 to 35 percent of the A horizon, 25 to 60 percent of each layer within the B horizon, and 60 to 90 percent of the C horizon. In unlimed areas reaction is strongly acid or very strongly acid throughout.

The A horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 through 4. Fine earth texture is silt loam or loam.

The B horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 through 6. Fine earth texture ranges from loam to silty clay loam.

The C horizon has hue of 10YR through 5YR, value of 5 or 6, and chroma of 4 through 6. Fine earth texture is loam or silt loam.

Holly Series

The soils of the Holly series are fine-loamy, mixed, nonacid, mesic Typic Fluvaquents. They are deep, poorly drained and very poorly drained soils on flood plains. They formed in alluvium. Slopes range from 0 to 3 percent.

Holly soils are near the deep, well drained Linden and Barbour soils and the deep, moderately well drained and somewhat poorly drained Basher soils.

Typical pedon of Holly silt loam, in Franklin Township, 1/2 mile west of Lairdsville on Pennsylvania Route 118, 100 yards northwest of Pennsylvania Route 118, in a pasture:

A1—0 to 5 inches; very dark gray (10YR 3/1) silt loam; weak fine granular structure; friable; medium acid; clear wavy boundary.
B1g—5 to 10 inches; light brownish gray (2.5Y 6/2) silt loam; common medium distinct dark grayish brown (10YR 4/2) and brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable; 5 percent coarse fragments; medium acid; abrupt wavy boundary.
B21g—10 to 18 inches; gray (5Y 5/1) silt loam; many medium distinct reddish yellow (7.5YR 6/6) and light brown (7.5YR 6/4) mottles; moderate medium subangular blocky structure; friable, slightly sticky; medium acid, clear wavy boundary.
B22g—18 to 23 inches; gray (N 5/0) silty clay loam; common medium distinct yellowish red (5YR 5/6) and reddish yellow (7.5YR 6/6) mottles; moderate coarse subangular blocky structure; friable, slightly sticky and slightly plastic; medium acid; clear wavy boundary.
C1g—23 to 38 inches; gray (5Y 5/1) very fine sandy loam; common medium distinct dark reddish brown (5YR 3/4), strong brown (7.5YR 5/6), and reddish yellow (7.5YR 6/8) mottles; massive; friable; medium acid; gradual wavy boundary.
C2g—38 to 48 inches; gray (5Y 5/1) sandy loam; massive; friable; medium acid; clear wavy boundary.
IIC3g—48 to 60 inches; gray (5Y 5/1) loamy sand; massive; very friable; 25 percent coarse fragments; medium acid.

The solum is 20 to 30 inches thick. Bedrock is at a depth of more than 60 inches. Coarse fragments make up 0 to 10 percent of the solum and 0 to 25 percent of the substratum. In unlimed areas reaction is moderately acid or slightly acid throughout.

The A horizon has hue of 10YR, value of 2 through 4, and chroma of 1 or 2. Fine earth texture is silt loam or loam.

The B horizon is neutral or has hue of 10YR through 5Y, value of 4 through 6, and chroma of 0 to 2. Fine earth texture ranges from loam to silty clay loam.

The C horizon is neutral or has hue of 10YR through 5Y, value of 3 through 6, and chroma of 0 to 2. Above the IIC horizon fine earth texture is sandy loam, very fine sandy loam, loam, silt loam, and silty clay loam.

Klinesville Series

The soils of the Klinesville series are loamy-skeletal, mixed, mesic Lithic Dystrochrepts. They are shallow, well drained soils on low hills and ridges. They formed in material weathered from shale, siltstone, and sandstone. Slopes range from 3 to 80 percent.

Klinesville soils are near the deep, well drained Leck Kill soils, the deep, moderately well drained Albrights soils, the moderately deep, well drained Oquaga soils, and the shallow and well drained Weikert soils.

Typical pedon of Klinesville shaly silt loam, 3 to 8 percent slopes, in Watson Township, 1/4 mile south of the intersection of Township Route 342 and Pennsylvania Route 973, along Township Route 342, in a roadbank:

O2—1 inch to 0; dark reddish brown (5YR 3/2) partly decomposed roots and leaf litter.
A1—0 to 4 inches; reddish brown (2.5YR 4/4) shaly silt loam; weak very fine granular structure; very friable, slightly sticky and slightly plastic; 20 percent coarse fragments; strongly acid; clear wavy boundary.

B—4 to 12 inches; weak red (10R 4/4) shaly silt loam; moderate fine subangular blocky structure; friable, sticky and slightly plastic; few thin continuous clay films in pores; 40 percent coarse fragments; very strongly acid; clear wavy boundary.
C—12 to 19 inches; weak red (10R 4/3) very shaly silt loam; massive; firm; 80 percent coarse fragments; strongly acid; abrupt wavy boundary.
R—19 inches; dusky red (10R 3/2) fractured shale bedrock.

The solum is 10 to 15 inches thick. Bedrock is at a depth of 10 to 20 inches. Coarse fragments make up 15 to 75 percent of the A and B horizons and 50 to 90 percent of the C horizon. They average more than 50 percent in the control section. In unlimed areas reaction ranges from very strongly acid to moderately acid throughout.

The A horizon has hue of 5YR or 2.5YR, value of 3 or 4, and chroma of 3 or 4. Fine earth texture is silt loam or loam.

The B horizon has hue of 2.5YR or 10R, value of 3 or 4, and chroma of 4 or 5. Fine earth texture is silt loam or loam.

The C horizon has hue of 2.5YR or 10R, value of 3 or 4, and chroma of 3 through 6. Fine earth texture is silt loam or loam.

Lackawanna Series

The soils of the Lackawanna series are coarse-loamy, mixed, mesic Typic Fragiochrepts. They are deep, well drained, nearly level to moderately steep soils on glaciated mountaintops and benches. They formed in firm Wisconsinan glacial till derived from reddish sandstone, siltstone, and shale. Slopes range from 0 to 25 percent.

Lackawanna soils are near the moderately deep, well drained, Oquaga soils, the deep, moderately well drained Wellsboro soils, the deep, somewhat poorly drained Morris soils, and the deep, poorly drained and very poorly drained Norwich soils.

Typical pedon of Lackawanna channery silt loam, 3 to 8 percent slopes, in Gamble Township, on the north side of Legislative Route 41047, 100 feet west of the intersection of Township Route 693 and Legislative Route 41047, in a roadbank:

Ap—0 to 8 inches; dark reddish brown (5YR 3/4) channery silt loam; weak fine and medium granular structure; very friable; 15 percent coarse fragments; neutral; abrupt wavy boundary.
B21—8 to 13 inches; reddish brown (2.5YR 4/4) channery loam; weak medium subangular blocky structure; friable, slightly sticky; 25 percent coarse fragments; slightly acid; gradual wavy boundary.
B22—13 to 20 inches; reddish brown (2.5YR 4/4) channery loam; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; few thin discontinuous clay films in pores; 30 percent coarse fragments; very strongly acid; gradual wavy boundary.
B23—20 to 28 inches; reddish brown (2.5YR 4/4) channery silt loam; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; common thin patchy clay films in pores; 30 percent coarse fragments; very strongly acid; gradual wavy boundary.
Bx1—28 to 38 inches; weak red (2.5YR 4/2) channery silt loam; strong coarse prismatic structure parting to moderate fine blocky; very firm and brittle, sticky and slightly plastic; common thin patchy clay films in pores; 40 percent coarse fragments; very strongly acid; gradual wavy boundary.
Bx2—38 to 44 inches; dusky red (10R 3/4) channery silt loam; few fine faint light reddish brown (5YR 6/3) and yellowish red (5YR 5/8) mottles; weak coarse prismatic structure parting to weak thin platy; very firm and brittle, sticky and slightly plastic; few thin patchy clay films in pores; 45 percent coarse fragments; very strongly acid; clear wavy boundary.
C—44 to 68 inches; dusky red (10R 3/4) channery loam; massive; friable; 40 percent coarse fragments; very strongly acid.

The solum is 40 to 60 inches thick. Bedrock is at a depth of more than 60 inches. Depth to the fragipan ranges from 20 to 34 inches. Coarse fragments make up 15 to 40 percent of each layer above the fragipan and 20 to 50 percent of the fragipan and the C horizon. In unlimed areas reaction is very strongly acid or strongly acid above the fragipan and ranges from very strongly acid to moderately acid in the fragipan and the C horizon.

The Ap horizon has hue of 5YR through 10YR, value of 3 or 4, and chroma of 2 through 4.

The B2 horizon has hue of 2.5YR through 10YR, value of 4 or 5, and chroma of 4 through 6. Fine earth texture is loam or silt loam.

The Bx horizon has hue of 10R through 5YR, value of 3 through 5, and chroma of 2 through 4. Fine earth texture ranges from sandy loam to silt loam.

The C horizon has hue of 10R through 5YR, value of 3 through 5, and chroma of 2 through 4. Fine earth texture ranges from sandy loam to silt loam.

Laidig Series

The soils of the Laidig series are fine-loamy, mixed, mesic Typic Fragiudults. They are deep, well drained soils on the middle and lower slopes of mountainsides. They formed in colluvial material derived largely from acid gray sandstone and shale. Slopes range from 0 to 70 percent.

Laidig soils are near the moderately deep, well drained Dekalb soils and the deep, moderately well drained Buchanan soils.

Typical pedon of Laidig channery loam, in an area of Laidig very stony loam, 8 to 25 percent slopes, in Armstrong Township, about 1/2 mile west of Duboistown, 200 feet south of Pennsylvania Route 654, in woodland:

O1—2 inches to 1 inch; hardwood leaf litter.
O2—1 inch to 0; black (10YR 2/1) partly decomposed leaf litter.
A1—0 to 3 inches; very dark gray (10YR 3/1) channery loam; weak fine granular structure; friable; 15 percent coarse fragments; strongly acid; clear wavy boundary.
A2—3 to 8 inches; light yellowish brown (10YR 6/4) channery loam; weak fine subangular blocky structure; friable; 25 percent coarse fragments; strongly acid; clear wavy boundary.
B1—8 to 16 inches; yellowish brown (10YR 5/4) channery loam; weak medium subangular blocky structure; friable; 25 percent coarse fragments; strongly acid; abrupt wavy boundary.
B21t—16 to 23 inches; brown (7.5YR 5/4) channery sandy loam; moderate medium subangular blocky structure; friable, slightly sticky; few thin patchy clay films on faces of peds; 30 percent coarse fragments; strongly acid; clear wavy boundary.
B22t—23 to 30 inches; strong brown (7.5YR 5/6) channery sandy clay loam; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; common thick continuous clay films on faces of peds; 30 percent coarse fragments; strongly acid; abrupt wavy boundary.
Bx—30 to 65 inches; brown (7.5YR 5/4) channery sandy loam; few fine faint yellowish brown (10YR 5/4) and red (2.5YR 4/6) mottles; weak very coarse prismatic structure parting to weak thin platy; very firm, brittle; 35 percent coarse fragments; strongly acid.

The solum is 60 to 80 inches or more thick. Bedrock is at a depth of more than 60 inches. Depth to the fragipan ranges from 30 to 50 inches. Coarse fragments make up 10 to 35 percent of the A horizon and the layers of the B horizon above the fragipan and 30 to 70 percent of the fragipan. In unlimed areas reaction ranges from strongly acid to extremely acid throughout.

The A horizon has hue of 10YR or 7.5YR, value of 2 through 6, and chroma of 1 through 6. Fine earth texture is silt loam, loam, or sandy loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 4 through 6. In the B1 horizon fine earth texture ranges from silt loam to sandy loam and in the B2 horizon from silt loam to sandy loam or sandy clay loam.

The Bx horizon has hue of 5YR through 10YR, value of 4 or 5, and chroma of 3 through 6. Fine earth texture ranges from silt loam to sandy loam or sandy clay loam.

Leck Kill Series

The soils of the Leck Kill series are fine-loamy, mixed, mesic Typic Hapludults. They are deep, well drained soils on ridgetops and convex hillsides. They formed in residuum or glacial till derived from red shale, siltstone, or fine-grained sandstone. Slopes range from 3 to 25 percent.

Leck Kill soils are near the shallow, well drained Klinesville soils, the deep, moderately well drained Albrights soils, and the deep, well drained Lackawanna soils. Unlike the Leck Kill soils, the Albrights and Lackawanna soils have a fragipan.

Typical pedon of Leck Kill channery silt loam, 8 to 15 percent slopes, in Mifflin Township, 1/2 mile north of Larryville, at pipeline crossing on Township Route T-360, along Seeley Run, in a roadbank:

Ap—0 to 9 inches; reddish brown (5YR 4/3) channery silt loam; weak fine and medium granular structure; friable; 20 percent coarse fragments; slightly acid; abrupt wavy boundary.
B1—9 to 14 inches; reddish brown (2.5YR 4/4) channery silt loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; 25 percent coarse fragments; slightly acid; clear wavy boundary.
B21t—14 to 20 inches; reddish brown (2.5YR 4/4) channery silt loam; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; few thin patchy clay films on faces of peds; 20 percent coarse fragments; medium acid; abrupt smooth boundary.
B22t—20 to 26 inches; dark reddish brown (2.5YR 3/4) channery silty clay loam; fine to very fine subangular blocky structure; firm, slightly sticky and slightly plastic; common thick discontinuous clay films on faces of peds; many thin black coatings on coarse fragments; 30 percent coarse fragments; medium acid; gradual wavy boundary.
B23t—26 to 35 inches; reddish brown (2.5YR 4/4) channery silty clay loam; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; common thick discontinuous clay films on faces of peds; 35 percent coarse fragments; medium acid; gradual wavy boundary.
C—35 to 60 inches; reddish brown (2.5YR 4/4) very channery loam; massive; firm; few thin patchy clay films on coarse fragments; 80 percent coarse fragments; strongly acid; abrupt wavy boundary.
R—60 inches; dusky red (10R 3/2) interbedded sandstone and shale bedrock.

The solum is 24 to 48 inches thick. Bedrock is at a depth of more than 42 inches. Coarse fragments make up 10 to 25 percent of the A and B horizons, 10 to 40 percent of the Bt horizon, 35 to 65 percent of the B3 horizon, and 60 to 90 percent of the C horizon. Reaction is neutral to very strongly acid in the A and B horizons and medium acid to very strongly acid in the C horizon.

The Ap horizon has hue of 2.5YR through 7.5YR, value of 3 or 4, and chroma of 4. Fine earth texture is silt loam or loam.

The B horizon has hue of 10R through 5YR, value of 3 or 4, and chroma of 4 through 6. Fine earth texture is silt loam, loam, or silty clay loam.

The C horizon has hue of 10R through 5YR, value of 3 or 4, and chroma of 4 through 6. Fine earth texture is loam or silt loam.

Lehew Series

The soils of the Lehew series are loamy-skeletal, mixed, mesic Typic Dystrochrepts. They are moderately deep, well drained soils on steep and very steep mountainsides and ridges. They formed in material weathered mainly from sandstone. Slopes range from 25 to 80 percent. Lehew soils in this survey area are mapped only with Dekalb soils.

Lehew soils are near the deep, well drained Clymer and Laidig soils, the moderately deep, well drained Dekalb soils, and the deep, moderately well drained Cookport soils. Lehew soils are redder throughout than Dekalb soils.

Typical pedon of Lehew channery sandy loam, in an area of Dekalb and Lehew very stony sandy loams, 25 to 80 percent slopes, in Washington Township, on the north side of Yarison Road, about 2,000 feet south of the intersection with Walters Road, in a roadbank:

O1—2 inches to 1 inch; hardwood leaf litter.
O2—1 to 0 inch; black (N 2/) organic mat of partly decomposed leaf litter, twigs, and fine roots.
A1—0 to 3 inches; dark brown (7.5YR 4/2) channery sandy loam; weak fine granular structure; very friable; 40 percent coarse fragments; very strongly acid; clear smooth boundary.
A2—3 to 7 inches; reddish brown (5YR 4/4) channery sandy loam; weak fine granular structure; very friable; 40 percent coarse fragments; very strongly acid; clear wavy boundary.
B1—7 to 11 inches; reddish brown (5YR 5/4) very channery sandy loam; weak fine subangular blocky structure; very friable; 50 percent coarse fragments; very strongly acid; gradual wavy boundary.
B2—11 to 19 inches; reddish brown (2.5YR 4/4) very channery sandy loam; moderate medium subangular blocky structure; friable; 50 percent coarse fragments; very strongly acid; gradual wavy boundary.
C—19 to 26 inches; weak red (2.5YR 4/2) very channery loamy sand; massive; friable; 70 percent coarse fragments; very strongly acid; abrupt wavy boundary.
R—26 inches; weak red (10R 4/4) sandstone bedrock.

The solum is 15 to 30 inches thick. Bedrock is at a depth of 20 to 40 inches. Coarse fragments make up 30 to 50 percent of the solum and 50 to 90 percent of the C horizon. On the average, they make up more than 35 percent of the control section. In unlimed areas reaction is strongly acid or very strongly acid throughout.

The A1 horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 1 or 2. The A2 horizon has hue of 5YR or 7.5YR, value of 4 through 6, and chroma of 2 through 4. Fine earth texture of the A horizon is sandy loam or loam.

The B horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 through 6. Fine earth texture is sandy loam or loam.

The C horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 2 through 4. Fine earth texture is loamy sand or sandy loam.

Linden Series

The soils of the Linden series are coarse-loamy, mixed, mesic Fluventic Dystrochrepts. They are deep, well drained soils on flood plains. They formed in alluvial sediment derived mainly from red and brown shale and sandstone. Slopes range from 0 to 3 percent.

Linden soils are near the deep, well drained Barbour soils, the deep, moderately well drained and somewhat poorly drained Basher soils, and the deep, poorly drained and very poorly drained Holly soils. Linden soils have a thicker solum than Barbour soils.

Typical pedon of Linden loam, in an area of Linden soils, occasionally flooded, in Piatt Township, 2 miles southwest of the village of Linden and 1 mile southeast of the intersection of U.S. Route 220 and Pine Run Road; about 1,000 feet northwest of the Susquehanna River, 300 feet southeast of Pine Run, in a cultivated field:

Ap—0 to 9 inches; dark brown (7.5YR 3/2) loam; pinkish gray (7.5YR 6/2) dry; weak medium granular structure; friable, nonsticky and slightly plastic; few roots; neutral; abrupt smooth boundary.
B1—9 to 15 inches; reddish brown (5YR 4/4) loam; weak coarse subangular blocky structure; friable, nonsticky and slightly plastic; few roots; neutral; clear wavy boundary.
B2—15 to 31 inches; reddish brown (5YR 4/4) loam; weak medium subangular blocky structure; friable, nonsticky and slightly plastic; few roots; strongly acid; clear wavy boundary.
B3—31 to 37 inches; reddish brown (5YR 4/4) fine sandy loam; weak medium and coarse subangular

blocky structure; friable, nonsticky and nonplastic; few roots; strongly acid; clear wavy boundary.
C1—37 to 52 inches; reddish brown (5YR 4/4) fine sandy loam; massive; very friable, nonsticky and nonplastic; few roots; very strongly acid; abrupt smooth boundary.
C2—52 to 64 inches; brown (7.5YR 4/4) loamy fine sand stratified with thin lenses of brown (7.5YR 4/4) coarse sand and reddish brown (5YR 4/4) fine sandy loam; single grained; loose; no roots; very strongly acid.

The solum is 35 to 50 inches thick. Bedrock is at a depth of more than 60 inches. Coarse fragments make up 0 to 5 percent of the A horizon and the B1 and B2 horizons, 0 to 15 percent of the B3 horizon and the C horizon above a depth of 40 inches, and 0 to 50 percent of the C horizon below a depth of 40 inches. In unlimed areas reaction ranges from very strongly acid to moderately acid throughout.

The A horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3. Fine earth texture is loam, silt loam, or fine sandy loam.

The B horizon has hue of 2.5YR through 7.5YR, value of 3 through 5, and chroma of 3 or 4. Fine earth texture is silt loam, loam, or fine sandy loam.

The C horizon has hue of 5YR through 10YR, value of 4 or 5, and chroma of 3 or 4. Fine earth texture is fine sandy loam or loamy sand above a depth of 40 inches and ranges from fine sandy loam to sand below a depth of 40 inches.

Lordstown Series

The soils of the Lordstown series are coarse-loamy, mixed, mesic Typic Dystrochrepts. They are moderately deep, well drained soils on smooth or slightly convex slopes on mountaintops and side slopes that were glaciated. They formed in glacial till derived from sandstone, siltstone, and shale. Slopes range from 0 to 70 percent. Lordstown soils in this survey area are mapped only with Oquaga soils.

Lordstown soils are near the moderately deep, well drained Oquaga soils, the deep, well drained Lackawanna and Swartswood soils, and the deep, moderately well drained Wurtsboro soils. Unlike Lordstown soils, Oquaga soils have reddish colors. Lordstown soils have fewer coarse fragments throughout than Oquaga soils.

Typical pedon of Lordstown channery loam, in an area of Oquaga and Lordstown very stony loams, 8 to 25 percent slopes, in McIntyre Township on forestry road, 1/2 mile north of McIntyre coal mine, in a roadbank:

O1—11 inches to 9 inches; hardwood leaf litter.
O2—9 to 0 inches; black (N/2) partly decomposed fibrous organic matter; strongly acid.
A1—0 to 4 inches; dark grayish brown (10YR 4/2) channery loam; weak fine granular structure; very friable; 25 percent coarse fragments; very strongly acid; clear wavy boundary.
B1—4 to 10 inches; dark yellowish brown (10YR 4/4) channery silt loam; weak fine subangular blocky structure; friable; 25 percent coarse fragments; very strongly acid; gradual wavy boundary.
B2—10 to 22 inches; yellowish brown (10YR 5/6) channery silt loam; weak fine and medium subangular blocky structure; friable; 30 percent coarse fragments; strongly acid; abrupt wavy boundary.
C—22 to 34 inches; brown (10YR 5/3) channery silt loam; massive; friable; 40 percent coarse fragments; very strongly acid; abrupt smooth boundary.
R—34 inches; gray (10YR 5/1) sandstone and siltstone bedrock.

The solum is 20 to 36 inches thick. Bedrock is at a depth of 20 to 40 inches. Coarse fragments make up 20 to 30 percent of the solum and 20 to 50 percent of the C horizon. In unlimed areas reaction ranges from moderately acid to very strongly acid throughout.

The A horizon has hue of 7.5YR through 2.5Y, value of 3 through 5, and chroma of 2 through 4. Fine earth texture is silt loam or loam.

The B horizon has hue of 7.5YR through 2.5Y, value of 4 through 6, and chroma of 3 through 6. Fine earth texture is silt loam or loam.

The C horizon has hue of 7.5YR through 5Y, value of 3 through 6, and chroma of 2 through 4. Fine earth texture ranges from silt loam to fine sandy loam.

Morris Series

The soils of the Morris series are coarse-loamy, mixed, mesic Aeric Fragiaquepts. They are deep, somewhat poorly drained soils on uniform to slightly concave broad ridgetops and drainageways. They formed in glacial till derived from reddish sandstone, siltstone, and shale. Slopes range from 0 to 15 percent.

Morris soils are near the moderately deep, well drained Oquaga soils, the deep, moderately well drained Wellsboro soils, and the deep, very poorly drained and poorly drained Norwich soils.

Typical pedon of Morris channery silt loam, 8 to 15 percent slopes, in Jackson Township, 100 feet east of the intersection of Township Route 657 and Township Route 812, on the north side of the road, in a roadbank:

Ap—0 to 9 inches; dark reddish brown (5YR 3/3) channery silt loam; weak fine granular structure; friable, slightly sticky; 15 percent coarse fragments; strongly acid; abrupt wavy boundary.
B21—9 to 13 inches; dark brown (7.5YR 4/4) silt loam; few fine faint reddish yellow (7.5YR 6/8) and pinkish

gray (5YR 6/2) mottles; weak fine subangular blocky structure; friable; 10 percent coarse fragments; very strongly acid; gradual wavy boundary.

B22—13 to 16 inches; reddish brown (5Y 5/3) loam; common medium distinct reddish yellow (5YR 6/8) and pinkish gray (5YR 7/2) mottles; weak medium subangular blocky structure; friable; 10 percent coarse fragments; very strongly acid; abrupt wavy boundary.

B23—16 to 19 inches; reddish gray (5YR 5/2) channery loam; common medium distinct red (2.5YR 4/8) and pinkish gray (7.5YR 6/2) mottles; weak fine subangular blocky structure; friable; 15 percent coarse fragments; very strongly acid; gradual wavy boundary.

Bx1—19 to 31 inches; reddish brown (2.5YR 4/4) channery loam; few fine faint reddish yellow (5YR 6/6) and pinkish gray (5YR 7/2) mottles; weak medium subangular blocky structure; firm and brittle, slightly sticky and slightly plastic; 25 percent coarse fragments; strongly acid; abrupt wavy boundary.

Bx2—31 to 45 inches; weak red (2.5YR 5/2) channery sandy clay loam; common medium distinct light gray (5YR 7/1) and pinkish gray (5YR 6/2) mottles; moderate very coarse prismatic structure parting to moderate medium platy; very firm and brittle, slightly sticky and slightly plastic; few thin patchy clay films in pores; 40 percent coarse fragments; strongly acid; abrupt wavy boundary.

Bx3—45 to 60 inches; weak red (2.5YR 4/2) channery sandy loam; few fine faint yellowish red (5YR 5/6) mottles; strong thick platy structure; very firm, brittle; 50 percent coarse fragments; strongly acid.

The solum is 40 to 72 inches thick. Bedrock is at a depth of more than 60 inches. Depth to the fragipan ranges from 10 to 22 inches. Coarse fragments make up 10 to 40 percent of the A and B2 horizons and 15 to 50 percent of the Bx and C horizons. In unlimed areas reaction ranges from very strongly acid to medium acid in the A and B2 horizons and in 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 has hue of 5YR through 10YR, value of 2 through 5, and chroma of 1 through 4. Fine earth texture is silt loam or loam.

The B horizon has hue of 5YR through 10YR, value of 3 through 6, and chroma of 2 through 6. Fine earth texture is loam or silt loam.

The Bx horizon has hue of 2.5YR through 7.5YR, value of 4 or 5, and chroma of 2 through 6. Fine earth texture is sandy loam, loam, sandy clay loam, clay loam, or silty clay loam.

Some pedons have a C horizon that has hue of 2.5YR through 7.5YR, value of 4 or 5, and chroma of 2 through 6. Fine earth texture is loam or silt loam.

Nolo Series

The soils of the Nolo series are fine-loamy, mixed, mesic Typic Fragiaquults. They are deep, poorly drained soils in depressions on mountaintops. They formed in material weathered from sandstone, shale, and siltstone. Slopes range from 0 to 8 percent.

Nolo soils are near the moderately deep, well drained Dekalb soils, the deep, well drained Clymer soils, and the deep, moderately well drained Cookport soils.

Typical pedon of Nolo loam, in an area of Nolo very stony loam, 0 to 8 percent slopes, in Brown Township, about 0.2 mile east of Pennsylvania Route 44 on Slate Run Road, 50 feet north of Slate Run Road, in a wooded area:

O1—5 to 4 inches; partly decomposed sphagnum moss and leaf litter.

O2—4 inches to 0; black (N/2) decomposed sphagnum moss and leaf litter.

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) loam; weak medium granular structure; very friable, slightly sticky; 10 percent coarse fragments; very strongly acid; abrupt smooth boundary.

A2—2 to 5 inches; gray (10YR 6/1) sandy loam; few fine faint light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; very friable; 10 percent coarse fragments; very strongly acid; abrupt wavy boundary.

B2tg—5 to 16 inches; gray (10YR 6/1) channery clay loam; common medium prominent reddish yellow (7.5YR 6/8) and few fine faint light gray (10YR 7/2) mottles; strong medium subangular blocky structure; friable, slightly sticky and plastic; 20 percent coarse fragments; extremely acid; abrupt smooth boundary.

Bxtg—16 to 42 inches; brownish yellow (10YR 6/6) channery clay loam; common coarse prominent reddish yellow (7.5YR 6/8) and few fine faint light gray (10YR 7/2) mottles; moderate very coarse prismatic structure parting to weak medium subangular blocky; firm and brittle, sticky and plastic; gray (10YR 5/1) prism faces; 35 percent coarse fragments; extremely acid; abrupt wavy boundary.

C—42 to 51 inches; brown (10YR 5/3) very channery loam; few fine faint light gray (10YR 7/2) mottles; massive; firm; 50 percent coarse fragments; extremely acid; clear wavy boundary.

R—51 inches; gray (10YR 6/1) partly weathered acid sandstone bedrock.

The solum is 40 to 50 inches thick. Bedrock is at a depth of 40 to 60 inches. The fragipan is at a depth of 16 to 30 inches. Coarse fragments make up 5 to 20 percent of the volume above the Bx horizon and 20 to 35 percent of that in the Bx horizon. In unlimed areas reaction is very strongly acid or extremely acid throughout.

The A horizon has hue of 10YR or 2.5Y; value in the A1 horizon is 2 or 3 and in the A2 horizon is 5 or 6; chroma is 1 or 2.

The B2tg horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 1 or 2. Fine earth texture ranges from loam to clay loam.

The Bx horizon has hue of 7.5YR through 2.5Y, value of 4 through 6, and chroma of 1 through 6. Fine earth texture ranges from loam to clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 through 4. Fine earth texture is sandy loam or loam.

Norwich Series

The soils of the Norwich series are fine-loamy, mixed, mesic Typic Fragiaquepts. They are deep, poorly drained and very poorly drained soils along drainageways and in depressions. They formed in Wisconsinan glacial till derived from reddish sandstone, siltstone, and shale. Slopes range from 0 to 8 percent.

Norwich soils are near the moderately deep, well drained Oquaga soils, the deep, well drained Lackawanna soils, the deep, moderately well drained Wellsboro soils, and the deep, somewhat poorly drained Morris soils.

Typical pedon of Norwich silt loam, in an area of Norwich very stony silt loam, 0 to 8 percent slopes, in McNett Township, on Camels Road, 1/4 mile east of intersection with Sprout Fire Tower Road, in a roadbank:

O1—2 inches to 1 inch; leaf litter.
O2—1 inch to 0; black (N 2/0) decomposed leaf litter.
A1—0 to 3 inches; dark brown (7.5YR 3/2) silt loam; weak medium granular structure; friable; 10 percent coarse fragments; strongly acid; abrupt wavy boundary.
A2—3 to 6 inches; pinkish gray (7.5YR 6/2) channery silt loam; moderate medium granular structure; friable; 20 percent coarse fragments; strongly acid; abrupt wavy boundary.
B2g—6 to 13 inches; dark reddish gray (5YR 4/2) channery loam; common medium prominent gray (5YR 6/1), brown (7.5YR 5/4), and strong brown (7.5YR 5/6) mottles; weak fine blocky structure; friable; 30 percent coarse fragments; strongly acid; clear wavy boundary.
Bx1—13 to 22 inches; reddish gray (5YR 5/2) channery loam; many coarse prominent yellowish red (5YR 5/6), light reddish brown (5YR 6/3), weak red (2.5YR 5/2), and reddish yellow (7.5YR 6/6) mottles; moderate coarse prismatic structure parting to weak medium platy; firm, brittle; 40 percent coarse fragments; strongly acid; abrupt wavy boundary.
Bx2—22 to 48 inches; weak red (2.5YR 4/2) channery silt loam; common medium distinct pinkish gray (7.5YR 6/2), reddish yellow (7.5YR 6/6), reddish gray (5YR 5/2), and yellowish red (5YR 5/6) mottles; moderate, very coarse prismatic structure parting to moderate medium blocky; firm, brittle; 30 percent coarse fragments; strongly acid; gradual wavy boundary.
C—48 to 62 inches; reddish gray (5YR 5/2) channery loam; common coarse distinct reddish yellow (7.5YR 6/6) and pinkish gray (7.5YR 6/2) mottles; massive; firm; 30 percent coarse fragments; medium acid.

The solum is 36 to 50 inches thick. Bedrock is at a depth of more than 60 inches. The fragipan is at a depth of 12 to 24 inches. Coarse fragments make up 5 to 30 percent of the solum above the Bx horizon and 15 to 40 percent of the Bx and C horizons. Reaction ranges from strongly acid to slightly acid in the A and B horizons and from strongly acid to neutral in the C horizon.

The A1 horizon has hue of 7.5YR or 10YR, value of 2 through 4, and chroma of 1 or 2. Fine earth texture is silt loam or loam.

The A2 and B horizons have hue of 2.5YR through 10YR, value of 4 through 6, and chroma of 1 or 2. Fine earth texture is silt loam or loam.

The Bx horizon has hue of 2.5YR through 7.5YR, value of 4 or 5, and chroma of 2 through 3. Fine earth texture ranges from silt loam to sandy loam.

The C horizon has hue of 2.5YR through 7.5YR, value of 4 or 5, and chroma of 1 through 3. Fine earth texture ranges from silt loam to sandy loam.

Oquaga Series

The soils of the Oquaga series are loamy-skeletal, mixed, mesic Typic Dystrochrepts. They are moderately deep, well drained to excessively drained soils on glaciated, dissected mountaintops and mountainsides. They formed in glacial till dominated by reddish sandstone and shale. Slopes range from 0 to 70 percent.

Oquaga soils are near the moderately deep, well drained, brownish Lordstown soils, the deep, well drained Lackawanna soils, and the deep, moderately well drained Wellsboro soils.

Typical pedon of Oquaga channery loam, 3 to 8 percent slopes, along Merrill Road in Cascade Township, 1.4 miles from intersection with Cascade Road, in woodland:

O1—2 inches to 1 inch; hardwood leaf litter.
O2—1 inch to 0; black (5YR 2/1) partly decomposed organic matter; very strongly acid; abrupt smooth boundary.
A1—0 to 5 inches; dark brown (7.5YR 4/2) channery loam; weak medium granular structure; friable; 20 percent coarse fragments; strongly acid; clear wavy boundary.

B—5 to 15 inches; reddish brown (5YR 4/4) channery silt loam; weak fine subangular blocky structure; friable; 35 percent coarse fragments; strongly acid; abrupt wavy boundary.
C—15 to 27 inches; reddish brown (5YR 5/3) very channery loam; massive; very friable; 75 percent coarse fragments; strongly acid; clear wavy boundary.
R—27 inches; weak red (2.5YR 4/2) sandstone and shale bedrock.

The solum is 15 to 35 inches thick. Bedrock is at a depth of 20 to 40 inches. Coarse fragments make up 20 to 50 percent of the A horizon, 30 to 60 percent of the B horizon, and 35 to 90 percent of the C horizon. In unlimed areas reaction is very strongly acid or strongly acid.

The A horizon has hue of 2.5YR through 7.5YR, value of 3 through 5, and chroma of 2 through 4. Fine earth texture is loam or silt loam.

The B horizon has hue of 2.5YR through 7.5YR, value of 3 through 5, and chroma of 4 through 6. Fine earth texture is silt loam or loam.

The C horizon has hue of 2.5YR through 7.5YR, value of 3 through 5, and chroma of 2 through 4. Fine earth texture is loam or silt loam.

Rexford Series

The soils of the Rexford series are coarse-loamy, mixed, mesic Aeric Fragiaquepts. They are deep, somewhat poorly drained and poorly drained soils on glacial outwash terraces. They formed in water-laid material derived mainly from sandstone and shale. Slopes range from 0 to 3 percent.

Rexford soils are near the deep, well drained and somewhat excessively drained Chenango and Tunkhannock soils.

Typical pedon of Rexford gravelly loam, in Wolf Township, 1/2 mile southwest of Hughesville, 50 yards west of Legislative Route 41066:

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) gravelly loam; weak fine granular structure; friable; 25 percent coarse fragments; medium acid; gradual wavy boundary.
B1—7 to 9 inches; dark grayish brown (2.5Y 4/2) gravelly loam; weak fine granular and weak fine subangular blocky structure; friable, slightly sticky; 25 percent coarse fragments; medium acid; abrupt wavy boundary.
B21—9 to 11 inches; brown (10YR 5/3) gravelly loam; weak fine subangular blocky structure; friable, slightly sticky; 25 percent coarse fragments; medium acid; abrupt wavy boundary.
B22—11 to 18 inches; brown (7.5YR 5/2) gravelly loam; common fine distinct strong brown (7.5YR 5/6) and reddish yellow (5YR 6/6) mottles; moderate fine subangular blocky structure; firm; few black concretions on coarse fragments; 30 percent coarse fragments; medium acid; gradual wavy boundary.
IIBx1g—18 to 35 inches; pinkish gray (5YR 6/2) gravelly silt loam; many fine distinct reddish yellow (5YR 6/6) and reddish brown (2.5YR 5/4) mottles; moderate medium platy structure parting to moderate medium subangular blocky; very firm, brittle and slightly sticky; few thin patchy clay films in pores; few black concretions on coarse fragments; 25 percent coarse fragments; strongly acid; gradual wavy boundary.
IIBx2—35 to 49 inches; reddish brown (5YR 4/4) gravelly sandy loam; many medium and coarse prominent red (2.5YR 5/8), light gray (N 7/0), and pinkish gray (7.5YR 7/2) mottles; strong very coarse prismatic structure parting to strong medium blocky; very firm and brittle, slightly sticky and slightly plastic, few thin patchy clay films in pores; few black concretions on coarse fragments; 20 percent coarse fragments; fine sandy loam in cracks; strongly acid; gradual wavy boundary.
IIIC—49 to 60 inches; dark brown (10YR 4/3) gravelly loamy sand; single grained; loose; 40 percent coarse fragments; strongly acid.

The solum is 30 to 50 inches thick. Bedrock is at a depth of more than 60 inches. The fragipan is at a depth of 15 to 24 inches. Coarse fragments make up 15 to 40 percent of the solum and 30 to 60 percent of the C horizon. In unlimed areas reaction in the A and B horizons is moderately acid or strongly acid and in the C horizon ranges from strongly acid to slightly acid.

The A horizon has hue of 10YR, value of 4, and chroma of 1 or 2. Fine earth texture is loam or sandy loam.

The B2 horizon has hue of 7.5YR through 2.5Y, value of 4 through 6, and chroma of 1 through 6. Fine earth texture is loam, silt loam, or sandy loam.

The Bx horizon has hue of 5YR through 5Y, value of 4 through 6, and chroma of 2 through 4. Fine earth texture is sandy loam, loam, or silt loam.

The C horizon has hue of 5YR through 5Y, value of 4 or 5, and chroma of 3 or 4. Fine earth texture ranges from silt loam to sand.

Shelmadine Series

The soils of the Shelmadine series are fine-loamy, mixed, mesic Typic Fragiaquults. They are deep, poorly drained soils in depressions and drainageways and near stream heads. They formed in glacial or periglacial material derived from shale, siltstone, and sandstone. Slopes range from 0 to 8 percent.

Shelmadine soils are near the deep, well drained Allenwood and Hartleton soils, the deep, moderately well drained Watson soils, and the deep, somewhat poorly drained Alvira soils.

Typical pedon of Shelmadine silt loam, 3 to 8 percent slopes, in Clinton Township, on property of Williamsport Area Community College, near White Deer Golf Course, about 200 yards southwest of the Schneebeli Buildings, in a field:

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; 5 percent coarse fragments; strongly acid; abrupt smooth boundary.
B2tg—9 to 20 inches; grayish brown (10YR 5/2) silty clay loam; common medium distinct dark gray (N 4/0) and yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; few thin continuous clay films on faces of peds; 10 percent coarse fragments; strongly acid; gradual wavy boundary.
Bx1g—20 to 30 inches; brown (10YR 5/3) silty clay loam; many medium distinct gray (10YR 5/1) and strong brown (7.5YR 5/6) mottles; moderate coarse prismatic structure parting to strong coarse blocky; firm and brittle, sticky and plastic; common thick continuous clay films in pores; 10 percent coarse fragments; strongly acid; clear wavy boundary.
Bx2g—30 to 42 inches; dark yellowish brown (10YR 4/4) shaly silt loam; few fine faint gray (10YR 6/1) and brown (7.5YR 5/2) mottles; moderate coarse prismatic structure parting to moderate medium blocky; firm and brittle, slightly sticky; 20 percent coarse fragments; very strongly acid; abrupt wavy boundary.
C—42 to 60 inches; dark brown (10YR 4/3) shaly silt loam; few fine faint strong brown (7.5YR 5/8) and gray (N 6/0) mottles; massive; friable, slightly sticky; 40 percent coarse fragments; very strongly acid.

The solum is 40 to 60 inches thick. Bedrock is at a depth of more than 60 inches. The fragipan is at a depth of 18 to 30 inches. Coarse fragments make up 5 to 25 percent of the A and B horizons and 15 to 60 percent of the C horizon. In unlimed areas reaction is very strongly acid or extremely acid throughout.

The Ap horizon has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 1 or 2.

The B2 horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. Fine earth texture is silt loam or silty clay loam.

The Bx horizon has hue of 7.5YR through 2.5Y, value of 4 through 6, and chroma of 2 through 4. Fine earth texture ranges from loam to silty clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 1 through 3. Fine earth texture is silt loam or loam.

Swartswood Series

The soils of the Swartswood series are coarse-loamy, mixed, mesic Typic Fragiochrepts. They are deep, well drained soils on smooth or slightly convex slopes on mountaintops and side slopes. They formed in glacial till derived largely from quartzite, conglomerate, and sandstone. Slopes range from 8 to 25 percent.

Swartswood soils are near Lordstown, Wurtsboro, Oquaga, and Lackawanna soils. Swartswood soils are deeper to bedrock than Lordstown and Oquaga soils, are better drained than Wurtsboro soils, and have less silt in the subsoil than Lackawanna soils.

Typical pedon of Swartswood gravelly sandy loam, in an area of Swartswood very stony sandy loam, 8 to 25 percent slopes, in McNett Township, at the intersection of John Merrill Road and Cascade Road, in woodland:

O1—3 inches to 1 inch; leaf litter.
O2—1 inch to 0; black (10YR 2/1) partly decomposed leaf litter; very strongly acid; clear smooth boundary.
A1—0 to 4 inches; very dark grayish brown (10YR 3/2) gravelly sandy loam; weak fine granular structure; very friable; 20 percent coarse fragments; very strongly acid; clear smooth boundary.
A2—4 to 9 inches; light brownish gray (10YR 6/2) gravelly loam; weak fine granular structure; friable; 30 percent coarse fragments; strongly acid; abrupt wavy boundary.
B21ir—9 to 11 inches; strong brown (7.5YR 5/6) gravelly loam; weak fine subangular blocky structure; friable; 25 percent coarse fragments; very strongly acid; gradual wavy boundary.
B22—11 to 21 inches; dark brown (7.5YR 4/4) channery sandy loam; weak fine and medium subangular blocky structure; friable; 30 percent coarse fragments; strongly acid; gradual wavy boundary.
B23—21 to 30 inches; strong brown (7.5YR 5/6) channery loam; moderate fine and medium subangular blocky structure; firm; 30 percent coarse fragments; very strongly acid; abrupt wavy boundary.
Bx1—30 to 42 inches; dark brown (7.5YR 4/4) channery sandy loam; few fine faint pinkish gray (7.5YR 6/2) and yellowish red (5YR 5/8) mottles; moderate thin and medium platy structure; very firm, brittle; 20 percent coarse fragments; strongly acid; gradual wavy boundary.
Bx2—42 to 60 inches; reddish brown (5YR 4/4) channery sandy loam; few fine distinct light brownish gray (10YR 6/2) and pinkish gray (7.5YR 6/2) mottles; strong thick platy structure parting to strong fine subangular blocky; very firm, brittle; 30 percent coarse fragments; strongly acid.

The solum is 40 to 70 inches thick. Bedrock is at a depth of more than 60 inches. The fragipan is at a depth of 24 to 36 inches. Coarse fragments make up 10 to 40 percent of each layer above the fragipan and on the average make up less than 35 percent. They make up 15 to 50 percent of the Bx and C horizons. In unlimed

areas reaction is strongly acid or very strongly acid throughout.

The A1 horizon has hue of 10YR, value of 2 or 3, and chroma of 1 through 3.

The A2 horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 1 through 3. Fine earth texture is sandy loam or loam.

The B2 horizon has hue of 7.5YR to 10YR, value of 4 through 6, and chroma of 3 through 6. Fine earth texture is loam or sandy loam.

The Bx horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 through 6. Fine earth texture is sandy loam or loam.

Some pedons have a C horizon that has hue of 5YR through 10YR, value of 4 or 5, and chroma of 2 through 6. Fine earth texture is sandy loam.

Tunkhannock Series

The soils of the Tunkhannock series are loamy-skeletal, mixed, mesic Typic Dystrochrepts. They are deep, well drained and somewhat excessively drained soils on glacial outwash terraces. They formed in water-sorted glacial material derived from reddish sandstone, siltstone, and shale. Slopes range from 0 to 25 percent.

Tunkhannock soils are near the deep, somewhat poorly drained and poorly drained Rexford soils and the deep, well drained Linden and Barbour soils. They are also near the deep, moderately well drained and somewhat poorly drained Basher soils on nearby flood plains.

Typical pedon of Tunkhannock gravelly loam, 0 to 3 percent slopes, in Fairfield Township, on Pennsylvania Route 87, 2.4 miles north of intersection of Pennsylvania Route 87 and U.S. Route 220 in Montoursville, and 300 feet west of Pennsylvania Route 87, in a field:

Ap—0 to 8 inches; brown (10YR 4/3) gravelly loam; weak fine granular structure; very friable, nonsticky and slightly plastic; common roots; 15 percent coarse fragments; slightly acid; abrupt smooth boundary.

B21—8 to 16 inches; brown (7.5YR 4/4) gravelly loam; weak medium subangular blocky structure; friable, nonsticky and slightly plastic; common roots; 20 percent coarse fragments; slightly acid; clear wavy boundary.

B22—16 to 26 inches; reddish brown (5YR 4/4) gravelly loam; weak coarse subangular blocky structure; friable, nonsticky and slightly plastic; common roots; 45 percent coarse fragments; medium acid; gradual wavy boundary.

B3—26 to 30 inches; reddish brown (5YR 4/4) very gravelly sandy loam; very weak medium subangular blocky structure; very friable, nonsticky and nonplastic; common roots; 60 percent coarse fragments; strongly acid; gradual wavy boundary.

C—30 to 65 inches; reddish brown (5YR 4/3) very gravelly loamy sand and lenses of loamy fine sand; single grained; loose, nonsticky and nonplastic; few roots; 60 percent coarse fragments; strongly acid.

The solum is 24 to 40 inches thick. Bedrock is at a depth of more than 60 inches. Coarse fragments make up 15 to 35 percent of the A horizon, 15 to 60 percent of the B horizon, and 40 to 70 percent of the C horizon. In unlimed areas reaction ranges from extremely acid to moderately acid throughout.

The Ap horizon has hue of 5YR through 10YR, value of 3 through 5, and chroma of 2 or 3. Fine earth texture is loam or sandy loam.

The B horizon has hue of 2.5YR through 7.5YR, value of 4 or 5, and chroma of 3 through 6. Fine earth texture is silt loam, loam, or sandy loam.

The C horizon has hue of 2.5YR through 10YR, value of 3 or 4, and chroma of 2 or 3. Fine earth texture ranges from sandy loam to sand.

Udifluvents

Udifluvents consist of deep, moderately well drained to excessively drained soils. These soils formed in alluvium that is of recent origin. They are somewhat stratified. They are on flood plains. Slopes are 0 to 3 percent.

Udifluvents are near Holly, Barbour, Basher, Linden, and Wyoming soils. Unlike Udifluvents, Holly, Barbour, Basher, Linden, and Wyoming soils have distinct horizons.

The properties of Udifluvents differ greatly from area to area; thus, a typical pedon is not given. The solum ranges from 2 to 30 inches in thickness. Depth to bedrock is more than 36 inches. Coarse fragments make up 0 to 50 percent of the surface layer and 0 to 75 percent of the substratum. Reaction ranges from very strongly acid to neutral.

The surface layer has hue of 5YR through 10YR, value of 3 through 7, and chroma of 1 through 6. Fine earth texture is loam, silt loam, or fine sandy loam.

The substratum has hue of 2.5YR through 10YR, value of 3 through 6, and chroma of 3 through 8. Fine earth texture ranges from loam to sand.

Udorthents

Udorthents consist of deep, somewhat poorly drained to excessively drained soils. These soils are a heterogenous mixture of coarse fragments and soil material that have been disturbed or stockpiled in mining or construction. They are predominantly on the Allegheny Plateau near surface mines and along the Susquehanna River near Urban land. Slopes range from 0 to 100 percent.

Udorthents are near Dekalb, Clymer, Cookport, Lordstown, and Wurtsboro soils in the area of surface

mines and near Hartleton, Allenwood, Berks, Alvira, and Watson soils in the area of Urban land.

The properties of Udorthents differ greatly from area to area; thus, a typical pedon is not given. These soils range from 30 to 60 inches or more in thickness over bedrock or undisturbed material. The content of coarse fragments ranges from 5 to 80 percent throughout. In unlimed areas the soils range from extremely acid to strongly acid throughout. They have hue of 2.5YR through 2.5Y, value of 3 through 6, and chroma of 2 through 8. Fine earth texture ranges from loam to silty clay loam.

Washington Series

The soils of the Washington series are fine-loamy, mixed, mesic Ultic Hapludalfs. They are deep, well drained soils on nearly level to sloping hilltops and side slopes. They formed in old glacial drift or colluvium, typically overlying limestone bedrock. Slopes range from 0 to 15 percent.

Washington soils are near the deep, well drained Hagerstown and Allenwood soils and the deep, moderately well drained Clarksburg soils. Washington soils have less clay throughout than Hagerstown soils and have a browner hue in the Bt horizon than Allenwood soils.

Typical pedon of Washington silt loam, 3 to 8 percent slopes, in Washington Township on Township Route 428, 1/4 mile southeast of intersection with Legislative Route 41004, 200 feet east of Township Route 428, in a cultivated field:

Ap—0 to 9 inches; dark brown (7.5YR 4/2) silt loam; weak fine granular structure; very friable; 5 percent coarse fragments; neutral; clear smooth boundary.

B21t—9 to 23 inches; brown (7.5YR 5/4) silt loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few thin patchy clay films in pores; neutral; gradual wavy boundary.

B22t—23 to 33 inches; strong brown (7.5YR 5/6) clay loam; moderate medium subangular blocky structure; firm, sticky and plastic; many thick continuous clay films on faces of peds; 10 percent coarse fragments; medium acid; gradual wavy boundary.

B23t—33 to 41 inches; strong brown (7.5YR 5/6) clay loam; moderate medium subangular blocky structure; firm, sticky and plastic; many thick continuous clay films on faces of peds; 10 percent coarse fragments; medium acid; gradual wavy boundary.

B3t—41 to 48 inches; brown (7.5YR 5/4) gravelly clay loam; strong medium blocky structure; firm, sticky and plastic; common thin discontinuous clay films on faces of peds; 15 percent coarse fragments; medium acid; gradual wavy boundary.

C—48 to 62 inches; yellowish red (5YR 5/8) clay loam; massive; firm, slightly sticky and slightly plastic; 10 percent coarse fragments; slightly acid.

The solum is 40 to 60 inches thick. Bedrock is at a depth of more than 60 inches. Coarse fragments make up 2 to 15 percent of the A horizon, 5 to 35 percent of the B horizon, and 2 to 50 percent of the C horizon. Reaction ranges from moderately acid to neutral throughout.

The Ap horizon has hue of 7.5YR or 10YR, value of 4, and chroma of 2 through 4. Fine earth texture is silt loam, loam, or clay loam.

The B horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 through 8. Fine earth texture is silty clay loam, clay loam, loam, or silt loam.

The C horizon has hue of 5YR through 10YR, value of 5 or 6, and chroma of 8. Fine earth texture is loam, clay loam, or silt loam.

Watson Series

The soils of the Watson series are fine-loamy, mixed, mesic Typic Fragiudults. They are deep, moderately well drained soils on glaciated hills and ridges. They formed in pre-Wisconsinan glacial till derived from sandstone, siltstone, and shale. Slopes range from 0 to 15 percent.

Watson soils are near the deep, well drained Allenwood and Hartleton soils, the deep, somewhat poorly drained Alvira soils, and the deep, poorly drained Shelmadine soils.

Typical pedon of Watson silt loam, 3 to 8 percent slopes, in Muncy Township, along Legislative Route 41061, 200 yards north of U.S. Route 220, 1 mile east of Pennsdale, on the east side of the road, in a cultivated field:

Ap—0 to 9 inches; dark brown (7.5YR 4/4) silt loam; weak fine granular structure; very friable; 5 percent coarse fragments; medium acid; abrupt smooth boundary.

B1—9 to 16 inches; brown (7.5YR 5/4) silt loam; weak fine subangular blocky structure; friable; 5 percent coarse fragments; medium acid; clear wavy boundary.

B21t—16 to 20 inches; yellowish red (5YR 5/6) silt loam; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; few thin discontinuous clay films on faces of peds; 10 percent coarse fragments; medium acid; clear wavy boundary.

B22t—20 to 26 inches; light reddish brown (5YR 6/4) silty clay loam; few fine faint reddish brown (5YR 5/3) and yellowish red (5YR 4/6) mottles; moderate fine and medium blocky structure; firm, sticky and plastic; common thin continuous clay films on faces

of peds; 10 percent coarse fragments; medium acid; abrupt wavy boundary.

Bx1—26 to 40 inches; yellowish red (5YR 5/6) shaly clay loam; many medium distinct pink (5YR 7/3) and pinkish gray (5YR 6/2) mottles; weak very coarse prismatic structure parting to moderate medium blocky; very firm and brittle, sticky and plastic; many thick clay films on faces of prisms; 20 percent coarse fragments; strongly acid; gradual wavy boundary.

Bx2—40 to 52 inches; yellowish red (5YR 4/6) shaly loam; common medium distinct reddish gray (5YR 5/2) and reddish brown (2.5YR 4/4) mottles; weak very coarse prismatic structure parting to moderate fine subangular blocky; very firm and brittle, slightly sticky and slightly plastic; few thin discontinuous clay films in pores; many black coatings on coarse fragments; 25 percent coarse fragments; strongly acid; gradual wavy boundary.

C—52 to 64 inches; dark yellowish brown (10YR 4/4) very shaly loam; massive; firm, slightly sticky; many black coatings on coarse fragments; 50 percent coarse fragments; very strongly acid.

The solum is 40 to 72 inches thick. Bedrock is at a depth of more than 60 inches. The fragipan is at a depth of 20 to 30 inches. Coarse fragments make up 5 to 10 percent of the A and B2 horizons, 10 to 40 percent of the Bx horizons, and 40 to 50 percent of the C horizon. In unlimed areas reaction is very strongly acid or strongly acid throughout.

The Ap horizon has hue of 5YR through 10YR, value of 3 or 4, and chroma of 2 through 4. Fine earth texture is silt loam or loam.

The B1 and B2 horizons have hue of 5YR through 10YR, value of 5 or 6, and chroma of 4 through 8. Fine earth texture ranges from loam to silty clay loam.

The Bx horizon has hue of 2.5YR through 7.5YR; value and chroma are 4 through 6. Fine earth texture ranges from loam to silty clay loam.

The C horizon has hue of 2.5YR through 10YR, value of 4 or 5, and chroma of 2 through 8. Fine earth texture ranges from silt loam to sandy loam.

Weikert Series

The soils of the Weikert series are loamy-skeletal, mixed, mesic Lithic Dystrochrepts. They are shallow, well drained soils on narrow ridgetops and on hillsides. They formed in residuum of interbedded, gray and brown, acid shale, siltstone, and in some places, sandstone. Slopes range from 3 to 80 percent.

Weikert soils are near the moderately deep, well drained Berks soils, the deep, well drained Hartleton soils, the deep, moderately well drained Watson soils, and the deep, somewhat poorly drained Alvira soils.

Typical pedon of Weikert shaly silt loam, 8 to 15 percent slopes, in Penn Township, about 1/2 mile southeast of Picture Rocks along Township Route 646, on east side of road, in pipeline right-of-way, in a cultivated field:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) shaly silt loam; weak fine granular structure; friable; 25 percent coarse fragments; strongly acid; abrupt smooth boundary.

B2—6 to 14 inches; light yellowish brown (10YR 6/4) channery silt loam; weak medium subangular blocky structure; friable, slightly sticky; few thin patchy clay films in pores; 45 percent coarse fragments; very strongly acid; gradual wavy boundary.

C—14 to 20 inches; light yellowish brown (10YR 6/4) very channery silt loam; massive; friable; few thin silt and clay deposits on shale fragments and in voids between fragments; 80 percent coarse fragments; very strongly acid; clear wavy boundary.

R—20 inches; very dark grayish brown (10YR 3/2), fractured, very strongly acid shale bedrock.

The solum is 10 to 16 inches thick. Bedrock is at a depth of 10 to 20 inches. Coarse fragments make up 20 to 40 percent of the A horizon, 30 to 50 percent of the B horizon, and 60 to 80 percent of the C horizon. In unlimed areas reaction ranges from medium acid to very strongly acid throughout.

The A horizon has hue of 2.5Y through 7.5YR, value of 3 through 5, and chroma of 2 through 4. Fine earth texture is silt loam or loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 3 through 6. Fine earth texture is silt loam or loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 3 through 6. Fine earth texture is silt loam or loam.

Wellsboro Series

The soils of the Wellsboro series are coarse-loamy, mixed, mesic Typic Fragiochrepts. They are deep, moderately well drained soils on the broad, glaciated mountain tops and on the lower foot slopes. They formed in Wisconsinan glacial till derived from reddish sandstone, siltstone, and shale. Slopes range from 0 to 25 percent.

Wellsboro soils are near the moderately deep, well drained to excessively drained Oquaga soils, the deep, well drained Lackawanna soils, the deep, somewhat poorly drained Morris soils, the deep, poorly drained and very poorly drained Norwich soils, and the deep, moderately drained Wurtsboro soils.

Typical pedon of Wellsboro channery silt loam, 8 to 15 percent slopes, in Jackson Township, about 1/4 mile east of intersection of Township Routes 657 and 812, about 200 feet north of Township Route 657, in a hayfield:

Ap—0 to 8 inches; dark reddish gray (5YR 4/2) channery silt loam; weak fine granular structure; friable; 20 percent coarse fragments; slightly acid; abrupt wavy boundary.
B21—8 to 18 inches; reddish brown (5YR 4/4) channery silt loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; 20 percent coarse fragments; medium acid; abrupt wavy boundary.
B22—18 to 24 inches; brown (7.5YR 5/4) channery loam; common fine distinct yellowish red (5YR 5/8), gray (10YR 6/1), and light reddish brown (5YR 6/3) mottles; weak medium subangular blocky structure; friable, slightly plastic; 35 percent coarse fragments; strongly acid; clear wavy boundary.
Bx—24 to 48 inches; reddish brown (5YR 5/3) channery loam; many medium distinct reddish yellow (5YR 6/8), yellowish red (5YR 5/8), and gray (10YR 6/1) mottles; very coarse prismatic structure parting to moderate medium subangular blocky; firm, brittle; 40 percent coarse fragments; strongly acid; clear wavy boundary.
C—48 to 64 inches; weak red (10R 4/2) very channery silt loam; massive; very firm, slightly sticky and plastic; few thin clay patchy films in pores; 50 percent coarse fragments; medium acid.

The solum is 40 to 60 inches thick. Bedrock is at a depth of more than 60 inches. The fragipan is at a depth of 18 to 26 inches. Coarse fragments make up 15 to 35 percent of the A and B2 horizons and 15 to 50 percent of the Bx and C horizons. In unlimed areas reaction ranges from very strongly acid to medium acid throughout.

The Ap horizon has hue of 5YR through 10YR, value of 3 or 4, and chroma of 2 or 3. Fine earth texture is loam or silt loam.

The B2 horizon has hue of 2.5YR through 10YR, value of 4 or 5, and chroma of 3 through 6. Fine earth texture is loam or silt loam.

The Bx horizon has hue of 5YR through 10YR, value of 3 through 5, and chroma of 2 through 4. Fine earth texture ranges from sandy loam to silt loam.

The C horizon has hue of 5YR through 10R, value of 3 through 5, and chroma of 2 through 4. Fine earth texture ranges from sandy loam to silt loam.

Wheeling Series

The soils of the Wheeling series are fine-loamy, mixed, mesic Ultic Hapludalfs. They are deep, well drained soils on river terraces. They formed in silty or loamy material underlain by noncalcareous sand and gravel at a depth of more than 40 inches. Slopes range from 0 to 8 percent.

Wheeling soils are near the deep, well drained Duncannon soils, the deep, well drained Linden soils, the deep, moderately well drained and somewhat poorly drained Basher soils, and the deep, poorly drained and very poorly drained Holly soils.

Typical pedon of Wheeling silt loam, 0 to 3 percent slopes, in Clinton Township, northeast of Montgomery, about 200 yards south of the intersection of Township Routes 421 and 532, 150 yards west of Township Route 532, in a cultivated field:

Ap—0 to 10 inches; brown (10YR 4/3) silt loam; moderate fine granular structure; friable, slightly plastic; slightly acid; clear smooth boundary.
B1—10 to 16 inches; dark brown (7.5YR 4/4) silt loam; weak fine prismatic structure; friable, slightly sticky and slightly plastic; slightly acid; clear wavy boundary.
B21—16 to 24 inches; dark brown (7.5YR 4/4) silt loam; weak fine prismatic structure parting to moderate fine subangular blocky; friable, slightly sticky and slightly plastic; few thin patchy clay films on faces of peds; neutral; diffuse wavy boundary.
B22t—24 to 40 inches; dark brown (7.5YR 4/4) loam; weak fine prismatic structure parting to moderate fine subangular blocky; friable, slightly plastic; few thin patchy clay films on faces of peds and in pores; strongly acid; clear wavy boundary.
B23t—40 to 46 inches; dark brown (7.5YR 4/4) loam; moderate fine prismatic structure; firm, slightly brittle; common thin patchy clay films lining pores and on faces of peds; strongly acid; clear wavy boundary.
B24t—46 to 59 inches; dark brown (7.5YR 4/4) silt loam; weak fine prismatic structure parting to weak fine subangular blocky; friable, slightly plastic; common thin patchy clay films lining pores and on faces of peds; strongly acid; clear wavy boundary.
IIC—59 to 68 inches; brown (10YR 4/3) and pale brown (10YR 6/3) gravelly sand; single grained; loose; 20 percent coarse fragments; medium acid; abrupt wavy boundary.

The solum is 40 to 60 inches thick. Depth to bedrock is more than 60 inches. Coarse fragments make up 0 to 10 percent of the layers above a depth of 40 inches. They make up 0 to 50 percent of the layers below 40 inches. In unlimed areas reaction is strongly acid to moderately acid throughout.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Fine earth texture is silt loam, fine sandy loam, or loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 through 6. Fine earth texture ranges from loam to silty clay loam.

The IIC horizon has hue of 10YR, value of 4 through 6, and chroma of 3 or 4. Fine earth texture ranges from very fine sand to sand.

Wurtsboro Series

The soils of the Wurtsboro series are coarse-loamy, mixed, mesic Typic Fragiochrepts. They are deep, moderately well drained soils on glaciated mountaintops and on the lower foot slopes. They formed in Wisconsinan glacial till derived from sandstone, conglomerate, and quartzite. Slopes range from 0 to 25 percent.

Wurtsboro soils are near the moderately deep, well drained Lordstown and Oquaga soils, the deep, well drained Swartswood soils, the deep, moderately well drained Wellsboro soils, and the deep, somewhat poorly drained Morris soils.

Typical pedon of Wurtsboro channery sandy loam, in an area of Wurtsboro very stony sandy loam, 0 to 8 percent slopes, in McIntyre Township, along Ellenton Ridge Road about 2.2 miles southeast of Rock Run Bridge, on west side of road, in a roadbank:

O1—2 inches to 1 inch; hardwood leaf litter.
O2—1 inch to 0; black (10YR 2/1) partly decomposed leaf litter; very strongly acid; clear smooth boundary.
A2—0 to 5 inches; brown (10YR 5/3) channery sandy loam; weak fine granular structure; very friable; 20 percent coarse fragments; very strongly acid; abrupt smooth boundary.
B21—5 to 13 inches; dark brown (7.5YR 4/4) channery very fine sandy loam; weak fine granular structure; very friable; 20 percent coarse fragments; very strongly acid; clear smooth boundary.
B22—13 to 19 inches; brown (10YR 5/3) channery loam; common medium distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few thin patchy clay films in pores; 15 percent coarse fragments; strongly acid; abrupt irregular boundary.
Bx1—19 to 30 inches; yellowish brown (10YR 5/6) channery fine sandy loam; common medium distinct gray (10YR 5/1) and strong brown (7.5YR 5/8) mottles; weak very coarse prismatic structure parting to moderate thick platy; firm and brittle, slightly sticky; few thin patchy clay films in pores; 25 percent coarse fragments; strongly acid; clear smooth boundary.
Bx2—30 to 60 inches; brown (10YR 4/3) channery loam; common medium distinct brown (7.5YR 5/2) and reddish yellow (7.5YR 6/6) mottles; moderate very coarse prismatic structure parting to moderate medium platy; very firm and brittle, slightly sticky; few thin discontinuous clay films in pores; 25 percent coarse fragments; very strongly acid.

The solum is 40 to 70 inches thick. Bedrock is at a depth of more than 60 inches. The fragipan is at a depth of 17 to 28 inches. Coarse fragments make up 15 to 30 percent of the A, B21, and B22 horizons and 20 to 50 percent of the Bx and C horizons. In unlimed areas reaction is very strongly acid or strongly acid throughout.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Fine earth texture is sandy loam, silt loam, or loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 through 6. Fine earth texture is very fine sandy loam or loam.

The Bx horizon has hue of 5YR through 2.5Y, value of 4 or 5, and chroma of 2 through 6. Fine earth texture ranges from sandy loam to loam.

In some pedons there is a C horizon that has hue of 5YR through 2.5Y, value of 4 or 5, and chroma of 3 through 6. Fine earth texture is sandy loam.

Wyoming Series

The soils of the Wyoming series are loamy-skeletal, mixed, mesic Typic Dystrochrepts. They are deep, somewhat excessively drained soils on low-lying outwash terraces. They formed in water-laid sand and gravel derived from red and gray sandstone, siltstone, and shale. Slopes range from 0 to 3 percent.

Wyoming soils are near the deep, well drained Barbour soils, the deep, moderately well drained Basher soils, the deep, somewhat excessively drained Tunkhannock soils, and on nearby slopes the moderately deep, well drained Oquaga soils.

Typical pedon of Wyoming gravelly sandy loam, occasionally flooded, in Plunketts Creek Township, about 1/2 mile north of Proctor, on Legislative Route 41051, on the east side of the road, in a cultivated field:

Ap—0 to 8 inches; brown (7.5YR 5/4) gravelly sandy loam; weak fine granular structure; very friable; 20 percent coarse fragments; medium acid; abrupt smooth boundary.
B2—8 to 17 inches; reddish brown (5YR 4/3) gravelly sandy loam; weak fine subangular blocky structure; friable; 20 percent coarse fragments; medium acid; abrupt wavy boundary.
B3—17 to 25 inches; reddish brown (2.5YR 5/4) very gravelly sandy loam; weak fine subangular blocky structure; very friable; 70 percent coarse fragments; medium acid; gradual wavy boundary.
IIC—25 to 64 inches; reddish brown (5YR 4/4) stratified very gravelly coarse sand; single grained; loose; 75 percent coarse fragments; strongly acid.

The solum is 18 to 30 inches thick. Bedrock is at a depth of more than 60 inches. Coarse fragments make up 15 to 50 percent of the A horizon, 20 to 60 percent of the B2 horizon, and 35 to 75 percent of the B3 and C horizons. In unlimed areas reaction ranges from moderately acid to very strongly acid throughout.

The A horizon has hue of 5YR through 10YR, value of 3 through 5, and chroma of 2 through 4. Fine earth texture is sandy loam, fine sandy loam, or loam.

The B horizon has hue of 2.5YR through 7.5YR, value of 4 or 5, and chroma of 3 or 4. Fine earth texture is coarse sandy loam, sandy loam, or fine sandy loam.

The C horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4.

Formation of the Soils

This section describes the factors and processes of soil formation, the processes of horizon differentiation, and the major soil horizons.

Factors of Soil Formation

The characteristics of the soil at any given place are determined by (1) the physical and mineralogical composition of the parent material, (2) the climate under which the soil material has accumulated and existed since accumulation, (3) the plant and animal life on and in the soil, (4) the relief, or lay of the land, and (5) the length of time that the forces of soil development have acted on the soil material.

Climate and vegetation are important factors of soil formation. They act on the parent material that has accumulated through the weathering of rocks and bring about the development of soil horizons. The effects of climate and vegetation are conditioned by relief. The parent material also affects the kind of profile that is formed and, in extreme cases, determines it almost entirely. Finally, time is needed for the parent material to change into a soil. Generally, a long time is required for distinct horizons to develop.

Parent Material

Parent material is the unconsolidated mass from which the soils formed. The soils of Lycoming County formed in material derived from highly folded sedimentary rocks, mainly sandstone, shale, and limestone.

Some soils formed in place in residuum directly over the original bedrock. Hagerstown and Clarksburg soils formed in residuum of limestone. Such soils as Cookport, Dekalb, and Clymer soils formed in residuum of sandstone. Berks, Weikert, and Leck Kill soils formed in residuum dominantly of shale.

Some soils formed in material that slipped or otherwise moved downhill to lower positions on the landscape. Laidig and Buchanan soils formed in colluvial material derived from sandstone and shale.

Some soils formed in stream-deposited material. This material may be either very old or recent. Wheeling soils on terraces formed in old stream deposits. Such soils as Linden and Holly soils on flood plains formed in recent deposits.

Plant and Animal Life

All living organisms affect soil formation. These include plants, animals, bacteria, fungi, and other micro-organisms. Vegetation adds organic matter to the soil and affects the level of plant nutrients in the soil. Animals, such as earthworms, cicadas, and burrowing animals, help to mix the partly decomposed organic matter with the mineral soil material, thus making the soil porous for the movement of water and air. Through this mixing action, animals also improve the environmental conditions for certain micro-organisms to break down further the organic matter, which in turn releases nutrients needed for plant growth.

In Lycoming County, most of the soils developed under forest stands consisting mainly of oak, chestnut, maple, and hickory. Under these conditions, the soil surface was covered by a litter of leaves. The surface layer, because of its organic matter content, is darker than the layer directly below it. The organic matter and plant nutrients are mainly in the uppermost 4 inches of the soil. If the soil has been cleared and cultivated, the organic matter and plant nutrients are mixed to plow depth.

Climate

The climate of Lycoming County is a humid-temperate, continental type of climate characteristic of the Middle Atlantic States. Some characteristics of the soil profiles indicate that this was the prevailing climate when the soils were forming. This climate influenced soil development in that many of the soils are acid and strongly leached.

The effect of climate on the formation of soils has been nearly uniform throughout the county. In some places a microclimate caused by differences in relief has influenced the development of some soils.

Relief

The relief of the county is dominated by steep slopes and narrow to moderately wide valley floors. The relief is influenced by the underlying sloping bedrock and by erosion and other water-related geologic processes. The highest ridges in the county, such as those in areas of Clymer and Dekalb soils, overlie sandstone bedrock, which is highly resistant to weathering. The moderately wide valleys that have undulating slopes, such as those

in areas of Clarksburg and Hagerstown soils, overlie limestone bedrock, which is readily weathered. The highly dissected hills typical of the shale bedrock areas, which are moderately resistant to weathering, formed in readily eroded soils by a concentration of runoff. The accumulation of soil material by washing, creeping, slippage, and gravity at the base of steep slopes is typical of the foot slope relief in the areas of Buchanan and Laidig soils.

Time

The length of time that factors of soil formation have operated is indicated, to some extent, by the degree of development of the soil profile. Some soils, especially those that formed in alluvium, show little profile development because the soil material has not been in place long enough for distinct horizons to form. Holly and Basher soils formed in alluvium. These soils are continually receiving fresh deposits of soil material on the surface. They are young, or recent, soils.

The profile development of Weikert, Berks, and Dekalb soils shows that some changes have taken place in the parent material. These changes, however, do not represent the effects of advanced weathering. The weathering of parent material and the profile development in those soils have been slowed by relief and by the kind of parent material.

Leck Kill, Hagerstown, and Allenwood soils have a well developed profile because the parent material has been in place long enough for the development of distinct horizons.

Processes of Horizon Differentiation

As the weathering of parent material proceeds and as plants grow on a young soil, several processes tend to cause the development of layers, or horizons, in the soil. Organic matter accumulates in the soil from leaves and other plant residue on and below the surface. Organic matter has accumulated in Dekalb, Clymer, Oquaga, and other uncultivated soils that formed under forests. Organic matter, chemicals, and mineral material are brought in from adjacent areas by animals, floodwaters, wind, and the force of gravity.

Minerals in the soil are lost when primary minerals decompose. Some water-soluble products of weathering are leached from the soils. For example, calcium carbonates have been leached from Hagerstown soils. Minerals are lost from all soils when plant nutrients are removed in harvested plants. Fine particles of soil material are lost through erosion, and gases escape as organic matter decomposes.

The translocation of material from one part of the soil to another is common in most soils. Organic matter in suspension or in solution is removed from the upper part of the profile to the lower part. In Allenwood and Hartleton soils clay from the A horizon has been translocated to the B horizon.

As bases and plant nutrients are absorbed by the roots of plants, they rise in the stems of plants and are stored in the leaves and twigs. When plants die and decay, the plant nutrients are returned to the soil.

In chemical weathering, iron, aluminum, calcium, and other elements are released from the primary and secondary minerals in the soil. For example, the oxidation of iron is evident in the well drained Hagerstown soil, where, as the gray and white parent material weathered, it gradually changed to the reds, browns, and yellows of oxidized iron compounds. This change in color indicates that iron has been released or that ferrous oxide has been oxidized to ferric oxide in the presence of an adequate supply of oxygen.

Major Soil Horizons

The effects of the soil-forming processes are reflected in the individual horizons developed in a soil profile. The soil profile extends from the surface downward to material that is little altered by the soil-forming processes.

Most soils have three major horizons: the A, B, and C horizons. These horizons can be subdivided by the use of numbers and letters to indicate changes within one horizon. An example is the B2t horizon, a layer within the B horizon that contains an accumulation of clay.

The A horizon, or surface layer, contains the A1 horizon, which has the largest accumulation of organic matter. It also contains the A2 horizon, the horizon of maximum leaching or eluviation, of clay and iron.

The B horizon, or subsoil, is beneath the A horizon. In most soils it is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the A horizon. In some soils, however, the B horizon forms by the oxidation and reduction of iron or by the weathering of clay minerals. The B horizon commonly has a blocky or prismatic structure, and is generally firmer and lighter in color than the A1 horizon and darker than the C horizon.

The C horizon is below the A and B horizons. It consists of material that could have been modified by weathering. However, it is relatively unaffected by the biological, physical, or chemical processes involved in the formation of the A and B horizons.

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Glossary

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

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

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

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

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

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

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

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

	Inches
Very low	0 to 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	more than 5.2

Basal till. Compact glacial till deposited beneath the ice.

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

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

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

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

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on the contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

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

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

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

Broad-base terrace. A ridge-type terrace built to control erosion by diverting runoff along the contour at a nonscouring velocity. The terrace is 10 to 20 inches high and 15 to 30 feet wide and has gently sloping sides, a rounded crown, and a dish-shaped channel along the upper side. It may be nearly level or have a grade toward one or both ends.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but

have different characteristics as a result of differences in relief and drainage.

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

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

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Cement rock. Shaly limestone used in the manufacture of cement.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Congeliturbate. Soil material disturbed by frost action.

Conservation tillage. A tillage and planting system in which crop residue covers at least 30 percent of the soil surface after planting. Where soil erosion by wind is the main concern, the system leaves the equivalent of at least 1,000 pounds per acre of flat small-grain residue on the surface during the critical erosion period.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that some commonly grown 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 most 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 crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

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

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

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

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

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

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

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Esker (geology). A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Excess alkali (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sulfur (in tables). Excessive amount of sulfur in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

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

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

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

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

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

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of Vertisols—clayey soils having a high coefficient of expansion and contraction with changes in moisture content.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial melt water.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial melt water. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low

0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants follow disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—
Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.
Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.
Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.
Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.
Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.
Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.
Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.
Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.
Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage. (See Conservation tillage.)

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Narrow-base terrace. A terrace no more than 4 to 8 feet wide at the base. A narrow-base terrace is similar to a broad-base terrace, except for the width of the ridge and channel.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by glacial melt water.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material).

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Much has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, whre there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multipled by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial

ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period the the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifiying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer of a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by melt water streams, in glacial lake or other body of still water in front of a glacier.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-78 at Williamsport, Pa.]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	34.1	18.1	26.1	59	-8	15	2.83	1.61	3.90	8	11.2
February---	37.2	19.9	28.6	60	-6	14	2.89	1.53	4.07	6	11.8
March------	46.6	28.3	37.5	74	8	71	3.60	2.68	4.45	8	9.3
April------	60.7	38.4	49.6	88	22	296	3.45	2.02	4.71	8	1.3
May--------	71.1	47.8	59.5	91	31	605	3.72	1.92	5.29	8	.0
June-------	79.8	57.0	68.4	95	42	852	3.96	1.82	5.78	8	.0
July-------	83.7	61.2	72.5	96	47	1,008	3.98	2.26	5.50	8	.0
August-----	81.9	60.0	71.0	94	44	961	3.23	1.99	4.34	7	.0
September--	74.5	53.1	63.8	93	35	714	3.50	1.66	5.07	7	.0
October----	63.4	41.6	52.5	83	24	392	3.19	1.34	4.74	6	.1
November---	49.7	33.2	41.5	72	14	111	3.65	2.13	5.00	7	3.6
December---	38.0	23.5	30.8	62	-1	26	3.36	1.90	4.65	7	9.3
Yearly:											
Average--	60.1	40.2	50.2	---	---	---	---	---	---	---	---
Extreme--	---	---	---	98	-11	---	---	---	---	---	---
Total----	---	---	---	---	---	5,065	41.36	35.89	46.59	88	46.6

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-78 at Williamsport, Pa.]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 9	April 22	May 17
2 years in 10 later than--	April 5	April 18	May 11
5 years in 10 later than--	March 29	April 11	April 29
First freezing temperature in fall:			
1 year in 10 earlier than--	October 24	October 15	September 29
2 years in 10 earlier than--	October 30	October 20	October 4
5 years in 10 earlier than--	November 11	October 31	October 14

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-78 at Williamsport, Pa.]

Probability	Length of growing season if daily minimum temperature is--		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	206	183	142
8 years in 10	213	189	151
5 years in 10	226	201	168
2 years in 10	239	214	184
1 year in 10	245	220	193

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AbB	Albrights silt loam, 3 to 8 percent slopes	2,825	0.4
AbC	Albrights silt loam, 8 to 15 percent slopes	1,896	0.2
AlB	Allenwood gravelly silt loam, 3 to 8 percent slopes	6,176	0.8
AlC	Allenwood gravelly silt loam, 8 to 15 percent slopes	2,341	0.3
AvA	Alvira silt loam, 0 to 3 percent slopes	1,610	0.2
AvB	Alvira silt loam, 3 to 8 percent slopes	3,362	0.4
AvC	Alvira silt loam, 8 to 15 percent slopes	1,621	0.2
AxB	Alvira very stony loam, 0 to 8 percent slopes	1,553	0.2
Ba	Barbour fine sandy loam	2,435	0.3
Bb	Barbour fine sandy loam, occasionally flooded	7,334	0.9
Bc	Basher silt loam	3,584	0.5
Bd	Basher silt loam, occasionally flooded	2,476	0.3
BeB	Berks channery silt loam, 3 to 8 percent slopes	3,876	0.5
BeC	Berks channery silt loam, 8 to 15 percent slopes	11,949	1.5
BeD	Berks channery silt loam, 15 to 25 percent slopes	17,700	2.2
BuB	Buchanan very stony loam, 0 to 8 percent slopes	1,783	0.2
BuD	Buchanan very stony loam, 8 to 25 percent slopes	2,963	0.4
ChA	Chenango gravelly loam, 0 to 3 percent slopes	1,902	0.2
ClA	Clarksburg silt loam, 0 to 3 percent slopes	679	0.1
ClB	Clarksburg silt loam, 3 to 8 percent slopes	1,464	0.2
CmB	Clymer channery loam, 3 to 8 percent slopes	18,041	2.3
CmC	Clymer channery loam, 8 to 15 percent slopes	1,831	0.2
CnB	Clymer very stony loam, 0 to 8 percent slopes	14,893	1.9
CnD	Clymer very stony loam, 8 to 25 percent slopes	14,299	1.8
CoB	Cookport loam, 3 to 8 percent slopes	4,470	0.6
CxB	Cookport very stony loam, 0 to 8 percent slopes	7,061	0.9
CxD	Cookport very stony loam, 8 to 25 percent slopes	2,628	0.3
DeB	Dekalb channery loam, 3 to 8 percent slopes	2,088	0.3
DeC	Dekalb channery loam, 8 to 15 percent slopes	1,256	0.2
DkB	Dekalb very stony sandy loam, 0 to 8 percent slopes	22,778	2.9
DkD	Dekalb very stony sandy loam, 8 to 25 percent slopes	40,256	5.1
DlE	Dekalb and Lehew very stony sandy loams, 25 to 80 percent slopes	86,293	11.0
DuB	Duncannon loam, 3 to 8 percent slopes	2,308	0.3
HaA	Hagerstown silt loam, 0 to 3 percent slopes	708	0.1
HaB	Hagerstown silt loam, 3 to 8 percent slopes	1,720	0.2
HaC	Hagerstown silt loam, 8 to 20 percent slopes	546	0.1
HhB	Hartleton channery silt loam, 3 to 8 percent slopes	4,714	0.6
HhC	Hartleton channery silt loam, 8 to 15 percent slopes	11,035	1.4
HhD	Hartleton channery silt loam, 15 to 25 percent slopes	4,089	0.5
Ho	Holly silt loam	5,152	0.7
KlB	Klinesville shaly silt loam, 3 to 8 percent slopes	1,258	0.2
KlC	Klinesville shaly silt loam, 8 to 15 percent slopes	2,043	0.3
KlD	Klinesville shaly silt loam, 15 to 25 percent slopes	5,623	0.7
LaB	Lackawanna channery silt loam, 3 to 8 percent slopes	3,888	0.5
LaC	Lackawanna channery silt loam, 8 to 15 percent slopes	2,952	0.4
LbB	Lackawanna very stony silt loam, 0 to 8 percent slopes	3,325	0.4
LbD	Lackawanna very stony silt loam, 8 to 25 percent slopes	6,979	0.9
LdB	Laidig channery silt loam, 3 to 8 percent slopes	775	0.1
LdC	Laidig channery silt loam, 8 to 15 percent slopes	1,904	0.2
LgB	Laidig very stony loam, 0 to 8 percent slopes	1,197	0.2
LgD	Laidig very stony loam, 8 to 25 percent slopes	12,207	1.6
LgE	Laidig very stony loam, 25 to 70 percent slopes	1,593	0.2
LkB	Leck Kill channery silt loam, 3 to 8 percent slopes	12,301	1.6
LkC	Leck Kill channery silt loam, 8 to 15 percent slopes	23,944	3.0
LkD	Leck Kill channery silt loam, 15 to 25 percent slopes	21,112	2.7
Lm	Linden loam	1,563	0.2
Ln	Linden loam, occasionally flooded	6,467	0.8
MoB	Morris channery silt loam, 3 to 8 percent slopes	2,428	0.3
MoC	Morris channery silt loam, 8 to 15 percent slopes	684	0.1
MrB	Morris very stony silt loam, 0 to 8 percent slopes	5,174	0.7
NoB	Nolo very stony loam, 0 to 8 percent slopes	1,288	0.2
NrA	Norwich silt loam, 0 to 3 percent slopes	621	0.1
NxB	Norwich very stony silt loam, 0 to 8 percent slopes	888	0.1
OgB	Oquaga channery loam, 3 to 8 percent slopes	3,718	0.5
OgC	Oquaga channery loam, 8 to 15 percent slopes	6,607	0.8

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
OgD	Oquaga channery loam, 15 to 25 percent slopes	5,971	0.8
OxB	Oquaga and Lordstown very stony loams, 0 to 8 percent slopes	13,054	1.7
OxD	Oquaga and Lordstown very stony loams, 8 to 25 percent slopes	44,355	5.6
OxE	Oquaga and Lordstown very stony loams, 25 to 70 percent slopes	125,271	16.0
Pt	Pits	633	0.1
Re	Rexford gravelly loam	831	0.1
Ru	Rubble land-Dystrochrepts complex, 15 to 80 percent slopes	3,704	0.5
ShA	Shelmadine silt loam, 0 to 3 percent slopes	2,183	0.3
ShB	Shelmadine silt loam, 3 to 8 percent slopes	1,014	0.1
SvB	Shelmadine very stony silt loam, 0 to 8 percent slopes	636	0.1
SxD	Swartswood very stony sandy loam, 8 to 25 percent slopes	2,327	0.3
TuA	Tunkhannock gravelly loam, 0 to 3 percent slopes	2,399	0.3
TuB	Tunkhannock gravelly loam, 3 to 8 percent slopes	2,177	0.3
TuC	Tunkhannock gravelly loam, 8 to 15 percent slopes	955	0.1
TuD	Tunkhannock gravelly loam, 15 to 25 percent slopes	580	0.1
Ud	Udifluvents, loamy	6,875	0.9
Uo	Udorthents, sandstone	902	0.1
Ur	Urban land	2,303	0.3
UsB	Urban land-Udorthents complex, 0 to 8 percent slopes	2,900	0.4
UsD	Urban land-Udorthents complex, 8 to 25 percent slopes	651	0.1
WaA	Washington silt loam, 0 to 3 percent slopes	783	0.1
WaB	Washington silt loam, 3 to 8 percent slopes	2,780	0.4
WaC	Washington silt loam, 8 to 15 percent slopes	948	0.1
WbA	Watson silt loam, 0 to 3 percent slopes	980	0.1
WbB	Watson silt loam, 3 to 8 percent slopes	6,528	0.8
WbC	Watson silt loam, 8 to 15 percent slopes	3,855	0.5
WeB	Weikert shaly silt loam, 3 to 8 percent slopes	631	0.1
WeC	Weikert shaly silt loam, 8 to 15 percent slopes	1,551	0.2
WeD	Weikert shaly silt loam, 15 to 25 percent slopes	3,124	0.4
WkE	Weikert and Klinesville shaly silt loams, 25 to 80 percent slopes	53,775	6.8
WlB	Wellsboro channery silt loam, 3 to 8 percent slopes	3,532	0.5
WlC	Wellsboro channery silt loam, 8 to 15 percent slopes	1,961	0.3
WmB	Wellsboro very stony silt loam, 0 to 8 percent slopes	4,638	0.6
WmD	Wellsboro very stony silt loam, 8 to 25 percent slopes	5,053	0.6
WsA	Wheeling silt loam, 0 to 3 percent slopes	1,469	0.2
WsB	Wheeling silt loam, 3 to 8 percent slopes	1,204	0.2
WxB	Wurtsboro very stony sandy loam, 0 to 8 percent slopes	4,526	0.6
WxD	Wurtsboro very stony sandy loam, 8 to 25 percent slopes	1,952	0.2
Wy	Wyoming gravelly sandy loam, occasionally flooded	2,355	0.3
	Water	4,400	0.6
	Total	782,000	100.0

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Corn	Corn silage	Oats	Wheat	Alfalfa hay	Grass-legume hay	Pasture
	Bu	Tons	Bu	Bu	Tons	Tons	AUM*
AbB---- Albrights	100	20	70	40	3.5	3.0	6.5
AbC---- Albrights	90	18	65	40	3.5	3.0	6.5
AlB---- Allenwood	135	27	80	50	5.5	3.5	10.5
AlC---- Allenwood	125	25	75	45	5.0	3.5	9.5
AvA---- Alvira	95	19	60	35	3.5	3.0	6.0
AvB---- Alvira	95	19	60	35	3.5	3.0	6.0
AvC---- Alvira	90	18	55	30	3.5	3.0	6.0
AxB---- Alvira	---	---	---	---	---	---	---
Ba---- Barbour	110	22	75	40	4.5	3.5	8.5
Bb---- Barbour	120	24	80	45	4.5	3.5	8.5
Bc, Bd---- Basher	120	24	80	45	4.5	3.5	8.5
BeB---- Berks	80	16	60	35	3.5	3.0	6.5
BeC---- Berks	75	15	55	35	3.0	2.5	5.5
BeD---- Berks	70	14	50	30	3.0	2.5	5.5
BuB---- Buchanan	---	---	---	---	---	---	---
BuD---- Buchanan	---	---	---	---	---	---	---
ChA---- Chenango	100	20	80	45	4.5	3.5	8.5
ClA---- Clarksburg	100	20	70	40	3.5	3.0	6.5
ClB---- Clarksburg	100	20	70	40	3.5	3.0	6.5

See footnote 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	Tons	Bu	Bu	Tons	Tons	AUM*
CmB---------- Clymer	120	24	75	45	4.5	3.5	8.5
CmC---------- Clymer	110	22	70	40	4.0	3.0	8.0
CnB, CnD---------- Clymer	---	---	---	---	---	---	---
CoB---------- Cookport	100	20	65	40	3.5	3.0	5.5
CxB---------- Cookport	---	---	---	---	---	---	---
CxD---------- Cookport	---	---	---	---	---	---	---
DeB---------- Dekalb	80	16	60	35	3.5	3.0	6.6
DeC---------- Dekalb	75	15	55	35	3.0	2.5	5.6
DkB, DkD---------- Dekalb	---	---	---	---	---	---	---
DlE---------- Dekalb and Lehew	---	---	---	---	---	---	---
DuB---------- Duncannon	110	22	70	40	4.5	3.5	8.0
HaA---------- Hagerstown	135	27	80	50	5.5	3.5	9.5
HaB---------- Hagerstown	135	27	80	50	5.5	3.5	8.5
HaC---------- Hagerstown	125	25	75	45	5.0	3.5	8.5
HhB---------- Hartleton	90	18	65	35	3.5	3.0	6.5
HhC---------- Hartleton	80	---	60	35	3.0	2.5	6.0
HhD---------- Hartleton	80	16	55	30	3.0	2.0	6.0
Ho---------- Holly	90	18	65	---	---	3.0	6.0
KlB---------- Klinesville	60	12	55	25	2.5	2.0	5.0
KlC---------- Klinesville	---	---	50	20	2.5	2.0	5.0

See footnote 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	Tons	Bu	Bu	Tons	Tons	AUM*
KlD---------- Klinesville	---	---	---	---	---	---	---
LaB---------- Lackawanna	100	20	75	45	4.0	4.0	8.0
LaC---------- Lackawanna	95	19	75	45	4.0	4.0	8.0
LbB, LbD---------- Lackawanna	---	---	---	---	---	---	---
LdB---------- Laidig	100	20	70	40	4.0	3.0	4.5
LdC---------- Laidig	95	19	65	35	4.0	3.0	4.5
LgB---------- Laidig	---	---	---	---	---	---	---
LgD---------- Laidig	---	---	---	---	---	---	---
LgE---------- Laidig	---	---	---	---	---	---	---
LkB---------- Leck Kill	125	25	80	50	4.5	3.0	5.0
LkC---------- Leck Kill	120	24	80	50	4.0	3.0	4.5
LkD---------- Leck Kill	105	21	80	45	4.0	2.5	4.0
Lm, Ln---------- Linden	120	24	80	45	4.5	3.5	---
MoB---------- Morris	80	16	65	35	3.0	3.0	6.0
MoC---------- Morris	70	14	60	30	3.0	3.0	6.0
MrB---------- Morris	---	---	---	---	---	---	---
NoB---------- Nolo	---	---	---	---	---	---	---
NrA---------- Norwich	---	---	---	---	---	---	4.5
NxB---------- Norwich	---	---	---	---	---	---	---
OgB---------- Oquaga	90	17	75	45	3.5	3.0	6.5

See footnote 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	Tons	Bu	Bu	Tons	Tons	AUM*
OgC---- Oquaga	85	17	70	40	3.5	3.0	6.5
OgD---- Oquaga	80	16	65	55	3.0	3.0	5.5
OxB, OxD---- Oquaga and Lordstown	---	---	---	35	---	---	3.0
OxE---- Oquaga and Lordstown	---	---	---	---	---	---	---
Pt**. Pits							
Re---- Rexford	80	16	65	35	3.0	3.0	5.5
Ru---- Rubble land-Dystrochrepts	---	---	---	---	---	---	---
ShA---- Shelmadine	85	17	60	30	---	2.5	5.0
ShB---- Shelmadine	85	17	60	35	---	2.5	5.0
SvB---- Shelmadine	---	---	---	---	---	---	---
SxD---- Swartswood	---	---	---	---	---	---	---
TuA---- Tunkhannock	90	18	75	45	4.0	3.0	7.5
TuB---- Tunkhannock	90	18	75	45	4.0	3.0	7.5
TuC---- Tunkhannock	75	15	70	40	3.5	2.5	6.5
TuD---- Tunkhannock	70	14	50	30	3.0	2.0	5.5
Ud**. Udifluvents							
Uo**. Udorthents							
Ur**. Urban land							
UsB---- Urban land-Udorthents	---	---	---	---	---	---	---
UsD---- Urban land-Udorthents	---	---	---	---	---	---	---

See footnote 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	Tons	Bu	Bu	Tons	Tons	AUM*
WaA---------- Washington	140	28	80	50	5.5	3.5	9.5
WaB---------- Washington	140	28	80	50	5.5	3.5	8.5
WaC---------- Washington	130	26	80	45	5.0	3.5	8.5
WbA---------- Watson	100	20	70	40	3.5	3.0	6.5
WbB---------- Watson	100	20	70	40	3.5	3.0	6.5
WbC---------- Watson	90	18	65	40	3.5	3.0	6.5
WeB---------- Weikert	60	12	50	25	2.0	2.0	4.0
WeC---------- Weikert	---	---	45	20	2.0	2.0	4.0
WeD---------- Weikert	---	---	---	---	---	---	---
WkE---------- Weikert and Klinesville	---	---	---	---	---	---	---
WlB---------- Wellsboro	90	18	70	40	4.0	3.0	8.0
WlC---------- Wellsboro	85	17	65	40	4.0	3.0	8.0
WmB, WmD---------- Wellsboro	---	---	---	---	---	---	---
WsA---------- Wheeling	125	25	75	45	4.5	3.5	8.5
WsB---------- Wheeling	125	25	75	45	4.5	3.5	8.5
WxB, WxD---------- Wurtsboro	---	---	---	---	---	---	---
Wy---------- Wyoming	90	18	75	45	4.0	3.0	7.5

* 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 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

(Miscellaneous areas are excluded. Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I	16,761	---	---	---	---
II	100,603	82,408	11,717	6,478	---
III	88,760	78,174	8,231	2,355	---
IV	62,016	53,046	8,970	---	---
V	---	---	---	---	---
VI	159,165	8,747	---	150,418	---
VII	332,327	53,775	---	278,552	---
VIII	---	---	---	---	---

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Trees to plant
AbB---------- Albrights	3o	Slight	Slight	Slight	Slight	Northern red oak----	70	Red pine, eastern white pine, Japanese larch, Norway spruce, white spruce.
						Yellow-poplar-------	75	
						White ash----------	---	
						Red maple----------	---	
AbC---------- Albrights	3o	Slight	Slight	Slight	Slight	Northern red oak----	70	Red pine, eastern white pine, Japanese larch, Norway spruce, white spruce.
						Yellow-poplar-------	75	
						White ash----------	---	
						Red maple----------	---	
AlB, AlC-------- Allenwood	2o	Slight	Slight	Slight	Slight	Northern red oak----	80	Eastern white pine, Japanese larch, yellow-poplar, Norway spruce, Virginia pine.
						Yellow-poplar-------	85	
AvA, AvB-------- Alvira	3w	Slight	Moderate	Moderate	Moderate	Northern red oak----	70	Eastern white pine, yellow-poplar, Norway spruce, Japanese larch, white spruce.
						Yellow-poplar-------	75	
AvC---------- Alvira	3w	Moderate	Moderate	Moderate	Moderate	Northern red oak----	70	Eastern white pine, yellow-poplar, Norway spruce, Japanese larch, white spruce.
						Yellow-poplar-------	75	
AxB---------- Alvira	3w	Slight	Moderate	Moderate	Moderate	Northern red oak----	70	Eastern white pine, yellow-poplar, Norway spruce, Japanese larch, white spruce.
						Yellow-poplar-------	75	
Ba, Bb---------- Barbour	2o	Slight	Slight	Slight	Slight	Sugar maple---------	70	Eastern white pine, Norway spruce, black walnut.
						Northern red oak----	80	
Bc, Bd---------- Basher	2o	Slight	Slight	Slight	Slight	Sugar maple---------	70	Eastern white pine, black walnut, Norway spruce, Japanese larch.
						Northern red oak----	80	
						American basswood---	85	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Trees to plant
BeB, BeC-------- Berks	3F	Slight	Slight	Moderate	Slight	Northern red oak---- Black oak---------- Virginia pine--------	70 70 70	Virginia pine, eastern white pine, Japanese larch, Norway spruce, red pine.
BeD------------- Berks	3F	Slight	Moderate	Moderate	Slight	Northern red oak---- Black oak---------- Virginia pine--------	70 70 70	Virginia pine, eastern white pine, Japanese larch, Norway spruce, red pine.
BuB------------- Buchanan	2o	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 90	Northern red oak, yellow-poplar, sugar maple, eastern white pine, Japanese larch.
BuD------------- Buchanan	2r	Moderate	Moderate	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 90	Northern red oak, yellow-poplar, sugar maple, eastern white pine, Japanese larch.
ChA------------- Chenango	2o	Slight	Slight	Slight	Slight	Sugar maple--------- Northern red oak----	70 80	Eastern white pine, red pine, Japanese larch.
ClA, ClB-------- Clarksburg	3o	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar-------	75 85	Eastern white pine, yellow-poplar, Japanese larch, Norway spruce.
CmB, CmC, CnB--- Clymer	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.
CnD------------- Clymer	2r	Slight	Moderate	Slight	Slight	Northern red oak---- Yellow-poplar------- Eastern white pine--	83 95 ---	Eastern white pine, black cherry, yellow-poplar, 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		
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Trees to plant
CoB---------- Cookport	2w	Slight	Moderate	Slight	Slight	Northern red oak----	76	Yellow-poplar, eastern white pine, black cherry, Japanese larch, Norway spruce.
						Black cherry--------	86	
						Yellow-poplar-------	90	
						White ash-----------	86	
						Sugar maple---------	80	
CxB---------- Cookport	2w	Slight	Moderate	Slight	Slight	Northern red oak----	76	Yellow-poplar, eastern white pine, Japanese larch, Norway spruce.
						Black cherry--------	86	
						Yellow-poplar-------	90	
						White ash-----------	86	
						Sugar maple---------	80	
CxD---------- Cookport	2w	Moderate	Moderate	Slight	Slight	Northern red oak----	76	Yellow-poplar, eastern white pine, Japanese larch, Norway spruce.
						Black cherry--------	86	
						Yellow-poplar-------	90	
						White ash-----------	86	
						Sugar maple---------	80	
DeB, DeC-------- Dekalb	4f	Slight	Slight	Moderate	Slight	Northern red oak----	57	Eastern white pine, Virginia pine, red pine, Austrian pine, Japanese larch.
DkB---------- Dekalb	4f	Slight	Slight	Moderate	Slight	Northern red oak----	57	Eastern white pine, red pine, red pine, Austrian pine, Japanese larch.
DkD---------- Dekalb	4f	Slight	Moderate	Moderate	Moderate	Northern red oak----	52	Eastern white pine, Virginia pine, white spruce, Norway spruce.
DlE**: Dekalb---------	4f	Moderate	Severe	Moderate	Moderate	Northern red oak----	52	Eastern white pine, Virginia pine, white spruce, Norway spruce.
Lehew----------	3r	Moderate	Severe	Slight	Slight	Northern red oak----	67	Eastern white pine, Virginia pine, Japanese larch.
						Virginia pine-------	60	
						Eastern white pine--	---	
DuB---------- Duncannon	2o	Slight	Slight	Slight	Slight	Northern red oak----	80	Yellow-poplar, black walnut, tamarack, Norway spruce, eastern white 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		
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Trees to plant
HaA, HaB, HaC--- Hagerstown	1c	Slight	Moderate	Slight	Slight	Northern red oak---- Yellow-poplar-------	85 95	Black walnut, yellow-poplar, eastern white pine, Norway spruce.
HhB, HhC-------- Hartleton	3f	Slight	Slight	Slight	Slight	Northern red oak---- Chestnut oak-------- Eastern white pine-- Virginia pine-------	70 70 70 70	Virginia pine, eastern white pine, Japanese larch, Norway spruce, red pine.
HhD-------------- Hartleton	3r	Slight	Moderate	Slight	Slight	Northern red oak---- Chestnut oak-------- Eastern white pine-- Virginia pine-------	70 70 70 70	Virginia pine, eastern white pine, Japanese larch, Norway spruce, red pine.
Ho--------------- Holly	4w	Slight	Severe	Severe	Severe	Pin oak------------- Red maple----------- Eastern cottonwood-- Black willow--------- American sycamore--- Green ash----------- Swamp white oak-----	66 --- --- --- --- --- ---	Red maple, green ash, American sycamore, eastern cottonwood, pin oak, sweetgum, silver maple, swamp white oak, baldcypress.
KlB, KlC-------- Klinesville	4d	Slight	Slight	Moderate	Slight	Northern red oak---- Virginia pine-------	60 60	Virginia pine, eastern white pine, red pine, pitch pine.
KlD-------------- Klinesville (North aspect)	4d	Slight	Moderate	Moderate	Slight	Northern red oak---- Virginia pine-------	50 50	Virginia pine, eastern white pine, red pine, pitch pine.
KlD-------------- Klinesville (South aspect)	5d	Slight	Moderate	Severe	Slight	Northern red oak---- Virginia pine-------	60 60	Virginia pine, eastern white pine, red pine, pitch pine.
LaB, LaC, LbB--- Lackawanna	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, Japanese larch.
LbD-------------- Lackawanna	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, Japanese 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		
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Trees to plant
LdB, LdC-------- Laidig	2o	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar------- Eastern white pine-- White ash---------- White oak---------- Sugar maple--------- Black cherry-------- Black locust--------	80 90 90 80 80 80 80 80	Eastern white pine, yellow-poplar, black walnut, Norway spruce, black locust, Japanese larch, black cherry.
LgB---------- Laidig	2o	Slight	Slight	Slight	Slight	Northern red oak---- White oak---------- Yellow-poplar------- White ash---------- Sugar maple--------- Black cherry-------- Eastern white pine-- Black locust--------	80 80 90 80 80 80 90 80	Eastern white pine, yellow-poplar, black walnut, Norway spruce, black locust, Japanese larch, black cherry.
LgD, LgE-------- Laidig	2r	Slight	Moderate	Slight	Slight	Northern red oak---- White oak---------- Yellow-poplar------- White ash---------- Sugar maple--------- Black cherry-------- Eastern white pine-- Black locust--------	80 80 90 80 80 80 90 80	Eastern white pine, yellow-poplar, black walnut, Norway spruce, black locust, Japanese larch, black cherry.
LkB, LkC-------- Leck Kill	3o	Slight	Slight	Slight	Slight	Northern red oak----	68	Eastern white pine, Virginia pine.
LkD---------- Leck Kill	3r	Slight	Moderate	Slight	Slight	Northern red oak----	68	Eastern white pine, Virginia pine.
Lm, Ln---------- Linden	1o	Slight	Slight	Slight	Slight	Northern red oak---- White ash---------- Sugar maple--------- Black cherry-------- Black walnut-------- Eastern white pine-- Yellow-poplar-------	90 90 90 90 90 90 100	Yellow-poplar, black walnut, black cherry, red pine, Japanese larch, Norway spruce, eastern white pine.
MoB, MoC-------- Morris	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, Japanese larch.
MrB---------- Morris	3w	Slight	Moderate	Moderate	Moderate	Northern red oak---- Sugar maple--------- Black cherry--------	65 79 69	Eastern white pine, Norway spruce, white 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		
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Trees to plant
NoB---------- Nolo	3w	Slight	Severe	Severe	Moderate	Northern red oak----	70	Eastern white pine, Norway spruce, red maple.
						Black cherry--------	70	
NrA, NxB-------- Norwich	5w	Slight	Severe	Severe	Severe	Red maple----------	50	Eastern white pine, white spruce.
OgB, OgC-------- Oquaga	3o	Slight	Slight	Slight	Slight	Sugar maple---------	69	Eastern white pine, red pine, Japanese larch, Norway spruce, black cherry.
						Northern red oak----	71	
						Black cherry--------	72	
						Eastern white pine--	75	
OgD---------- Oquaga	3r	Slight	Moderate	Slight	Slight	Sugar maple---------	69	Eastern white pine, red pine, Japanese larch, Norway spruce, black cherry.
						Northern red oak----	71	
						Black cherry--------	72	
						Eastern white pine--	75	
OxB**: Oquaga---------	3o	Slight	Slight	Slight	Slight	Sugar maple---------	73	Eastern white pine, red pine, Japanese larch, Norway spruce.
						Northern red oak----	60	
						White ash----------	75	
Lordstown------	3o	Slight	Slight	Slight	Slight	Sugar maple---------	70	Eastern white pine, red pine, Japanese larch, Norway spruce.
						Northern red oak----	60	
						White ash----------	75	
OxD**: Oquaga---------	3r	Slight	Moderate	Slight	Slight	Sugar maple---------	73	Eastern white pine, red pine, Japanese larch, Norway spruce.
						Northern red oak----	60	
						White ash----------	75	
Lordstown------	3r	Slight	Moderate	Slight	Slight	Sugar maple---------	70	Eastern white pine, red pine, Japanese larch, Norway spruce.
						Northern red oak----	60	
						White ash----------	75	
OxE**: Oquaga---------	3r	Moderate	Severe	Slight	Slight	Sugar maple---------	73	Eastern white pine, red pine, Japanese larch, Norway spruce.
						Northern red oak----	60	
						White ash----------	75	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Trees to plant
OxE**: Lordstown	3r	Moderate	Severe	Slight	Slight	Sugar maple Northern red oak White ash	70 60 75	Eastern white pine, red pine, Japanese larch, Norway spruce.
Re Rexford	3w	Slight	Moderate	Moderate	Moderate	Northern red oak White ash Sugar maple Black cherry	70 70 70 70	Black cherry, Japanese larch, Norway spruce, white spruce, eastern white pine.
ShA, ShB Shelmadine	3w	Slight	Severe	Severe	Moderate	Northern red oak Black cherry	70 70	Eastern white pine, red maple, Norway spruce.
SvB Shelmadine	3w	Slight	Severe	Severe	Severe	Northern red oak Black cherry	70 70	Eastern white pine, red maple, Norway spruce.
SxD Swartswood	3r	Slight	Moderate	Slight	Slight	Northern red oak Sugar maple White ash	70 70 70	Red pine, eastern white pine, Japanese larch, Norway spruce.
TuA, TuB, TuC Tunkhannock	3o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple	70 65	Eastern white pine, red pine, Japanese larch, Norway spruce.
TuD Tunkhannock	3r	Slight	Moderate	Slight	Slight	Northern red oak Sugar maple	70 65	Eastern white pine, red pine, Japanese larch, Norway spruce.
WaA, WaB, WaC Washington	1o	Slight	Slight	Slight	Slight	Northern red oak Yellow-poplar	85 95	Eastern white pine, Japanese larch, black walnut, yellow-poplar, Norway spruce.
WbA, WbB, WbC Watson	3o	Slight	Slight	Slight	Slight	Northern red oak Sugar maple Yellow-poplar	70 70 80	Eastern white pine, yellow-poplar, Japanese larch, Norway spruce, 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		
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Trees to plant
WeB, WeC-------- Weikert	4d	Slight	Slight	Severe	Moderate	Northern red oak---- Virginia pine-------	59 56	Virginia pine, shortleaf pine, red pine, eastern white pine.
WeD-------------- Weikert	4d	Slight	Moderate	Severe	Moderate	Northern red oak---- Virginia pine-------	64 60	Eastern white pine, shortleaf pine, Virginia pine.
WkE**: Weikert-------- (North aspect)	4d	Moderate	Severe	Severe	Moderate	Northern red oak---- Virginia pine-------	64 60	Eastern white pine, shortleaf pine, Virginia pine.
Klinesville---- (North aspect)	4d	Moderate	Severe	Moderate	Slight	Northern red oak---- Virginia pine-------	60 60	Virginia pine, eastern white pine, red pine, pitch pine.
WkE**: Weikert-------- (South aspect)	5d	Moderate	Severe	Severe	Moderate	Northern red oak---- Virginia pine-------	64 60	Eastern white pine, shortleaf pine, Virginia pine.
Klinesville---- (South aspect)	5d	Moderate	Severe	Moderate	Slight	Northern red oak---- Virginia pine-------	50 50	Virginia pine, eastern white pine, red pine, pitch pine.
WlB, WlC-------- Wellsboro	2o	Slight	Slight	Slight	Slight	Northern red oak---- Sugar maple---------	78 70	Norway spruce, eastern white pine, red pine, black cherry, Japanese larch.
WmB-------------- Wellsboro	2o	Slight	Slight	Slight	Slight	Northern red oak---- Sugar maple---------	78 70	Norway spruce, eastern white pine, red pine, black cherry.
WmD-------------- Wellsboro	2r	Slight	Moderate	Slight	Slight	Northern red oak---- Sugar maple---------	78 70	Norway spruce, eastern white pine, red pine, black cherry.
WsA, WsB-------- Wheeling	2o	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 90	Eastern white pine, yellow-poplar, black walnut.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Trees to plant
WxB, WxD-------- Wurtsboro	3o	Slight	Slight	Slight	Slight	Northern red oak---- Sugar maple---------	70 70	Norway spruce, eastern white pine, red pine, black cherry, Japanese larch.
Wy-------------- Wyoming	4f	Slight	Slight	Severe	Slight	Northern red oak----	55	Eastern white pine, red pine, Virginia pine.

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AbB Albrights	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
AbC Albrights	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.
AlB Allenwood	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
AlC Allenwood	Moderate: small stones, slope.	Moderate: small stones, slope.	Severe: slope, small stones.	Slight	Moderate: small stones, slope.
AvA, AvB Alvira	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
AvC Alvira	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.
AxB Alvira	Severe: wetness.	Severe: wetness.	Severe: wetness, large stones, small stones.	Severe: wetness.	Severe: wetness.
Ba Barbour	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
Bb Barbour	Severe: flooding.	Slight	Moderate: small stones.	Slight	Moderate: flooding, droughty.
Bc Basher	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Severe: wetness, flooding.
Bd Basher	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: wetness, flooding.
BeB Berks	Severe: small stones.	Severe: small stones.	Severe: small stones.	Slight	Severe: small stones.
BeC Berks	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight	Severe: small stones.
BeD Berks	Severe: slope, small stones.	Severe: small stones, slope.	Severe: slope, small stones.	Moderate: slope.	Severe: small stones, slope.
BuB Buchanan	Moderate: wetness, large stones.	Moderate: wetness, large stones.	Severe: large stones, small stones.	Slight	Severe: small stones.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
BuD---------- Buchanan	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: slope.	Severe: slope, small stones.
ChA---------- Chenango	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones, droughty.
ClA---------- Clarksburg	Moderate: wetness.	Moderate: wetness.	Moderate: small stones.	Severe: erodes easily.	Moderate: wetness.
ClB---------- Clarksburg	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones.	Severe: erodes easily.	Moderate: wetness.
CmB---------- Clymer	Slight----------	Slight----------	Severe: small stones.	Slight----------	Moderate: large stones.
CmC---------- Clymer	Moderate: slope.	Moderate: slope.	Severe: slope, small stones.	Slight----------	Moderate: slope, large stones.
CnB---------- Clymer	Moderate: large stones.	Moderate: large stones.	Severe: large stones, small stones.	Moderate: slope.	Moderate: droughty, large stones.
CnD---------- Clymer	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.		Severe: slope.
CoB---------- Cookport	Moderate: percs slowly, wetness.	Moderate: wetness.	Moderate: slope, small stones.	Severe: erodes easily.	Moderate: wetness.
CxB---------- Cookport	Moderate: wetness, large stones.	Moderate: large stones, wetness.	Severe: large stones.	Slight----------	Moderate: large stones, wetness.
CxD---------- Cookport	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Moderate: slope.	Severe: slope.
DeB---------- Dekalb	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: large stones.	Severe: small stones.
DeC---------- Dekalb	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: large stones.	Severe: small stones.
DkB---------- Dekalb	Severe: small stones.	Severe: small stones.	Severe: small stones, large stones.	Moderate: large stones.	Severe: small stones.
DkD---------- Dekalb	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones, large stones.	Moderate: slope, large stones.	Severe: slope, small stones.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
DlE*: Dekalb	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope, small stones.
Lehew	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope.
DuB---- Duncannon	Slight----	Slight----	Moderate: slope.	Severe: erodes easily.	Slight.
HaA---- Hagerstown	Slight----	Slight----	Moderate: small stones.	Slight----	Moderate: large stones.
HaB---- Hagerstown	Slight----	Slight----	Moderate: slope, small stones.	Slight----	Moderate: large stones.
HaC---- Hagerstown	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----	Moderate: large stones, slope.
HhB---- Hartleton	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----	Severe: large stones.
HhC---- Hartleton	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight----	Severe: large stones.
HhD---- Hartleton	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: large stones, slope.
Ho---- Holly	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
KlB---- Klinesville	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: small stones.	Severe: small stones, thin layer.
KlC---- Klinesville	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: small stones.	Severe: small stones, thin layer.
KlD---- Klinesville	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: small stones.	Severe: small stones, slope, thin layer.
LaB---- Lackawanna	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----	Moderate: small stones.
LaC---- Lackawanna	Moderate: small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight----	Moderate: small stones, slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
LbB---------- Lackawanna	Moderate: small stones, wetness.	Moderate: small stones.	Severe: large stones, small stones.	Slight----------	Moderate: small stones, large stones.
LbD---------- Lackawanna	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: slope.	Severe: slope.
LdB---------- Laidig	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones.
LdC---------- Laidig	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight----------	Moderate: small stones, slope.
LgB---------- Laidig	Moderate: large stones, small stones.	Moderate: small stones, large stones.	Severe: large stones, small stones.	Slight----------	Moderate: large stones, small stones.
LgD---------- Laidig	Severe: slope.	Severe: slope.	Severe: slope, large stones, small stones.	Moderate: slope.	Severe: slope.
LgE---------- Laidig	Severe: slope.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: slope.	Severe: slope.
LkB---------- Leck Kill	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones.
LkC---------- Leck Kill	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight----------	Moderate: small stones, slope.
LkD---------- Leck Kill	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Lm, Ln---------- Linden	Severe: flooding.	Slight----------	Moderate: flooding.	Severe: erodes easily.	Moderate: flooding.
MoB---------- Morris	Severe: wetness.	Severe: wetness.	Severe: small stones, wetness.	Severe: wetness.	Severe: wetness.
MoC---------- Morris	Severe: wetness.	Severe: wetness.	Severe: slope, small stones, wetness.	Severe: wetness.	Severe: wetness.
MrB---------- Morris	Severe: wetness.	Severe: wetness.	Severe: wetness, large stones.	Severe: wetness.	Severe: wetness.
NoB---------- Nolo	Severe: wetness.	Severe: wetness.	Severe: large stones.	Severe: wetness.	Severe: wetness.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
NrA---------- Norwich	Severe: wetness, percs slowly, excess humus.	Severe: wetness, excess humus, percs slowly.	Severe: excess humus, wetness, percs slowly.	Severe: wetness, excess humus.	Severe: wetness.
NxB---------- Norwich	Severe: wetness, percs slowly.	Severe: wetness, excess humus.	Severe: large stones, wetness.	Severe: wetness, excess humus.	Severe: wetness.
OgB---------- Oquaga	Severe: small stones.	Severe: small stones.	Severe: small stones.	Slight----------	Severe: small stones.
OgC---------- Oquaga	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight----------	Severe: small stones.
OgD---------- Oquaga	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope.	Severe: small stones, slope.
OxB*: Oquaga----------	Severe: small stones.	Severe: small stones.	Severe: large stones, small stones.	Slight----------	Severe: small stones.
Lordstown----------	Moderate: large stones.	Moderate: large stones.	Severe: large stones, small stones.	Slight----------	Moderate: large stones, thin layer.
OxD*: Oquaga----------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.	Moderate: slope.	Severe: small stones, slope.
Lordstown----------	Severe: slope.	Severe: slope.	Severe: slope, large stones, small stones.	Moderate: slope.	Severe: slope.
OxE*: Oquaga----------	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: small stones, slope.
Lordstown----------	Severe: slope.	Severe: slope.	Severe: slope, large stones, small stones.	Severe: slope.	Severe: slope.
Pt*. Pits					
Re---------- Rexford	Severe: wetness.	Severe: wetness.	Severe: wetness, small stones.	Severe: wetness.	Severe: wetness.
Ru*: Rubble land.					

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ru*: Dystrochrepts.					
ShA, ShB---------- Shelmadine	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
SvB---------- Shelmadine	Severe: wetness.	Severe: wetness.	Severe: wetness, large stones.	Severe: wetness.	Severe: wetness.
SxD---------- Swartswood	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: slope.	Severe: slope.
TuA, TuB---------- Tunkhannock	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Severe: small stones.
TuC---------- Tunkhannock	Moderate: small stones, slope.	Moderate: small stones, slope.	Severe: slope, small stones.	Slight----------	Severe: small stones.
TuD---------- Tunkhannock	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope.	Severe: small stones, slope.
Ud*. Udifluvents					
Uo*. Udorthents					
Ur*. Urban land					
UsB*, UsD*: Urban land.					
Udorthents.					
WaA---------- Washington	Slight----------	Slight----------	Moderate: small stones.	Slight----------	Slight.
WaB---------- Washington	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
WaC---------- Washington	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
WbA---------- Watson	Moderate: wetness.	Moderate: wetness.	Moderate: small stones, wetness.	Moderate: wetness, erodes easily.	Moderate: wetness.
WbB---------- Watson	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones.	Moderate: wetness, erodes easily.	Moderate: wetness.
WbC---------- Watson	Moderate: wetness, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: wetness, erodes easily.	Moderate: wetness, slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
WeB---------- Weikert	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: depth to rock, small stones.	Slight----------	Severe: thin layer, small stones.
WeC---------- Weikert	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: slope, depth to rock, small stones.	Slight----------	Severe: thin layer, small stones.
WeD---------- Weikert	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, depth to rock, small stones.	Moderate: slope.	Severe: slope, thin layer, small stones.
WkE*: Weikert----------	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, depth to rock, small stones.	Severe: slope.	Severe: slope, thin layer, small stones.
Klinesville----------	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones.	Severe: small stones, slope, thin layer.
WlB---------- Wellsboro	Moderate: percs slowly, wetness.	Moderate: wetness, percs slowly.	Severe: small stones.	Severe: slope.	Moderate: large stones.
WlC---------- Wellsboro	Moderate: slope, percs slowly, wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope, small stones.	Severe: slope.	Moderate: slope, large stones.
WmB---------- Wellsboro	Moderate: large stones, percs slowly.	Moderate: large stones.	Severe: large stones.	Moderate: wetness.	Moderate: large stones.
WmD---------- Wellsboro	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope, wetness.	Severe: slope.
WsA---------- Wheeling	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
WsB---------- Wheeling	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
WxB---------- Wurtsboro	Moderate: wetness, large stones.	Moderate: large stones, wetness.	Severe: large stones, small stones.	Moderate: wetness.	Moderate: small stones, large stones.
WxD---------- Wurtsboro	Moderate: slope, wetness.	Moderate: slope, large stones.	Severe: large stones, slope, small stones.	Moderate: wetness.	Moderate: small stones, large stones, slope.
Wy---------- Wyoming	Severe: flooding, small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Severe: small stones.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AbB---- Albrights	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AbC---- Albrights	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AlB---- Allenwood	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AlC---- Allenwood	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
AvA---- Alvira	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
AvB---- Alvira	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AvC---- Alvira	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AxB---- Alvira	Very poor.	Poor	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
Ba, Bb---- Barbour	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Bc, Bd---- Basher	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
BeB---- Berks	Poor	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Very poor.
BeC---- Berks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
BeD---- Berks	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
BuB---- Buchanan	Very poor.	Poor	Good	Good	Good	Fair	Very poor.	Poor	Good	Poor.
BuD---- Buchanan	Very poor.	Poor	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
ChA---- Chenango	Good	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
ClA---- Clarksburg	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
ClB---- Clarksburg	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CmB---- Clymer	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
CmC---- Clymer	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CnB---- Clymer	Very poor.	Poor	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
CnD---- Clymer	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
CoB---- Cookport	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CxB---- Cookport	Very poor.	Poor	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
CxD---- Cookport	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
DeB---- Dekalb	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
DeC---- Dekalb	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
DkB---- Dekalb	Very poor.	Poor	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
DkD---- Dekalb	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
DlE*: Dekalb----	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Lehew----	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
DuB---- Duncannon	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HaA, HaB---- Hagerstown	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
HaC---- Hagerstown	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HhB---- Hartleton	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HhC---- Hartleton	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HhD---- Hartleton	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Ho---- Holly	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
KlB, KlC, KlD---- Klinesville	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
LaB---- Lackawanna	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LaC---- Lackawanna	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LbB---- Lackawanna	Very poor.	Poor	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
LbD---- Lackawanna	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
LdB---- Laidig	Good	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
LdC---- Laidig	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
LgB---- Laidig	Very poor.	Poor	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
LgD---- Laidig	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
LgE---- Laidig	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
LkB---- Leck Kill	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LkC---- Leck Kill	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
LkD---- Leck Kill	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lm, Ln---- Linden	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MoB---- Morris	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
MoC---- Morris	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
MrB---- Morris	Very poor.	Poor	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
NoB---- Nolo	Very poor.	Poor	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
NrA---- Norwich	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
NxB---- Norwich	Very poor.	Poor	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
OgB---- Oquaga	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
OgC---------- Oquaga	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
OgD---------- Oquaga	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
OxB*:										
Oquaga----------	Very poor.	Very poor.	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
Lordstown---------	Very poor.	Very poor.	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
OxD*, OxE*:										
Oquaga----------	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Lordstown---------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Pt*. Pits										
Re---------- Rexford	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
Ru*: Rubble land.										
Dystrochrepts.										
ShA---------- Shelmadine	Poor	Fair	Good	Fair	Fair	Good	Good	Fair	Fair	Good.
ShB---------- Shelmadine	Poor	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
SvB---------- Shelmadine	Very poor.	Poor	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
SxD---------- Swartswood	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
TuA, TuB---------- Tunkhannock	Good	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
TuC---------- Tunkhannock	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
TuD---------- Tunkhannock	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Ud*. Udifluvents										
Uo*. Udorthents										
Ur*. Urban land										
UsB*, UsD*: Urban land.										

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
UsB*, UsD*: Udorthents.										
WaA, WaB---------- Washington	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WaC---------- Washington	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WbA---------- Watson	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
WbB---------- Watson	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WbC---------- Watson	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WeB, WeC, WeD------ Weikert	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
WkE*: Weikert----------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
Klinesville-------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
WlB---------- Wellsboro	Good	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
WlC---------- Wellsboro	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
WmB---------- Wellsboro	Very poor.	Poor	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
WmD---------- Wellsboro	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
WsA, WsB---------- Wheeling	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WxB---------- Wurtsboro	Very poor.	Poor	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
WxD---------- Wurtsboro	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Wy---------- Wyoming	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AbB---- Albrights	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
AbC---- Albrights	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, slope.	Severe: wetness.	Severe: wetness.
AlB---- Allenwood	Slight----	Slight----	Slight----	Moderate: slope.	Moderate: low strength, frost action.	Moderate: small stones.
AlC---- Allenwood	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope, frost action.	Moderate: small stones, slope.
AvA, AvB---- Alvira	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, wetness.	Severe: wetness.
AvC---- Alvira	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: frost action, wetness.	Severe: wetness.
AxB---- Alvira	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, wetness.	Severe: wetness.
Ba---- Barbour	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Bb---- Barbour	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, droughty.
Bc---- Basher	Severe: wetness, cutbanks cave.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action.	Severe: wetness, flooding.
Bd---- Basher	Severe: wetness, cutbanks cave.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action.	Moderate: wetness, flooding.
BeB---- Berks	Moderate: depth to rock.	Slight----	Moderate: depth to rock.	Moderate: slope.	Slight----	Severe: small stones.
BeC---- Berks	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.	Severe: small stones.
BeD---- Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
BuB---- Buchanan	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Severe: small stones.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
BuD---------- Buchanan	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
ChA---------- Chenango	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Moderate: small stones, droughty.
ClA---------- Clarksburg	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Moderate: low strength, wetness.	Moderate: wetness.
ClB---------- Clarksburg	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Moderate: low strength, wetness.	Moderate: wetness.
CmB---------- Clymer	Moderate: depth to rock.	Slight---------	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.	Moderate: large stones.
CmC---------- Clymer	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, large stones.
CnB---------- Clymer	Moderate: depth to rock.	Slight---------	Moderate: depth to rock.	Moderate: slope.	Moderate: frost action.	Moderate: droughty, large stones.
CnD---------- Clymer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CoB---------- Cookport	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Moderate: wetness, low strength.	Moderate: wetness.
CxB---------- Cookport	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Moderate: wetness, low strength.	Moderate: large stones, wetness.
CxD---------- Cookport	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Severe: slope.
DeB---------- Dekalb	Severe: depth to rock.	Moderate: depth to rock, large stones.	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Moderate: depth to rock, large stones.	Severe: small stones.
DeC---------- Dekalb	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, large stones.	Severe: small stones.
DkB---------- Dekalb	Severe: depth to rock.	Moderate: depth to rock, large stones.	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Moderate: depth to rock, large stones.	Severe: small stones.
DkD---------- Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
DlE*: Dekalb	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
Lehew	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
DuB---- Duncannon	Slight	Slight	Slight	Moderate: slope.	Severe: frost action.	Slight.
HaA---- Hagerstown	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Moderate: large stones.
HaB---- Hagerstown	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: large stones.
HaC---- Hagerstown	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope.
HhB---- Hartleton	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.
HhC---- Hartleton	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: slope, large stones.	Severe: large stones.	Severe: large stones.
HhD---- Hartleton	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
Ho---- Holly	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: ponding, flooding, frost action.	Severe: ponding, flooding.
KlB---- Klinesville	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.	Severe: small stones, thin layer.
KlC---- Klinesville	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Severe: small stones, thin layer.
KlD---- Klinesville	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope, thin layer.
LaB---- Lackawanna	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Moderate: small stones.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
LaC---------- Lackawanna	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: wetness, slope, frost action.	Moderate: small stones, slope.
LbB---------- Lackawanna	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Moderate: small stones, large stones.
LbD---------- Lackawanna	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: slope.	Severe: slope.
LdB---------- Laidig	Moderate: wetness.	Slight---------	Moderate: wetness.	Moderate: slope.	Moderate: frost action, low strength.	Moderate: small stones.
LdC---------- Laidig	Moderate: wetness, slope.	Moderate: slope.	Moderate: slope, wetness.	Severe: slope.	Moderate: slope, frost action, low strength.	Moderate: small stones, slope.
LgB---------- Laidig	Moderate: wetness.	Slight---------	Moderate: wetness.	Moderate: wetness, slope.	Moderate: low strength, frost action.	Moderate: large stones, small stones.
LgD, LgE---------- Laidig	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
LkB---------- Leck Kill	Slight---------	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Moderate: small stones.
LkC---------- Leck Kill	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, slope.
LkD---------- Leck Kill	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lm, Ln---------- Linden	Moderate: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
MoB---------- Morris	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, wetness.	Severe: wetness.
MoC---------- Morris	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: frost action, wetness.	Severe: wetness.
MrB---------- Morris	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, wetness.	Severe: wetness.
NoB---------- Nolo	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
NrA, NxB---------- Norwich	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
OgB---------- Oquaga	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.	Severe: small stones.
OgC---------- Oquaga	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, frost action.	Severe: small stones.
OgD---------- Oquaga	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
OxB*: Oquaga----------	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.	Severe: small stones.
Lordstown--------	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.	Moderate: large stones, thin layer.
OxD*, OxE*: Oquaga----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Lordstown--------	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
Pt*. Pits						
Re---------- Rexford	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
Ru*: Rubble land. Dystrochrepts.						
ShA, ShB, SvB----- Shelmadine	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
SxD---------- Swartswood	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: slope.	Severe: slope.
TuA---------- Tunkhannock	Severe: cutbanks cave.	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Severe: small stones.
TuB---------- Tunkhannock	Severe: cutbanks cave.	Moderate: large stones.	Moderate: large stones.	Moderate: slope, large stones.	Moderate: large stones.	Severe: small stones.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
TuC---------- Tunkhannock	Severe: cutbanks cave.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, large stones.	Severe: small stones.
TuD---------- Tunkhannock	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Ud*. Udifluvents						
Uo*. Udorthents						
Ur*. Urban land						
UsB*, UsD*: Urban land.						
Udorthents.						
WaA---------- Washington	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Slight.
WaB---------- Washington	Slight---------	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.
WaC---------- Washington	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
WbA---------- Watson	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Moderate: low strength, wetness, frost action.	Moderate: wetness.
WbB---------- Watson	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Moderate: low strength, wetness, frost action.	Moderate: wetness.
WbC---------- Watson	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Moderate: low strength, wetness, slope.	Moderate: wetness, slope.
WeB---------- Weikert	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.	Severe: thin layer, small stones.
WeC---------- Weikert	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, frost action.	Severe: thin layer, small stones.
WeD---------- Weikert	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, thin layer, small stones.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
WkE*: Weikert	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, thin layer, small stones.
Klinesville	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope, thin layer.
WlB Wellsboro	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Severe: frost action.	Moderate: large stones.
WlC Wellsboro	Severe: wetness.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Severe: frost action.	Moderate: slope, large stones.
WmB Wellsboro	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Severe: frost action.	Moderate: large stones.
WmD Wellsboro	Severe: slope, wetness.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
WsA Wheeling	Slight	Slight	Slight	Slight	Moderate: frost action, low strength.	Slight.
WsB Wheeling	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action, low strength.	Slight.
WxB Wurtsboro	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Moderate: small stones, large stones.
WxD Wurtsboro	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: wetness, slope, frost action.	Moderate: small stones, large stones, slope.
Wy Wyoming	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: small stones.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AbB---- Albrights	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
AbC---- Albrights	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
AlB---- Allenwood	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight----	Poor: too clayey, small stones, hard to pack.
AlC---- Allenwood	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, small stones, hard to pack.
AvA---- Alvira	Severe: percs slowly, wetness.	Moderate: depth to rock.	Severe: wetness, depth to rock.	Severe: wetness.	Poor: wetness.
AvB---- Alvira	Severe: percs slowly, wetness.	Moderate: slope, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness.	Poor: wetness.
AvC---- Alvira	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness, depth to rock.	Severe: wetness.	Poor: wetness.
AxB---- Alvira	Severe: percs slowly, wetness.	Moderate: slope, depth to rock.	Severe: depth to rock, wetness.	Severe: wetness.	Poor: wetness.
Ba, Bb---- Barbour	Severe: flooding, wetness, poor filter.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.
Bc, Bd---- Basher	Severe: flooding, wetness.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness.	Poor: seepage, too sandy, small stones.
BeB---- Berks	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
BeC---- Berks	Severe: depth to rock.	Severe: slope, seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
BeD---- Berks	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
BuB---------- Buchanan	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Poor: small stones.
BuD---------- Buchanan	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: wetness, slope.	Severe: slope.	Poor: small stones, slope.
ChA---------- Chenango	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
ClA, ClB---------- Clarksburg	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: small stones.
CmB---------- Clymer	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Poor: small stones.
CmC---------- Clymer	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Poor: small stones.
CnB---------- Clymer	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Poor: small stones.
CnD---------- Clymer	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: small stones, slope.
CoB, CxB---------- Cookport	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, depth to rock.	Moderate: wetness, depth to rock.	Fair: area reclaim, too clayey, wetness.
CxD---------- Cookport	Severe: slope, wetness, percs slowly.	Severe: slope, wetness.	Severe: slope, wetness, depth to rock.	Severe: slope.	Poor: slope.
DeB---------- Dekalb	Severe: depth to rock.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
DeC---------- Dekalb	Severe: depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, depth to rock.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.
DkB---------- Dekalb	Severe: depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: small stones, area reclaim.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
DkD---------- Dekalb	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
DlE*: Dekalb----------	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
Lehew----------	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, small stones, area reclaim.
DuB---------- Duncannon	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Fair: area reclaim.
HaA---------- Hagerstown	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
HaB---------- Hagerstown	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
HaC---------- Hagerstown	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
HhB---------- Hartleton	Severe: large stones.	Severe: seepage, large stones.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: large stones.
HhC---------- Hartleton	Severe: large stones.	Severe: seepage, slope, large stones.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: large stones.
HhD---------- Hartleton	Severe: slope, large stones.	Severe: seepage, slope, large stones.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: large stones, slope.
Ho---------- Holly	Severe: flooding, ponding, percs slowly.	Severe: seepage, flooding, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: ponding.
KlB---------- Klinesville	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim, seepage, small stones.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
KlC---------- Klinesville	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim, seepage, small stones.
KlD---------- Klinesville	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, seepage, small stones.
LaB---------- Lackawanna	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Moderate: wetness.	Moderate: wetness.	Poor: small stones.
LaC---------- Lackawanna	Severe: wetness, percs slowly.	Severe: slope.	Moderate: wetness, slope.	Moderate: wetness, slope.	Poor: small stones.
LbB---------- Lackawanna	Severe: wetness, percs slowly.	Moderate: slope, seepage.	Moderate: wetness.	Moderate: wetness.	Poor: small stones.
LbD---------- Lackawanna	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
LdB---------- Laidig	Severe: percs slowly, wetness.	Severe: seepage, wetness.	Moderate: wetness.	Severe: seepage.	Fair: small stones, wetness.
LdC---------- Laidig	Severe: percs slowly, wetness.	Severe: seepage, slope, wetness.	Moderate: slope, wetness.	Severe: seepage.	Fair: slope, small stones, wetness.
LgB---------- Laidig	Severe: percs slowly, wetness.	Severe: seepage, wetness.	Moderate: wetness.	Severe: seepage.	Fair: small stones, wetness.
LgD, LgE---------- Laidig	Severe: slope, percs slowly, wetness.	Severe: seepage, slope, wetness.	Severe: slope.	Severe: slope, seepage.	Poor: slope.
LkB---------- Leck Kill	Moderate: percs slowly, depth to rock.	Severe: seepage.	Severe: seepage, depth to rock.	Severe: seepage.	Poor: small stones.
LkC---------- Leck Kill	Moderate: percs slowly, slope, depth to rock.	Severe: seepage, slope.	Severe: seepage, depth to rock.	Severe: seepage.	Poor: small stones.
LkD---------- Leck Kill	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope.	Poor: small stones, slope.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Lm, Ln Linden	Severe: flooding, wetness, poor filter.	Severe: flooding, seepage.	Severe: wetness, flooding, seepage.	Severe: seepage, flooding.	Poor: thin layer.
MoB Morris	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness, small stones.
MoC Morris	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness, small stones.
MrB Morris	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
NoB Nolo	Severe: wetness, percs slowly.	Severe: wetness.	Severe: depth to rock, wetness.	Severe: wetness.	Poor: wetness, thin layer.
NrA Norwich	Severe: wetness, percs slowly.	Slight	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
NxB Norwich	Severe: wetness, percs slowly.	Moderate: slope, large stones.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
OgB Oquaga	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
OgC Oquaga	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
OgD Oquaga	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
OxB*: Oquaga	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
Lordstown	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
OxD*, OxE*: Oquaga	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Lordstown	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Poor: area reclaim, slope, thin layer.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Pt*. Pits					
Re---------- Rexford	Severe: percs slowly, wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
Ru*: Rubble land.					
Dystrochrepts.					
ShA---------- Shelmadine	Severe: wetness, percs slowly.	Slight----------	Severe: wetness.	Severe: wetness.	Poor: wetness.
ShB, SvB---------- Shelmadine	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
SxD---------- Swartswood	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: seepage, small stones, slope.
TuA, TuB---------- Tunkhannock	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
TuC---------- Tunkhannock	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
TuD---------- Tunkhannock	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Ud*. Udifluvents					
Uo*. Udorthents					
Ur*. Urban land					
UsB*, UsD*: Urban land.					
Udorthents.					
WaA, WaB---------- Washington	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Slight----------	Fair: too clayey, small stones.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
WaC---------- Washington	Moderate: slope, percs slowly.	Severe: slope, seepage.	Severe: seepage.	Moderate: slope.	Fair: slope, too clayey, small stones.
WbA---------- Watson	Severe: wetness, percs slowly.	Slight----------	Severe: wetness.	Moderate: wetness.	Poor: small stones, thin layer.
WbB---------- Watson	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Poor: small stones, thin layer.
WbC---------- Watson	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Moderate: wetness, slope.	Poor: small stones, thin layer.
WeB---------- Weikert	Severe: depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: area reclaim, seepage, small stones.
WeC---------- Weikert	Severe: depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: area reclaim, seepage, small stones.
WeD---------- Weikert	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, area reclaim, seepage.
WkE*: Weikert----------	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Poor: slope, area reclaim, seepage.
Klinesville--------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, seepage, small stones.
WlB---------- Wellsboro	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Poor: small stones.
WlC---------- Wellsboro	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Moderate: slope, wetness.	Poor: small stones.
WmB---------- Wellsboro	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Poor: small stones.
WmD---------- Wellsboro	Severe: slope, wetness, percs slowly.	Severe: slope.	Severe: slope, wetness.	Severe: slope.	Poor: slope, small stones.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
WsA, WsB---------- Wheeling	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Slight----------	Fair: thin layer.
WxB---------- Wurtsboro	Severe: wetness, percs slowly.	Moderate: small stones, slope.	Severe: wetness.	Severe: wetness.	Poor: thin layer, small stones.
WxD---------- Wurtsboro	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Severe: wetness.	Poor: thin layer, small stones.
Wy---------- Wyoming	Severe: poor filter, flooding.	Severe: seepage, flooding.	Severe: seepage, too sandy, flooding.	Severe: seepage, flooding.	Poor: seepage, too sandy, small stones.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AbB, AbC---------- Albrights	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
AlB, AlC---------- Allenwood	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
AvA, AvB, AvC, AxB---- Alvira	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
Ba, Bb---------- Barbour	Good----------	Probable----------	Probable----------	Poor: small stones, area reclaim.
Bc, Bd---------- Basher	Fair: wetness.	Probable----------	Probable----------	Poor: small stones, area reclaim.
BeB, BeC---------- Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
BeD---------- Berks	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
BuB---------- Buchanan	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
BuD---------- Buchanan	Fair: slope, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, area reclaim.
ChA---------- Chenango	Good----------	Probable----------	Probable----------	Poor: small stones, area reclaim.
ClA, ClB---------- Clarksburg	Fair: wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
CmB, CmC, CnB--------- Clymer	Fair: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
CnD---------- Clymer	Fair: area reclaim, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CoB---------- Cookport	Fair: low strength, wetness, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
CxB---------- Cookport	Fair: area reclaim, wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
CxD---------- Cookport	Fair: area reclaim, wetness, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
DeB, DeC, DkB--------- Dekalb	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
DkD---------- Dekalb	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
DlE*: Dekalb----------	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Lehew----------	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, large stones.
DuB---------- Duncannon	Fair: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Good.
HaA, HaB, HaC--------- Hagerstown	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
HhB, HhC---------- Hartleton	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim.
HhD---------- Hartleton	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
Ho---------- Holly	Poor: wetness.	Probable----------	Probable----------	Poor: wetness.
KlB, KlC---------- Klinesville	Poor: area reclaim.	Improbable: thin layer.	Improbable: thin layer.	Poor: area reclaim, small stones.
KlD---------- Klinesville	Poor: area reclaim.	Improbable: thin layer.	Improbable: thin layer.	Poor: area reclaim, small stones, slope.
LaB, LaC, LbB--------- Lackawanna	Fair: wetness, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
LbD---------- Lackawanna	Fair: wetness, slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
LdB, LdC, LgB--------- Laidig	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
LgD---------- Laidig	Fair: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
LgE---------- Laidig	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
LkB, LkC---------- Leck Kill	Fair: thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
LkD---------- Leck Kill	Fair: thin layer, slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Lm, Ln---------- Linden	Good----------	Probable----------	Probable----------	Fair: thin layer.
MoB, MoC, MrB--------- Morris	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
NoB---------- Nolo	Poor: wetness, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
NrA, NxB---------- Norwich	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
OgB, OgC---------- Oquaga	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
OgD---------- Oquaga	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
OxB*: Oquaga----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Lordstown----------	Poor: thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
OxD*: Oquaga----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
OxD*: Lordstown	Poor: thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
OxE*: Oquaga	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Lordstown	Poor: slope, thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Pt*. Pits				
Re Rexford	Poor: wetness, thin layer.	Probable	Probable	Poor: wetness, small stones, area reclaim.
Ru*: Rubble land. Dystrochrepts.				
ShA, ShB Shelmadine	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, area reclaim.
SvB Shelmadine	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, large stones, area reclaim.
SxD Swartswood	Fair: wetness, slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
TuA, TuB, TuC Tunkhannock	Fair: large stones.	Probable	Probable	Poor: small stones, area reclaim.
TuD Tunkhannock	Fair: large stones, slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
Ud*. Udifluvents				
Uo*. Udorthents				
Ur*. Urban land				

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
UsB*, UsD*: Urban land. Udorthents.				
WaA, WaB---------- Washington	Fair: frost action, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, too clayey.
WaC---------- Washington	Fair: frost action, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, small stones, too clayey.
WbA, WbB, WbC--------- Watson	Fair: wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
WeB, WeC---------- Weikert	Poor: area reclaim.	Improbable: small stones.	Improbable: thin layer.	Poor: small stones, area reclaim.
WeD---------- Weikert	Poor: area reclaim.	Improbable: small stones.	Improbable: thin layer.	Poor: slope, small stones, area reclaim.
WkE*: Weikert----------	Poor: slope, area reclaim.	Improbable: small stones.	Improbable: thin layer.	Poor: slope, small stones, area reclaim.
Klinesville----------	Poor: area reclaim, slope.	Improbable: thin layer.	Improbable: thin layer.	Poor: area reclaim, small stones, slope.
W1B, W1C, WmB--------- Wellsboro	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
WmD---------- Wellsboro	Fair: wetness, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, area reclaim.
WsA, WsB---------- Wheeling	Fair: low strength.	Probable----------	Probable----------	Fair: small stones.
WxB, WxD---------- Wurtsboro	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Wy---------- Wyoming	Good----------	Probable----------	Probable----------	Poor: small stones, area reclaim.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
AbB---- Albrights	Moderate: slope.	Severe: piping, wetness.	Severe: no water.	Slope----	Wetness, rooting depth.	Wetness, droughty, rooting depth.
AbC---- Albrights	Severe: slope.	Severe: piping, wetness.	Severe: no water.	Slope----	Slope, wetness, rooting depth.	Wetness, slope, droughty.
AlB---- Allenwood	Moderate: seepage, slope.	Moderate: piping.	Severe: no water.	Deep to water	Favorable----	Favorable.
AlC---- Allenwood	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope----	Slope.
AvA---- Alvira	Moderate: depth to rock.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action.	Rooting depth, percs slowly.	Percs slowly, wetness, rooting depth.
AvB---- Alvira	Moderate: depth to rock, slope.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Rooting depth, percs slowly.	Percs slowly, wetness, rooting depth.
AvC---- Alvira	Severe: slope.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, percs slowly, slope.	Wetness, rooting depth, slope.
AxB---- Alvira	Moderate: depth to rock, slope.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, large stones, rooting depth.	Large stones, wetness, rooting depth.
Ba, Bb---- Barbour	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Too sandy----	Droughty.
Bc, Bd---- Basher	Moderate: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave, slow refill.	Flooding, frost action, cutbanks cave.	Wetness, too sandy.	Favorable.
BeB---- Berks	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Depth to rock, large stones.	Droughty, depth to rock, large stones.
BeC, BeD---- Berks	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.
BuB---- Buchanan	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Percs slowly, rooting depth.	Percs slowly, rooting depth.
BuD---- Buchanan	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Slope, percs slowly, rooting depth.	Slope, percs slowly, rooting depth.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
ChA---------- Chenango	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Too sandy------	Droughty.
ClA---------- Clarksburg	Moderate: seepage.	Severe: piping.	Severe: no water.	Percs slowly---	Wetness, erodes easily.	Erodes easily, rooting depth.
ClB---------- Clarksburg	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Wetness, erodes easily.	Erodes easily, rooting depth.
CmB---------- Clymer	Moderate: seepage, depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones---	Large stones.
CmC---------- Clymer	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope.
CnB---------- Clymer	Moderate: seepage, depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones---	Large stones.
CnD---------- Clymer	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope.
CoB---------- Cookport	Moderate: depth to rock, slope.	Severe: piping.	Severe: no water.	Slope, percs slowly.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth.
CxB---------- Cookport	Moderate: depth to rock, slope.	Severe: piping.	Severe: no water.	Slope, percs slowly.	Wetness, percs slowly, rooting depth.	Rooting depth, percs slowly.
CxD---------- Cookport	Severe: slope.	Severe: piping.	Severe: no water.	Slope, percs slowly.	Wetness, rooting depth, slope.	Slope, rooting depth, percs slowly.
DeB---------- Dekalb	Severe: seepage.	Severe: piping, large stones.	Severe: no water.	Deep to water	Large stones, depth to rock.	Large stones, droughty, depth to rock.
DeC---------- Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Slope, large stones, droughty.
DkB---------- Dekalb	Severe: seepage.	Severe: piping, large stones.	Severe: no water.	Deep to water	Depth to rock, large stones.	Large stones, droughty, depth to rock.
DkD---------- Dekalb	Severe: seepage, slope.	Severe: piping, large stones.	Severe: no water.	Deep to water	Slope, depth to rock, large stones.	Slope, large stones, droughty.
D1E*: Dekalb----------	Severe: seepage, slope.	Severe: piping, large stones.	Severe: no water.	Deep to water	Slope, depth to rock, large stones.	Slope, large stones, droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
DlE*: Lehew	Severe: seepage, slope.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Slope, large stones, droughty.
DuB--- Duncannon	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
HaA--- Hagerstown	Moderate: seepage, depth to rock.	Moderate: hard to pack.	Severe: no water.	Deep to water	Favorable---	Favorable.
HaB--- Hagerstown	Moderate: seepage, depth to rock, slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Favorable---	Favorable.
HaC--- Hagerstown	Severe: slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope---	Slope.
HhB--- Hartleton	Severe: seepage.	Severe: piping, large stones.	Severe: no water.	Deep to water	Large stones---	Large stones, droughty.
HhC, HhD--- Hartleton	Severe: seepage, slope.	Severe: piping, large stones.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
Ho--- Holly	Severe: seepage.	Severe: piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, flooding, frost action.	Ponding---	Wetness.
KlB--- Klinesville	Severe: depth to rock.	Severe: seepage.	Severe: no water.	Deep to water	Depth to rock	Droughty, depth to rock.
KlC, KlD--- Klinesville	Severe: depth to rock, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, droughty, depth to rock.
LaB--- Lackawanna	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Percs slowly, wetness, rooting depth.	Percs slowly, rooting depth.
LaC--- Lackawanna	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Slope, percs slowly, wetness.	Percs slowly, slope, rooting depth.
LbB--- Lackawanna	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Wetness, rooting depth, percs slowly.	Wetness, rooting depth, percs slowly.
LbD--- Lackawanna	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Slope, wetness, rooting depth.	Slope, wetness, rooting depth.
LdB--- Laidig	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Rooting depth	Rooting depth.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
LdC---------- Laidig	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, rooting depth.	Slope, rooting depth.
LgB---------- Laidig	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Large stones, rooting depth.	Large stones, droughty.
LgD, LgE---------- Laidig	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, large stones, rooting depth.	Slope, large stones, droughty.
LkB---------- Leck Kill	Severe: seepage.	Moderate: thin layer.	Severe: no water.	Deep to water	Favorable------	Favorable.
LkC, LkD---------- Leck Kill	Severe: seepage, slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope----------	Slope.
Lm, Ln---------- Linden	Severe: seepage.	Severe: piping.	Moderate: deep to water.	Deep to water	Erodes easily	Erodes easily.
MoB---------- Morris	Moderate: slope.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Percs slowly, wetness, rooting depth.	Wetness, rooting depth, percs slowly.
MoC---------- Morris	Severe: slope.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Percs slowly, wetness, slope.	Wetness, rooting depth, slope.
MrB---------- Morris	Moderate: slope.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Percs slowly, wetness, large stones.	Percs slowly, wetness, large stones.
NoB---------- Nolo	Moderate: depth to rock, slope.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, rooting depth, percs slowly.	Wetness, percs slowly, rooting depth.
NrA---------- Norwich	Slight---------	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, frost action.	Wetness, rooting depth, percs slowly.	Wetness, rooting depth, percs slowly.
NxB---------- Norwich	Moderate: slope.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, frost action, slope.	Large stones, wetness, rooting depth.	Large stones, wetness, rooting depth.
OgB---------- Oquaga	Moderate: seepage, depth to rock, slope.	Severe: seepage, piping, thin layer.	Severe: no water.	Deep to water	Large stones, depth to rock.	Large stones, droughty.
OgC, OgD---------- Oquaga	Severe: slope.	Severe: seepage, piping, thin layer.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
OxB*: Oquaga----------	Moderate: seepage, depth to rock, slope.	Severe: seepage, piping, thin layer.	Severe: no water.	Deep to water	Large stones, depth to rock.	Large stones, droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
OxB*: Lordstown	Moderate: seepage, depth to rock, slope.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Large stones, depth to rock.	Large stones, depth to rock.
OxD*, OxE*: Oquaga	Severe: slope.	Severe: seepage, piping, thin layer.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Lordstown	Severe: slope.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Slope, large stones, depth to rock.
Pt*. Pits						
Re Rexford	Moderate: seepage.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action.	Wetness, percs slowly, rooting depth.	Percs slowly, wetness, rooting depth.
Ru*: Rubble land.						
Dystrochrepts.						
ShA Shelmadine	Slight	Severe: wetness.	Severe: no water.	Percs slowly, frost action.	Wetness, rooting depth, percs slowly.	Percs slowly, wetness, rooting depth.
ShB Shelmadine	Moderate: slope.	Severe: wetness.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, rooting depth, percs slowly.	Percs slowly, wetness, rooting depth.
SvB Shelmadine	Moderate: slope.	Severe: wetness.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, rooting depth, percs slowly.	Percs slowly, rooting depth, slope.
SxD Swartswood	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Percs slowly, slope.	Slope, large stones, wetness.	Large stones, slope, rooting depth.
TuA, TuB Tunkhannock	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, too sandy.	Large stones, droughty.
TuC, TuD Tunkhannock	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, too sandy.	Large stones, slope, droughty.
Ud*. Udifluvents						
Uo*. Udorthents						
Ur*. Urban land						

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
UsB*, UsD*: Urban land. Udorthents.						
WaA---- Washington	Moderate: seepage.	Moderate: piping.	Severe: no water.	Favorable----	Favorable----	Favorable.
WaB---- Washington	Moderate: slope, seepage.	Moderate: piping.	Severe: no water.	Slope----	Favorable----	Favorable.
WaC---- Washington	Severe: slope.	Moderate: piping.	Severe: no water.	Slope----	Slope----	Slope.
WbA---- Watson	Moderate: seepage.	Severe: piping.	Severe: no water.	Percs slowly---	Wetness, rooting depth, erodes easily.	Rooting depth, percs slowly, erodes easily.
WbB---- Watson	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Wetness, rooting depth, erodes easily.	Rooting depth, percs slowly, erodes easily.
WbC---- Watson	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Slope, wetness, rooting depth.	Slope, rooting depth, percs slowly.
WeB---- Weikert	Severe: depth to rock, seepage.	Severe: seepage, thin layer.	Severe: no water.	Deep to water	Depth to rock	Droughty, depth to rock.
WeC, WeD---- Weikert	Severe: depth to rock, slope, seepage.	Severe: seepage, thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, droughty.
WkE*: Weikert----	Severe: depth to rock, slope, seepage.	Severe: seepage, thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, droughty.
Klinesville----	Severe: depth to rock, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, droughty, depth to rock.
WlB---- Wellsboro	Moderate: slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, rooting depth, percs slowly.	Rooting depth, percs slowly.
WlC---- Wellsboro	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, rooting depth, slope.	Rooting depth, percs slowly, slope.
WmB---- Wellsboro	Moderate: slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Large stones, rooting depth, wetness.	Large stones, rooting depth, wetness.
WmD---- Wellsboro	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Slope, large stones, wetness.	Large stones, rooting depth, slope.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
WsA---------- Wheeling	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Favorable------	Favorable.
WsB---------- Wheeling	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Favorable------	Favorable.
WxB---------- Wurtsboro	Moderate: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Percs slowly, slope.	Wetness, rooting depth, percs slowly.	Wetness, rooting depth, percs slowly.
WxD---------- Wurtsboro	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Percs slowly, slope.	Slope, rooting depth, wetness.	Slope, rooting depth, wetness.
Wy---------- Wyoming	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, too sandy.	Large stones, droughty.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AbB, AbC--------- Albrights	0-9	Silt loam---------	ML, CL	A-4	0-10	80-100	80-95	70-90	55-80	15-30	5-10
	9-20	Channery clay loam, gravelly silt loam, silty clay loam.	ML, CL, SM, SC	A-4, A-6	0-15	80-100	65-95	60-90	40-85	25-40	3-15
	20-64	Silt loam, gravelly silty clay loam, channery clay loam.	CL, ML, SC, SM-SC	A-4, A-2, A-6	0-15	65-100	45-95	40-90	25-80	20-40	3-15
AlB, AlC--------- Allenwood	0-9	Gravelly silt loam.	GC, CL, SC, CL-ML	A-4, A-6	0-10	60-85	60-85	50-85	40-80	20-35	5-20
	9-40	Loam, gravelly clay, gravelly clay loam.	CL, GM, GC, MH	A-4, A-6, A-7	0-15	60-95	45-90	45-90	35-75	25-57	5-23
	40-64	Stratified gravelly sand to clay.	CL, SM, GM, MH	A-1, A-2, A-4, A-7	0-20	25-100	25-80	20-80	15-75	<55	NP-23
AvA, AvB, AvC---- Alvira	0-8	Silt loam---------	ML	A-4	0-5	90-100	80-95	70-90	50-80	25-35	3-10
	8-23	Silt loam, silty clay loam, gravelly loam.	CL, CL-ML, GM-GC, SM-SC	A-4, A-6	0-10	65-100	55-90	50-90	35-85	25-40	5-15
	23-60	Gravelly silt loam, gravelly loam, 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
AxB--------- Alvira	0-8	Very stony loam	ML, SM	A-4	3-15	70-100	60-95	55-90	40-80	25-35	3-10
	8-23	Silt loam, silty clay loam, gravelly loam.	CL, CL-ML, GM-GC, SM-SC	A-4, A-6	0-10	65-100	55-90	50-90	35-85	25-40	5-15
	23-60	Gravelly silt loam, gravelly loam, 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
Ba, Bb--------- Barbour	0-9	Fine sandy loam	ML, CL-ML, SM, SM-SC	A-4, A-2	0	80-100	75-100	50-95	30-90	15-25	2-7
	9-28	Silt loam, fine sandy loam, gravelly loam.	ML, SM, CL-ML, SM-SC	A-4, A-2, A-1	0	60-100	55-95	30-95	15-85	15-25	2-7
	28-60	Loamy sand, very gravelly sand, gravelly loamy fine sand.	SM, SP, GM, GP	A-1, A-2, A-3, A-4	0-5	35-95	30-95	20-80	2-40	---	NP
Bc,Bd--------- Basher	0-10	Silt loam---------	ML, CL-ML, SM, SM-SC	A-4, A-2, A-1	0-5	80-100	75-100	45-100	20-90	15-25	2-7
	10-25	Silt loam, loam, gravelly sandy loam.	SM, ML, CL-ML, SM-SC	A-4, A-2, A-1	0-5	75-100	70-100	40-100	20-90	15-25	2-7
	25-40	Silt loam, gravelly loam, sandy loam.	SM, ML, CL-ML, SM-SC	A-4, A-2, A-1	0-5	75-100	70-100	40-100	20-90	15-25	2-7
	40-65	Fine sandy loam, gravelly loamy sand, very gravelly sand.	GP, SW, SM, ML	A-1, A-2, A-4, A-3	0-5	30-100	25-100	10-85	1-55	---	NP

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
BeB, BeC, BeD---- Berks	0-7	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-30	50-80	45-70	40-60	30-55	25-36	5-10
	7-21	Channery loam, very channery loam, channery silt loam.	GM, SM, GC, SC	A-1, A-2, A-4	0-30	40-80	35-70	25-60	20-45	25-36	5-10
	21-28	Channery loam, very channery loam, channery silt loam.	GM, SM	A-1, A-2	0-40	35-65	25-55	20-40	15-35	24-38	2-10
	28-32	Weathered bedrock	---	---	---	---	---	---	---	---	---
BuB, BuD--------- Buchanan	0-5	Very stony loam	GM, ML, CL, CL-ML	A-2, A-4	3-20	50-90	45-75	40-75	30-65	20-35	2-11
	5-20	Gravelly loam, silt loam, gravelly sandy clay loam.	GM, ML, CL, SM	A-2, A-4	0-20	50-100	45-90	40-90	20-80	20-35	2-15
	20-85	Gravelly loam, loam, channery clay loam.	GM, ML, CL, SM	A-2, A-4, A-6	0-20	50-100	30-80	30-75	20-60	20-35	2-15
ChA---------- Chenango	0-9	Gravelly loam----	ML, SM, GM	A-2, A-4, A-1	5-15	55-85	55-80	35-80	15-70	<35	NP-10
	9-26	Gravelly silt loam, gravelly fine sandy loam, very gravelly silt loam.	ML, GM, SM	A-2, A-4, A-1	5-10	35-80	30-75	25-75	15-65	<40	NP-10
	26-64	Very gravelly loamy coarse sand, very gravelly sand, gravelly loamy fine sand.	GW, GM, SM, GP	A-1	5-10	25-65	20-60	10-50	1-20	---	NP
ClA, ClB--------- Clarksburg	0-9	Silt loam--------	ML	A-4, A-6	0-5	90-100	85-100	80-95	75-90	25-35	2-11
	9-36	Loam, channery silty clay loam, gravelly silt loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-10	80-100	65-100	60-95	55-85	25-45	6-20
	36-50	Silty clay loam, channery loam, gravelly silt loam.	CL-ML, CL, SM-SC, SC	A-4, A-6, A-7	0-15	75-100	55-100	50-95	45-90	20-45	4-20
	50-60	Clay, channery loam, silty clay loam.	CL, CH, SM-SC, GC	A-4, A-6, A-7, A-2	0-20	50-100	20-100	15-95	15-90	20-52	4-25

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
CmB, CmC--------- Clymer	0-7	Channery loam----	ML, SM, GM	A-2, A-4	0-15	60-80	50-70	45-65	30-60	10-30	NP-9
	7-30	Sandy loam, channery loam, channery clay loam.	GM, SM, GC, ML	A-2, A-4	0-20	60-95	50-95	45-85	30-60	14-32	NP-9
	30-44	Channery loam, very channery loam, channery sandy loam.	GM, GP-GM, GC, SM	A-1, A-2, A-3, A-4	10-30	30-75	25-70	20-60	5-40	14-32	NP-9
	44-48	Weathered bedrock	---	---	---	---	---	---	---	---	---
CnB, CnD--------- Clymer	0-7	Very stony loam	ML, SM, GM	A-4, A-2	3-30	60-100	50-95	45-90	30-85	10-30	NP-9
	7-30	Sandy loam, channery loam, channery clay loam.	GM, SM, GC, ML	A-2, A-4	0-20	60-95	50-95	45-85	30-60	14-32	NP-9
	30-44	Channery loam, very channery loam, channery sandy loam.	GM, GP-GM, GC, SM	A-1, A-2, A-3, A-4	10-30	30-75	25-70	20-60	5-40	14-32	NP-9
	44-48	Weathered bedrock	---	---	---	---	---	---	---	---	---
CoB--------- Cookport	0-6	Loam----------	ML, CL, SM, SC	A-2, A-4, A-6	0-5	85-100	80-100	60-85	30-85	20-40	1-15
	6-22	Sandy clay loam, clay loam, channery loam.	ML, CL, SM, SC	A-4, A-6	0-15	85-100	65-100	55-95	40-75	20-40	4-20
	22-39	Sandy clay loam, clay loam, channery loam.	ML, CL, SM, SC	A-4, A-6	0-15	85-100	65-100	55-95	40-75	20-40	4-20
	39-48	Very channery sandy loam, channery loam.	ML, CL, SM-SC, GM-GC	A-2, A-4, A-6	0-15	60-100	50-95	40-95	30-75	20-40	1-15
	48-52	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CxB, CxD--------- Cookport	0-6	Very stony loam	ML, CL, SM, SC	A-2, A-4, A-6	2-40	75-95	60-70	50-60	30-55	20-40	1-15
	6-22	Sandy clay loam, clay loam, channery loam.	ML, CL, SM, SC	A-4, A-6	0-15	85-100	65-100	55-95	40-75	20-40	4-20
	22-39	Sandy clay loam, clay loam, channery loam.	ML, CL, SM, SC	A-4, A-6	0-15	85-100	65-100	55-95	40-75	20-40	4-20
	39-48	Very channery sandy loam, channery loam.	ML, CL, SM-SC, GM-GC	A-2, A-4, A-6	0-15	60-100	50-95	40-95	30-75	20-40	1-15
	48-52	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
DeB, DeC--------- Dekalb	0-9	Channery loam----	SM, GM, ML, CL-ML	A-2, A-4, A-1	0-30	50-90	45-80	40-75	20-55	10-32	NP-10
	9-32	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-80	40-75	20-55	15-32	NP-9
	32-36	Channery sandy loam, flaggy sandy loam, very flaggy loamy sand.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	36-40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
DkB, DkD--------- Dekalb	0-9	Very stony sandy 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-10
	9-32	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-75	40-75	20-55	15-32	NP-9
	32-36	Channery sandy loam, flaggy sandy loam, very flaggy loamy sand.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	36-40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
DlE*: Dekalb----------	0-9	Very stony sandy 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-10
	9-32	Channery sandy loam, channery loam, very channery sandy loam.	SM, GM, ML, GM-GC	A-2, A-4, A-1	5-40	50-85	40-75	40-75	20-55	15-32	NP-9
	32-36	Channery sandy loam, flaggy sandy loam, very flaggy loamy sand.	SM, GM, SC, GC	A-2, A-4, A-1	10-50	45-85	25-75	20-65	15-40	15-32	NP-9
	36-40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lehew----------	0-7	Very stony sandy loam.	SM, GM, ML, CL-ML	A-2, A-4	5-25	50-90	45-80	40-75	20-55	15-30	NP-7
	7-19	Very channery sandy loam, channery fine sandy loam, channery loam.	SM, GM, GM-GC, SM-SC	A-2, A-4, A-1	5-40	45-75	30-65	20-55	10-40	15-30	NP-7
	19-26	Very channery sandy loam, very channery fine sandy loam, channery loam.	SM, GM, GM-GC, SM-SC	A-2, A-4, A-1	10-50	45-75	30-65	20-55	10-40	15-30	NP-7
	26-30	Weathered bedrock	---	---	---	---	---	---	---	---	---
DuB----------	0-9	Loam----------	ML	A-4	0	95-100	90-100	85-100	70-100	20-30	NP-5
Duncannon	9-47	Silt loam, loam, very fine sandy loam.	ML, CL, CL-ML	A-4	0	95-100	90-100	85-100	70-100	17-30	NP-8
	47-70	Shaly silt loam, gravelly sandy loam, loam.	ML, CL, GM, SM	A-2, A-4, A-1	0-10	40-90	30-80	25-75	20-70	19-30	NP-8
HaA, HaB, HaC---- Hagerstown	0-8	Silt loam--------	CL, CL-ML	A-4, A-6, A-7	0-15	85-100	80-100	80-100	70-95	25-50	5-25
	8-16	Clay, clay loam, loam.	CL, CH	A-7	0-5	90-100	80-100	75-100	55-95	48-65	26-34
	16-60	Clay, silty clay, silty clay loam.	CH, CL	A-7, A-6	0-5	85-100	80-100	75-100	75-95	30-70	15-40

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
HhB, HhC, HhD---- Hartleton	0-6	Channery silt loam.	SM, ML	A-4	10-20	80-95	70-90	60-90	45-80	20-30	NP-5
	6-32	Channery silt loam, very channery loam, channery silty clay loam.	GM, ML, SM	A-2, A-4	25-65	60-90	45-80	40-80	30-75	20-30	NP-7
	32-52	Very channery loam, very shaly silt loam.	SM, GM, ML	A-1, A-2, A-4	55-85	40-80	25-70	20-70	15-60	20-30	NP-7
	52-56	Weathered bedrock	---	---	---	---	---	---	---	---	---
Ho---------- Holly	0-5	Silt loam--------	ML	A-4	0	90-100	85-100	80-100	70-90	25-35	3-10
	5-23	Silt loam, loam, sandy loam.	ML, SM	A-4, A-6	0	85-100	85-100	70-95	45-85	20-40	NP-14
	23-60	Stratified silt loam to gravelly sand.	ML, SM, SP-SM	A-4, A-2, A-1	0-5	70-100	65-100	40-90	10-70	20-40	NP-10
K1B, K1C, K1D---- Klinesville	0-4	Shaly silt loam	GM, SM	A-2, A-4	0-10	55-85	45-60	35-50	25-40	25-35	2-7
	4-12	Shaly silt loam, very shaly silt loam.	GM, GP, SM, SP	A-2, A-1, A-4	0-10	25-75	15-55	10-50	4-40	20-35	NP-9
	12-19	Shaly silt loam, very shaly silt loam.	GM, GP, SM, SP	A-2, A-1	0-20	15-60	10-50	10-40	4-30	20-35	NP-7
	19-23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
LaB, LaC---------- Lackawanna	0-8	Channery silt loam.	GM, ML, CL, SM	A-2, A-4, A-1	0-15	40-80	40-75	35-70	20-60	15-30	1-10
	8-28	Loam, silt loam, channery silt loam.	GM, ML, CL, SM	A-2, A-4, A-6, A-1	0-20	40-80	40-75	35-70	20-60	20-35	1-14
	28-68	Silt loam, channery silt loam, channery sandy loam.	GM, SM, ML, CL	A-2, A-4, A-6, A-1	0-20	50-85	40-80	35-75	20-55	15-35	1-12
LbB, LbD---------- Lackawanna	0-8	Very stony silt loam.	ML, CL, GM, SM	A-4, A-2	3-20	40-100	40-95	35-90	20-85	15-30	1-10
	8-28	Channery loam, silt loam, flaggy loam.	GM, ML, CL, SM	A-2, A-4, A-6	0-20	40-80	40-75	35-70	20-60	20-35	1-14
	28-68	Channery loam, channery silt loam, flaggy loam.	GM, SM, ML, CL	A-2, A-4, A-6	0-20	50-85	40-80	35-75	20-55	15-35	1-12

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
LdB, LdC--------- Laidig	0-8	Channery silt loam.	GM, SM, ML, CL	A-4	0-5	65-90	55-80	50-80	35-70	15-30	1-10
	8-30	Channery loam, channery sandy clay loam, channery sandy loam.	SM, SC, CL, ML	A-2, A-4, A-6	5-20	70-95	55-90	40-80	20-70	15-40	2-18
	30-65	Channery sandy clay loam, channery loam, channery sandy loam.	GC, SC, GM-GC, CL-ML	A-2, A-4, A-6, A-1	5-30	50-90	40-85	30-80	15-70	15-35	2-16
LgB, LgD, LgE---- Laidig	0-8	Very stony loam	GM-GC, SM, CL-ML, SM-SC	A-4	3-15	65-90	50-80	45-80	35-70	15-30	NP-10
	8-30	Channery loam, channery sandy clay loam, channery sandy loam.	SM, SC, ML, CL	A-2, A-4, A-6	5-20	70-95	55-90	40-80	20-70	15-40	2-18
	30-65	Channery sandy clay loam, channery loam, channery sandy loam.	SC, GM-GC, CL-ML, GC	A-2, A-4, A-6, A-1	5-30	50-90	40-85	30-80	15-70	15-35	2-16
LkB, LkC, LkD---- Leck Kill	0-9	Channery silt loam.	SM, ML, GM	A-4	0-5	70-85	60-80	50-80	35-70	15-30	1-10
	9-35	Silt loam, channery loam, shaly silty clay loam.	GM, SC, GC, CL	A-4, A-2, A-6	0-10	60-90	50-85	40-80	30-70	23-40	2-17
	35-60	Very channery silt loam, very channery clay loam, very shaly loam.	SM, GM, GP-GM, SP-SM	A-2, A-1	0-30	30-70	10-30	8-30	6-25	25-40	2-13
	60-64	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lm, Ln---------- Linden	0-9	Loam----------	ML, SM	A-4	0	80-100	80-100	65-100	40-90	20-30	NP-5
	9-37	Silt loam, gravelly loam, sandy loam.	ML, SM	A-4, A-2	0-5	80-100	80-100	40-95	25-90	<30	NP-3
	37-64	Loam, gravelly sandy loam, very gravelly sand.	SM, GM, ML, SP-SM	A-2, A-1, A-3, A-4	0-20	40-100	30-100	15-90	5-75	<25	NP-5
MoB, MoC--------- Morris	0-19	Channery silt loam.	GM, ML, CL, SM	A-4, A-2	0-15	60-95	50-75	40-75	30-65	20-30	1-10
	19-60	Channery silt loam, channery loam, channery silty clay loam.	GM, SM, CL, SM	A-2, A-4	0-20	60-95	45-80	40-80	25-75	15-25	NP-9

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
MrB---------- Morris	0-19	Very stony silt loam.	GM, ML, CL, SM	A-4, A-2	3-20	60-95	55-85	40-80	30-70	20-30	1-10
	19-60	Channery loam, channery silt loam, channery silty clay loam.	GM, ML, CL, SM	A-2, A-4	0-20	60-95	45-80	40-80	25-75	15-25	NP-9
NoB---------- Nolo	0-5	Very stony loam	ML	A-4	3-15	75-100	75-100	70-100	60-90	35-45	2-7
	5-16	Silt loam, channery clay loam, channery sandy clay loam.	ML, CL-ML	A-6, A-4	0-15	80-100	80-100	80-95	55-85	25-40	4-11
	16-51	Loam, channery sandy clay loam, channery clay loam.	CL-ML, GC, SC, CL	A-4, A-6	0-15	60-100	60-90	55-85	35-70	25-35	4-11
	51-55	Weathered bedrock	---	---	---	---	---	---	---	---	---
NrA---------- Norwich	0-6	Silt loam--------	ML, OL	A-7, A-5	0-5	80-100	75-95	65-90	55-85	40-50	5-15
	6-13	Channery silt loam, channery loam, loam.	GM, ML, CL-ML, GM-GC	A-4	0-15	65-95	65-90	60-85	40-80	25-35	5-10
	13-60	Channery silt loam, channery loam, very channery sandy loam.	CL, GC, CL-ML, SC	A-2, A-4	10-20	60-90	55-70	35-70	20-65	15-25	5-10
NxB---------- Norwich	0-6	Very stony silt loam.	GM, ML, OL, SM	A-7, A-5	10-20	70-90	65-85	60-80	40-75	40-50	5-15
	6-13	Channery silt loam, channery loam, loam.	GM, ML, SM, CL-ML	A-4	0-15	65-95	65-90	60-85	40-80	25-35	5-10
	13-60	Channery silt loam, channery loam, very channery sandy loam.	CL-ML, SM-SC, GC, SC	A-2, A-4	10-25	60-90	55-70	35-70	20-65	15-25	5-10
OgB, OgC, OgD---- Oquaga	0-5	Channery loam----	ML, GM, SM	A-4, A-2, A-5	5-20	50-85	40-70	35-70	25-65	35-45	2-7
	5-27	Very channery loam, very channery silt loam.	GM, ML, SM, GM-GC	A-1, A-2, A-4	20-25	35-70	25-60	20-60	15-55	20-30	2-7
	27-31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
OxB*, OxD*, OxE*: Oquaga----------	0-5	Very stony loam	ML, GM, SM	A-4, A-2, A-5	10-20	50-85	40-70	35-70	25-65	35-45	2-7
	5-27	Very channery silt loam, very channery loam.	GM, ML, SM, GM-GC	A-1, A-2, A-4	20-25	35-70	25-60	20-60	15-55	20-30	2-7
	27-31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
OxB*, OxD*, OxE*: Lordstown-------	0-4	Very stony loam	ML, GM, SM	A-4	10-20	65-85	50-75	50-75	40-65	<30	NP-4
	4-22	Channery silt loam, channery loam.	ML, GM, SM	A-4	5-10	65-85	50-75	50-75	40-65	<30	NP-4
	22-34	Very channery loam, channery silt loam, very channery fine sandy loam.	ML, GM, SM	A-2, A-4, A-1	5-25	40-75	30-70	25-70	15-60	<30	NP-4
	34-38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Pt*. Pits											
Re--------------- Rexford	0-18	Gravelly loam----	ML, CL, SM, GC	A-2, A-4	0-10	65-90	50-85	40-70	25-55	15-35	NP-10
	18-49	Gravelly sandy loam, loam, silt loam.	ML, SM, GM	A-2, A-4	0-10	60-100	50-100	40-85	25-70	20-35	NP-5
	49-60	Stratified sand to gravel.	GP-GM, SP-SM, GW, SP	A-1, A-2	0-20	40-55	30-50	10-40	4-35	<10	NP
Ru*: Rubble land.											
Dystrochrepts.											
ShA, ShB--------- Shelmadine	0-9	Silt loam--------	ML	A-4	0-5	80-100	75-95	70-90	65-85	25-35	2-8
	9-20	Silt loam, channery silty clay loam, shaly silt loam.	ML, CL	A-4, A-6	0-10	80-100	75-95	60-90	50-80	25-40	3-15
	20-42	Silt loam, channery clay loam, shaly silty clay loam.	ML, CL	A-4, A-6	0-15	80-100	75-95	60-90	50-80	25-40	3-15
	42-60	Channery silt loam, channery loam, shaly loam.	GM, ML, SM	A-2, A-4, A-1	0-15	50-80	35-75	25-70	20-65	25-35	3-10
SvB--------------- Shelmadine	0-9	Very stony silt loam.	ML	A-4	3-10	70-100	65-95	60-90	50-85	25-35	2-8
	9-20	Silt loam, channery silty clay loam, shaly silt loam.	ML, CL	A-4, A-6	0-10	80-100	75-95	60-90	50-80	25-40	3-15
	20-42	Silt loam, channery clay loam, shaly silty clay loam.	ML, CL	A-4, A-6	0-10	80-100	75-95	60-90	50-80	25-40	3-15
	42-60	Channery silt loam, channery loam, shaly loam.	GM, SM, ML	A-4, A-2, A-1	0-15	50-80	35-75	25-70	20-65	25-35	3-10

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
SxD---------- Swartswood	0-9	Very stony sandy loam.	SM, ML	A-2, A-4, A-1	3-15	60-90	50-85	30-80	15-65	15-25	1-4
	9-30	Channery loam, channery sandy loam, gravelly sandy loam.	SM, ML, GM	A-2, A-4, A-1	0-25	60-90	50-90	30-85	15-65	<25	NP-3
	30-60	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
TuA, TuB, TuC, TuD---------- Tunkhannock	0-8	Gravelly loam----	SM, SP-SM	A-1, A-2, A-4	0-20	60-90	50-70	25-60	10-45	15-25	NP-2
	8-30	Gravelly silt loam, cobbly loam, very gravelly sandy loam.	SM, GM, SP-SM, GP-GM	A-2, A-1, A-4	0-35	40-80	35-75	20-60	10-45	<25	NP-3
	30-65	Gravelly sandy loam, very gravelly loamy sand, very gravelly sand.	SM, GM, GP-GM, SP-SM	A-1, A-2, A-3	5-35	30-80	25-70	15-55	5-15	<20	NP-2
Ud*. Udifluvents											
Uo*. Udorthents											
Ur*. Urban land											
UsB*, UsD*: Urban land.											
Udorthents.											
WaA, WaB, WaC---- Washington	0-9	Silt loam--------	CL, ML	A-4, A-6	0-5	85-100	85-95	65-90	55-75	25-40	3-15
	9-48	Clay loam, silty clay loam, gravelly loam.	CL, SC, ML, SM	A-4, A-6	0-5	75-100	60-95	50-90	35-85	25-40	3-15
	48-62	Clay loam, silt loam, gravelly loam.	CL, SC	A-4, A-6, A-2, A-1	0-15	70-95	40-95	30-85	15-75	25-35	8-15
	62-66	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
WbA, WbB, WbC---- Watson	0-9	Silt loam--------	ML, CL	A-4	0-5	80-100	80-100	65-95	60-95	25-40	3-15
	9-26	Gravelly silty clay loam, silt loam, gravelly loam.	CL, SC	A-4, A-6, A-7	0-10	85-100	80-95	50-95	35-90	25-45	8-20
	26-64	Gravelly silty clay loam, silt loam, gravelly loam.	CL, GC, SC, CL-ML	A-4, A-6, A-2	0-15	55-100	50-100	45-95	30-85	25-39	4-15

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
WeB, WeC, WeD---- Weikert	0-6	Shaly silt loam	GM, ML, SM	A-1, A-2, A-4	0-10	50-70	45-70	25-65	20-55	30-40	4-10
	6-20	Shaly loam, very shaly silt loam, cherty loam.	GM, GP-GM	A-1, A-2	0-20	15-60	10-55	5-45	5-35	28-36	3-9
	20-24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
WkE*:											
Weikert---------	0-6	Shaly silt loam	GM, ML, SM	A-1, A-2, A-4	0-10	50-70	45-70	25-65	20-55	30-40	4-10
	6-20	Shaly loam, very shaly silt loam, cherty loam.	GM, GP-GM	A-1, A-2	0-20	15-60	10-55	5-45	5-35	28-36	3-9
	20-24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Klinesville-----	0-4	Shaly silt loam	GM, SM	A-2, A-4	0-10	55-85	45-60	35-50	25-40	30-40	4-10
	4-12	Shaly silt loam, very shaly silt loam.	GM, GP, SM, SP	A-2, A-1, A-4	0-10	25-75	15-55	10-50	4-40	20-35	NP-9
	12-19	Shaly silt loam, very shaly silt loam.	GM, GP, SM, SP	A-2, A-1	0-20	15-60	10-50	10-40	4-30	20-35	NP-7
	19-23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
W1B, W1C--------- Wellsboro	0-8	Channery silt loam.	ML, CL, SM	A-2, A-4	0-15	70-90	65-85	60-80	30-60	15-30	1-10
	8-24	Loam, channery silt loam, gravelly loam.	ML, SM, CL-ML, GM-GC	A-2, A-4	0-15	70-90	60-85	55-80	30-60	15-30	NP-10
	24-64	Loam, channery sandy loam, gravelly silt loam.	SM, GM, ML, CL	A-2, A-4	0-20	55-90	45-90	35-80	25-60	15-30	NP-10
WmB, WmD--------- Wellsboro	0-8	Very stony silt loam.	ML, CL, SM	A-4, A-2	3-10	70-100	65-100	60-95	30-90	15-30	1-10
	8-24	Loam, channery silt loam, gravelly loam.	ML, SM, CL-ML, GM-GC	A-2, A-4	0-15	70-100	60-100	55-95	30-70	15-30	NP-10
	24-64	Loam, channery silt loam, channery loam.	GM, ML, CL, SM	A-2, A-4	0-20	55-90	45-90	35-80	25-60	15-30	NP-10
WsA, WsB--------- Wheeling	0-10	Silt loam--------	ML, CL, SM, SC	A-4	0	90-100	90-100	85-100	45-90	15-35	NP-10
	10-59	Silty clay loam, loam, gravelly sandy loam.	ML, CL, SM, SC	A-4, A-6	0-5	90-100	70-100	65-100	45-80	20-40	2-20
	59-68	Stratified very fine sand to very gravelly sand.	GM, SM, GP, GW	A-1, A-2, A-3, A-4	10-20	35-90	20-75	10-65	4-45	<20	NP-10

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
WxB, WxD--------- Wurtsboro	0-5	Very stony sandy loam.	SM, ML, GM	A-2, A-4	3-5	70-100	65-90	55-90	30-70	20-30	1-4
	5-19	Fine sandy loam, gravelly sandy loam, channery loam.	SM, GM	A-2, A-4	0-15	70-95	55-90	45-85	30-50	<30	NP-4
	19-60	Fine sandy loam, very gravelly sandy loam, channery loam.	SM, GM	A-2, A-4, A-1	0-20	50-95	35-90	30-80	20-50	<25	NP-4
Wy--------------- Wyoming	0-8	Gravelly sandy loam.	SM, SW-SM, GM, SP-SM	A-1, A-2, A-3	0-15	40-90	30-80	10-60	8-35	<30	NP-5
	8-25	Gravelly sandy loam, very gravelly sandy loam.	SM, GM, GP-GM, SP-SM	A-1, A-2, A-3	0-25	40-75	35-70	5-55	5-35	<30	NP-5
	25-64	Very gravelly loamy sand, very gravelly sand, gravelly sandy loam.	GW, SM, SW, GP-GM	A-1	5-30	30-65	20-55	5-50	1-12	<25	NP-5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cc	In/hr	In/in	pH				Pct
AbB, AbC--------- Albrights	0-9 9-20 20-64	15-27 18-35 18-35	1.20-1.40 1.30-1.50 1.40-1.70	0.6-2.0 0.6-2.0 0.2-0.6	0.16-0.20 0.10-0.14 0.04-0.08	3.6-5.5 3.6-5.5 4.5-6.5	Low---------- Low---------- Low----------	0.32 0.28 0.28	3-2	1-4
AlB, AlC--------- Allenwood	0-9 9-40 40-64	10-25 25-42 35-60	1.20-1.40 1.40-1.60 1.40-1.60	0.6-2.0 0.6-2.0 0.6-2.0	0.14-0.18 0.12-0.16 0.03-0.10	4.5-5.5 4.5-5.5 4.5-5.5	Low---------- Low---------- Low----------	0.24 0.17 0.17	4	1-4
AvA, AvB, AvC---- Alvira	0-8 8-23 23-60	10-20 18-35 18-35	1.40-1.60 1.40-1.60 1.50-1.70	0.6-2.0 0.6-2.0 0.06-0.2	0.16-0.20 0.14-0.18 0.08-0.12	3.6-5.5 3.6-5.5 3.6-5.5	Low---------- Low---------- Low----------	0.32 0.28 0.28	3-2	1-2
AxB-------------- Alvira	0-8 8-23 23-60	10-20 18-35 18-35	1.40-1.60 1.40-1.60 1.50-1.70	0.6-2.0 0.6-2.0 0.06-0.2	0.14-0.20 0.14-0.18 0.08-0.12	4.5-5.5 4.5-5.5 4.5-5.5	Low---------- Low---------- Low----------	0.24 0.28 0.28	3	---
Ba, Bb----------- Barbour	0-9 9-28 28-60	6-18 6-18 1-8	1.15-1.40 1.15-1.45 1.25-1.55	0.6-2.0 2.0-6.0 6.0-20	0.16-0.21 0.10-0.19 0.02-0.07	4.5-6.0 4.5-6.0 4.5-6.5	Low---------- Low---------- Low----------	0.32 0.32 0.17	5	1-5
Bc, Bd----------- Basher	0-10 10-25 25-40 40-65	6-18 6-18 6-18 1-8	1.15-1.40 1.15-1.45 1.25-1.55 1.25-1.55	0.6-2.0 0.6-2.0 0.2-2.0 0.6-6.0	0.15-0.21 0.10-0.19 0.10-0.19 0.02-0.07	4.5-6.0 4.5-6.0 4.5-6.5 4.5-6.5	Low---------- Low---------- Low---------- Low----------	0.32 0.32 0.32 0.17	5	1-5
BeB, BeC, BeD---- Berks	0-7 7-21 21-28 28-32	5-23 5-27 5-20 ---	1.20-1.50 1.20-1.60 1.20-1.60 ---	0.6-6.0 0.6-6.0 2.0-6.0 ---	0.08-0.12 0.04-0.10 0.04-0.10 ---	4.5-5.5 4.5-5.5 4.5-5.5 ---	Low---------- Low---------- Low---------- ----------	0.17 0.17 0.17 ----	3	.5-3
BuB, BuD--------- Buchanan	0-5 5-20 20-85	10-27 18-30 18-35	1.20-1.40 1.30-1.60 1.40-1.70	0.6-2.0 0.6-2.0 0.06-0.2	0.12-0.18 0.10-0.16 0.06-0.10	3.6-5.5 3.6-5.5 3.6-5.5	Low---------- Low---------- Low----------	0.24 0.24 0.17	3-2	---
ChA-------------- Chenango	0-9 9-26 26-64	6-18 6-18 1-8	1.20-1.50 1.25-1.55 1.45-1.65	0.6-6.0 0.6-6.0 6.0-20	0.08-0.16 0.07-0.15 0.01-0.05	4.5-5.5 4.5-6.0 5.1-7.8	Low---------- Low---------- Low----------	0.24 0.17 0.17	3	2-6
ClA, ClB--------- Clarksburg	0-9 9-36 36-50 50-60	10-27 22-35 22-35 22-40	1.20-1.40 1.30-1.50 1.40-1.70 1.20-1.60	0.6-2.0 0.6-2.0 0.06-0.6 0.06-0.6	0.14-0.20 0.12-0.18 0.06-0.12 0.06-0.16	5.1-6.5 5.1-6.5 5.1-6.5 5.1-6.5	Low---------- Moderate----- Moderate----- Moderate-----	0.37 0.28 0.28 0.28	3-2	1-3
CmB, CmC--------- Clymer	0-7 7-30 30-44 44-48	15-27 18-30 15-27 ---	1.20-1.40 1.20-1.50 1.20-1.40 ---	0.6-2.0 0.6-2.0 0.6-2.0 ---	0.10-0.14 0.08-0.14 0.04-0.08 ---	4.5-5.5 4.5-5.5 4.5-5.5 ---	Low---------- Low---------- Low---------- ----------	0.20 0.15 0.15 ----	3	1-4
CnB, CnD--------- Clymer	0-7 7-30 30-44 44-48	15-27 18-30 15-27 ---	1.20-1.40 1.20-1.50 1.20-1.40 ---	0.6-2.0 0.6-2.0 0.6-2.0 ---	0.10-0.16 0.08-0.14 0.04-0.08 ---	4.5-5.5 4.5-5.5 4.5-5.5 ---	Low---------- Low---------- Low---------- ----------	0.17 0.15 0.15 ----	3	---

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cc	In/hr	In/in	pH				Pct
CoB----------	0-6	10-27	1.20-1.40	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.32	3	1-4
Cookport	6-22	18-35	1.20-1.50	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.24		
	22-39	18-35	1.40-1.70	0.06-0.2	0.08-0.12	4.5-5.5	Low----------	0.24		
	39-48	10-27	1.20-1.50	0.2-0.6	0.08-0.12	4.5-5.5	Low----------	0.24		
	48-52	---	---	---	---	---	----------	----		
CxB, CxD----------	0-6	10-27	1.20-1.40	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.24	3	---
Cookport	6-22	18-35	1.20-1.50	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.24		
	22-39	18-35	1.40-1.70	0.06-0.2	0.08-0.12	4.5-5.5	Low----------	0.24		
	39-48	10-27	1.20-1.50	0.2-0.6	0.08-0.12	4.5-5.5	Low----------	0.24		
	48-52	---	---	---	---	---	----------	----		
DeB, DeC, DkB, DkD----------	0-9	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-5.5	Low----------	0.17	2	---
Dekalb	9-32	7-18	1.20-1.50	6.0-20	0.06-0.12	3.6-5.5	Low----------	0.17		
	32-36	5-15	1.20-1.50	>6.0	0.05-0.10	3.6-5.5	Low----------	0.17		
	36-40	---	---	---	---	---	----------	----		
D1E*:										
Dekalb----------	0-9	10-20	1.20-1.50	6.0-20	0.08-0.12	3.6-5.5	Low----------	0.17	2	---
	9-32	7-18	1.20-1.50	6.0-20	0.06-0.12	3.6-5.5	Low----------	0.17		
	32-36	5-15	1.20-1.50	>6.0	0.05-0.10	3.6-5.5	Low----------	0.17		
	36-40	---	---	---	---	---	----------	----		
Lehew----------	0-7	4-16	1.20-1.40	2.0-20	0.08-0.12	4.5-5.5	Low----------	0.17	3	---
	7-19	5-18	1.20-1.40	2.0-20	0.06-0.10	4.5-5.5	Low----------	0.17		
	19-26	5-18	1.20-1.40	2.0-20	0.06-0.10	4.5-5.5	Low----------	0.17		
	26-30	---	---	---	---	---	----------	----		
DuB----------	0-9	10-20	1.20-1.40	0.6-2.0	0.16-0.20	5.1-6.0	Low----------	0.37	4	2-4
Duncannon	9-47	10-24	1.40-1.60	0.6-2.0	0.14-0.16	5.1-6.0	Low----------	0.43		
	47-70	10-24	1.40-1.60	0.6-2.0	0.12-0.16	5.1-6.5	Low----------	0.32		
HaA, HaB, HaC----	0-8	15-35	1.20-1.40	0.6-6.0	0.16-0.24	4.5-6.5	Low----------	0.32	4	1-5
Hagerstown	8-16	23-60	1.20-1.60	0.6-2.0	0.10-0.24	4.5-7.3	Moderate-----	0.28		
	16-60	23-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate-----	0.28		
HhB, HhC, HhD----	0-6	10-25	1.20-1.40	0.6-6.0	0.10-0.14	4.5-5.5	Low----------	0.20	3	1-3
Hartleton	6-32	15-27	1.40-1.60	0.6-6.0	0.06-0.10	4.5-5.5	Low----------	0.20		
	32-52	15-27	1.40-1.60	0.6-6.0	0.04-0.08	4.5-5.5	Low----------	0.20		
	52-56	---	---	---	---	---	----------	----		
Ho----------	0-5	15-27	1.20-1.40	0.6-2.0	0.20-0.24	5.6-6.5	Low----------	0.28	5	2-5
Holly	5-23	18-30	1.20-1.50	0.2-2.0	0.17-0.21	5.6-6.5	Low----------	0.28		
	23-60	10-27	1.20-1.40	0.6-6.0	0.07-0.18	5.6-6.5	Low----------	0.28		
K1B, K1C, K1D----	0-4	10-25	1.20-1.40	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.20	2	.5-2
Klinesville	4-12	10-20	1.40-1.60	2.0-6.0	0.06-0.10	4.5-6.0	Low----------	0.20		
	12-19	10-20	1.40-1.60	2.0-6.0	0.04-0.08	4.5-6.0	Low----------	0.20		
	19-23	---	---	---	---	---	----------	----		
LaB, LaC----------	0-8	10-27	1.20-1.40	0.6-2.0	0.10-0.14	4.5-5.5	Low----------	0.28	3	1-3
Lackawanna	8-28	5-18	1.40-1.60	0.6-2.0	0.10-0.14	4.5-5.5	Low----------	0.20		
	28-68	5-18	1.60-1.80	0.06-0.2	0.06-0.12	4.5-6.0	Low----------	0.20		
LbB, LbD----------	0-8	10-27	1.20-1.40	0.6-2.0	0.10-0.16	4.5-5.5	Low----------	0.24	3	---
Lackawanna	8-28	5-18	1.40-1.60	0.6-2.0	0.10-0.16	4.5-5.5	Low----------	0.20		
	28-68	5-18	1.60-1.80	0.06-0.2	0.06-0.12	4.5-6.0	Low----------	0.20		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
LdB, LdC--------- Laidig	0-8	10-27	1.20-1.40	0.6-6.0	0.10-0.14	3.6-5.5	Low-----------	0.28	4	1-4
	8-30	18-35	1.30-1.50	0.6-6.0	0.08-0.12	3.6-5.5	Low-----------	0.24		
	30-65	18-35	1.30-1.60	0.2-0.6	0.06-0.10	3.6-5.5	Low-----------	0.17		
LgB, LgD, LgE---- Laidig	0-8	7-27	1.20-1.40	0.6-6.0	0.08-0.12	3.6-5.5	Low-----------	0.28	4	---
	8-30	18-35	1.30-1.50	0.6-6.0	0.08-0.10	3.6-5.5	Low-----------	0.28		
	30-65	18-35	1.30-1.60	0.2-0.6	0.06-0.10	3.6-5.5	Low-----------	0.17		
LkB, LkC, LkD---- Leck Kill	0-9	10-20	1.20-1.50	0.6-6.0	0.14-0.18	4.5-7.3	Low-----------	0.24	3	1-3
	9-35	17-32	1.40-1.70	0.6-6.0	0.12-0.16	4.5-7.3	Low-----------	0.24		
	35-60	17-32	1.30-1.60	0.6-6.0	0.04-0.08	4.5-6.0	Low-----------	0.17		
	60-64	---	---	---	---	---	-------------	----		
Lm, Ln----------- Linden	0-9	10-18	1.20-1.40	2.0-6.0	0.14-0.18	4.5-6.0	Low-----------	0.37	4	1-4
	9-37	10-18	1.20-1.40	2.0-6.0	0.14-0.18	4.5-6.0	Low-----------	0.37		
	37-64	5-25	1.20-1.40	6.0-20	0.05-0.08	4.5-6.0	Low-----------	0.17		
MoB, MoC--------- Morris	0-19	15-25	1.20-1.40	0.6-2.0	0.10-0.14	4.5-6.0	Low-----------	0.28	4	1-3
	19-60	15-32	1.30-1.70	<0.2	0.06-0.08	4.5-6.5	Low-----------	0.24		
MrB-------------- Morris	0-19	15-25	1.20-1.40	0.6-2.0	0.12-0.16	4.5-6.0	Low-----------	0.24	4	---
	19-60	15-32	1.30-1.70	<0.2	0.06-0.08	4.5-6.5	Low-----------	0.24		
NoB-------------- Nolo	0-5	10-20	1.20-1.40	0.6-2.0	0.14-0.20	3.6-5.0	Low-----------	0.24	3	---
	5-16	18-35	1.30-1.50	0.6-2.0	0.12-0.16	3.6-5.0	Low-----------	0.28		
	16-51	18-35	1.30-1.60	0.06-0.2	0.06-0.10	3.6-5.0	Low-----------	0.17		
	51-55	---	---	---	---	---	-------------	----		
NrA-------------- Norwich	0-6	10-27	1.10-1.40	0.6-2.0	0.14-0.20	5.1-6.5	Low-----------	0.32	3	3-10
	6-13	18-27	1.20-1.50	0.6-2.0	0.11-0.18	5.1-6.5	Low-----------	0.24		
	13-60	10-27	1.70-2.00	<0.2	0.02-0.04	5.1-7.3	Low-----------	0.24		
NxB-------------- Norwich	0-6	10-27	1.10-1.40	0.6-2.0	0.12-0.18	5.1-6.5	Low-----------	0.24	3	---
	6-13	18-27	1.20-1.50	0.6-2.0	0.11-0.18	5.1-6.5	Low-----------	0.24		
	13-60	10-27	1.70-2.00	<0.2	0.02-0.04	5.1-7.3	Low-----------	0.24		
OgB, OgC, OgD---- Oquaga	0-5	7-27	1.10-1.40	0.6-2.0	0.08-0.17	4.5-6.0	Low-----------	0.28	3	2-6
	5-27	7-27	1.20-1.50	0.6-2.0	0.04-0.12	4.5-6.0	Low-----------	0.20		
	27-31	---	---	---	---	---	-------------	----		
OxB*, OxD*, OxE*:										
Oquaga----------	0-5	7-27	1.10-1.40	0.6-2.0	0.08-0.17	4.5-6.0	Low-----------	0.20	3	---
	5-27	7-27	1.20-1.50	0.6-2.0	0.04-0.12	4.5-6.0	Low-----------	0.20		
	27-31	---	---	---	---	---	-------------	----		
Lordstown-------	0-4	8-18	1.10-1.40	0.6-2.0	0.11-0.17	4.5-6.5	Low-----------	0.20	3	---
	4-22	5-26	1.20-1.50	0.6-2.0	0.10-0.16	4.5-6.0	Low-----------	0.28		
	22-34	5-18	1.20-1.50	0.6-2.0	0.05-0.14	5.1-6.0	Low-----------	0.28		
	34-38	---	---	---	---	---	-------------	----		
Pt*. Pits										
Re--------------- Rexford	0-18	10-20	1.20-1.40	0.6-2.0	0.10-0.16	4.5-6.0	Low-----------	0.17	3	1-3
	18-49	10-18	1.20-1.50	0.06-0.2	0.04-0.08	5.1-6.5	Low-----------	0.20		
	44-60	5-15	1.20-1.40	>2.0	0.03-0.06	5.1-6.5	Low-----------	0.20		
Ru*: Rubble land.										

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cc	In/hr	In/in	pH				Pct
Ru*: Dystrochrepts.										
ShA, ShB---------- Shelmadine	0-9	10-17	1.20-1.50	0.6-2.0	0.14-0.18	3.6-5.5	Low----------	0.32	3-2	1-3
	9-20	22-35	1.50-1.70	0.6-2.0	0.10-0.14	3.6-5.5	Low----------	0.28		
	20-42	22-35	1.60-1.80	0.06-0.2	0.08-0.12	3.6-5.5	Low----------	0.28		
	42-60	10-27	1.40-1.60	0.06-0.6	0.10-0.14	3.6-5.5	Low----------	0.28		
SvB---------- Shelmadine	0-9	10-17	1.20-1.50	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.24	3	---
	9-20	22-35	1.50-1.70	0.6-2.0	0.10-0.14	3.6-5.5	Low----------	0.28		
	20-42	22-35	1.60-1.80	0.06-0.2	0.08-0.12	3.6-5.5	Low----------	0.28		
	42-60	10-27	1.40-1.60	0.06-0.6	0.10-0.14	3.6-5.5	Low----------	0.28		
SxD---------- Swartswood	0-9	12-20	1.20-1.40	0.6-2.0	0.08-0.12	4.5-5.5	Low----------	0.17	3	---
	9-30	10-20	1.20-1.50	0.6-2.0	0.08-0.12	4.5-5.5	Low----------	0.20		
	30-60	8-20	1.40-1.80	0.06-0.6	0.06-0.10	4.5-5.5	Low----------	0.20		
TuA, TuB, TuC, TuD---------- Tunkhannock	0-8	10-20	1.20-1.40	2.0-6.0	0.08-0.15	3.6-6.0	Low----------	0.24	3	2-4
	8-30	10-20	1.40-1.60	2.0-6.0	0.08-0.12	3.6-6.0	Low----------	0.17		
	30-65	10-20	1.40-1.60	2.0-20	0.01-0.08	3.6-6.0	Low----------	0.17		
Ud*. Udifluvents										
Uo*. Udorthents										
Ur*. Urban land										
UsB*, UsD*: Urban land.										
Udorthents.										
WaA, WaB, WaC---- Washington	0-9	15-25	1.25-1.45	0.6-2.0	0.18-0.22	5.6-7.3	Low----------	0.32	4	1-4
	9-48	25-35	1.35-1.65	0.6-2.0	0.16-0.20	5.6-7.3	Low----------	0.32		
	48-62	15-30	1.40-1.70	0.6-6.0	0.12-0.16	5.6-7.3	Low----------	0.28		
	62-66	---	---	---	---	---	----------	----		
WbA, WbB, WbC---- Watson	0-9	12-27	1.20-1.40	0.6-2.0	0.14-0.18	4.5-5.5	Low----------	0.37	3	1-3
	9-26	17-35	1.40-1.60	0.6-2.0	0.12-0.16	4.5-5.5	Moderate-----	0.17		
	26-64	15-30	1.60-1.80	0.06-0.2	0.08-0.12	4.5-5.5	Moderate-----	0.17		
WeB, WeC, WeD---- Weikert	0-6	15-27	1.20-1.40	2.0-6.0	0.08-0.14	4.5-6.0	Low----------	0.28	2	1-3
	6-20	15-27	1.20-1.40	2.0-6.0	0.04-0.08	4.5-6.0	Low----------	0.28		
	20-24	---	---	---	---	---	----------	----		
WkE*: Weikert---------	0-6	15-27	1.20-1.40	2.0-6.0	0.08-0.14	4.5-6.0	Low----------	0.28	2	1-3
	6-20	15-27	1.20-1.40	2.0-6.0	0.04-0.08	4.5-6.0	Low----------	0.28		
	20-24	---	---	---	---	---	----------	----		
Klinesville-----	0-4	10-25	1.20-1.40	2.0-6.0	0.08-0.12	4.5-6.0	Low----------	0.20	2	.5-2
	4-12	10-20	1.40-1.60	2.0-6.0	0.06-0.10	4.5-6.0	Low----------	0.20		
	12-19	10-20	1.40-1.60	2.0-6.0	0.04-0.08	4.5-6.0	Low----------	0.20		
	19-23	---	---	---	---	---	----------	----		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cc	In/hr	In/in	pH				Pct
W1B, W1C--------- Wellsboro	0-8 8-24 24-64	15-25 15-27 15-27	1.20-1.40 1.30-1.50 1.30-1.60	0.6-2.0 0.6-2.0 0.06-0.2	0.10-0.14 0.10-0.14 0.06-0.10	4.5-6.0 4.5-6.0 4.5-6.0	Low---------- Low---------- Low----------	0.28 0.28 0.28	3	1-3
WmB, WmD--------- Wellsboro	0-8 8-24 24-64	15-25 15-27 15-27	1.20-1.40 1.30-1.50 1.30-1.60	0.6-2.0 0.6-2.0 0.06-0.2	0.10-0.16 0.10-0.14 0.06-0.10	4.5-6.0 4.5-6.0 4.5-6.0	Low---------- Low---------- Low----------	0.24 0.28 0.28	3	---
WsA, WsB--------- Wheeling	0-10 10-59 59-68	12-20 18-30 8-15	1.20-1.40 1.30-1.50 1.30-1.50	0.6-6.0 0.6-2.0 6.0-20	0.12-0.18 0.08-0.16 0.04-0.08	5.1-6.5 5.1-6.0 5.1-6.0	Low---------- Low---------- Low----------	0.37 0.32 0.20	4	1-3
WxB, WxD--------- Wurtsboro	0-5 5-19 19-60	10-20 10-20 10-20	1.20-1.40 1.40-1.60 1.60-1.80	0.6-2.0 0.6-2.0 0.06-0.2	0.10-0.16 0.10-0.14 0.08-0.12	4.5-5.5 4.5-5.5 4.5-5.5	Low---------- Low---------- Low----------	0.24 0.28 0.28	3-2	---
Wy--------------- Wyoming	0-8 8-25 25-64	8-18 5-15 1-11	1.10-1.40 1.10-1.50 1.30-1.60	6.0-20 6.0-20 6.0-20	0.06-0.14 0.06-0.09 0.02-0.04	4.5-6.0 4.5-6.0 4.5-6.0	Low---------- Low---------- Low----------	0.17 0.17 0.17	3	2-4

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
AbB, AbC---------- Albrights	C	None--------	---	---	1.0-2.5	Perched	Nov-May	>60	---	Moderate	High-----	High.
AlB, AlC---------- Allenwood	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	High.
AvA, AvB, AvC, AxB---------- Alvira	C	None--------	---	---	0.5-1.5	Perched	Oct-May	>40	Soft	High-----	High-----	High.
Ba---------- Barbour	B	Frequent----	Brief-----	Dec-Apr	3.0-6.0	Apparent	Jan-Apr	>60	---	Moderate	Low------	Moderate.
Bb---------- Barbour	B	Occasional	Brief-----	Dec-Apr	3.0-6.0	Apparent	Jan-Apr	>60	---	Moderate	Low------	Moderate.
Bc---------- Basher	B	Frequent----	Brief-----	Dec-Apr	1.5-2.0	Apparent	Jan-May	>60	---	High-----	Moderate	Moderate.
Bd---------- Basher	B	Occasional	Brief-----	Dec-Apr	1.5-2.0	Apparent	Jan-May	>60	---	High-----	Moderate	Moderate.
BeB, BeC, BeD----- Berks	C	None--------	---	---	>6.0	---	---	20-40	Soft	Low------	Low------	High.
BuB, BuD---------- Buchanan	C	None--------	---	---	1.0-3.0	Perched	Nov-Mar	>60	---	Moderate	High-----	High.
ChA---------- Chenango	A	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
ClA, ClB---------- Clarksburg	C	None--------	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate	Moderate	Moderate.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
CmB, CmC, CnB, CnD---------- Clymer	B	None--------	---	---	>6.0	---	---	>40	Hard	Moderate	Low------	High.
CoB, CxB, CxD----- Cookport	C	None--------	---	---	1.5-2.5	Perched	Nov-Apr	40-72	Hard	Moderate	Moderate	Moderate.
DeB, DeC, DkB, DkD---------- Dekalb	C	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	Low------	High.
DlE*: Dekalb----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	Low------	High.
Lehew----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	Low------	High.
DuB---------- Duncannon	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Low------	Moderate.
HaA, HaB, HaC----- Hagerstown	C	None--------	---	---	>6.0	---	---	>60	Hard	Moderate	Moderate	Low.
HhB, HhC, HhD----- Hartleton	B	None--------	---	---	>6.0	---	---	>40	Soft	Moderate	Low------	High.
Ho---------- Holly	D	Frequent----	Very long	Sep-Jun	+1-0.5	Apparent	Sep-Jun	>60	---	High-----	High-----	Moderate.
KlB, KlC, KlD----- Klinesville	C/D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	High.
LaB, LaC---------- Lackawanna	C	None--------	---	---	2.0-6.0	Perched	Nov-Mar	>60	---	Moderate	Low------	Moderate.
LbB, LbD---------- Lackawanna	C	None--------	---	---	2.0-6.0	Perched	Nov-Mar	>60	---	Moderate	Low------	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	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
LdB, LdC, LgB, LgD, LgE--------- Laidig	C	None---------	---	---	2.5-4.0	Perched	Nov-Mar	>60	---	Moderate	Moderate	High.
LkB, LkC, LkD----- Leck Kill	B	None---------	---	---	>6.0	---	---	>40	Soft	Moderate	Low------	Moderate.
Lm---------- Linden	B	Frequent----	Very brief to brief.	Dec-Apr	3.0-6.0	Apparent	Nov-Mar	>60	---	Moderate	Low------	High.
Ln---------- Linden	B	Occasional	Very brief to brief.	Dec-Apr	3.0-6.0	Apparent	Nov-Mar	>60	---	Moderate	Low------	High.
MoB, MoC, MrB----- Morris	C	None---------	---	---	0.5-1.5	Perched	Nov-Mar	>60	---	High-----	High-----	Moderate.
NoB---------- Nolo	D	None---------	---	---	0-0.5	Perched	Sep-Jun	40-60	Soft	High-----	High-----	High.
NrA, NxB---------- Norwich	D	None---------	---	---	0-0.5	Apparent	Nov-May	>60	---	High-----	High-----	Moderate.
OgB, OgC, OgD----- Oquaga	C	None---------	---	---	>6.0	---	---	20-40	Hard	Moderate	Low------	Moderate.
OxB*, OxD*, OxE*: Oquaga----------	C	None---------	---	---	>6.0	---	---	20-40	Hard	Moderate	Low------	Moderate.
Lordstown--------	C	None---------	---	---	>6.0	---	---	20-40	Hard	Moderate	Low------	High.
Pt*. Pits												
Re---------- Rexford	C	None---------	---	---	0-1.5	Perched	Oct-May	>60	---	High-----	High-----	High.
Ru*: Rubble land.												

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	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
Ru*: Dystrochrepts.												
ShA, ShB, SvB----- Shelmadine	D	None--------	---	---	0-0.5	Perched	Sep-Jun	>60	---	High-----	High-----	High.
SxD---------- Swartswood	C	None--------	---	---	2.0-4.0	Perched	Nov-Mar	>60	---	Moderate	Low------	High.
TuA, TuB, TuC, TuD---------- Tunkhannock	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	High.
Ud*. Udifluvents												
Uo*. Udorthents												
Ur*. Urban land												
UsB*, UsD*: Urban land.												
Udorthents.												
WaA, WaB, WaC----- Washington	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
WbA, WbB, WbC----- Watson	C	None--------	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate	Moderate	Moderate.
WeB, WeC, WeD----- Weikert	C/D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	Moderate.
WkE*: Weikert----------	C/D	None--------	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	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	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
WkE*: Klinesville	C/D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate	High.
W1B, W1C, WmB, WmD---------- Wellsboro	C	None	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	High	High	Moderate.
WsA, WsB---------- Wheeling	B	None	---	---	>6.0	---	---	>60	---	Moderate	Low	Moderate.
WxB, WxD---------- Wurtsboro	C	None	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	Moderate	High	High.
Wy---------- Wyoming	A	Occasional	Very brief	Nov-Apr	>6.0	---	---	>60	---	Low	Low	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Albrights	Fine-loamy, mixed, mesic Aquic Fragiudalfs
Allenwood	Fine-loamy, mixed, mesic Typic Hapludults
Alvira	Fine-loamy, mixed, mesic Aeric Fragiaquults
Barbour	Coarse-loamy over sandy or sandy-skeletal, mixed, mesic Fluventic Dystrochrepts
Basher	Coarse-loamy, mixed, mesic Fluvaquentic Dystrochrepts
Berks	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Buchanan	Fine-loamy, mixed, mesic Aquic Fragiudults
Chenango	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Clarksburg	Fine-loamy, mixed, mesic Typic Fragiudalfs
Clymer	Fine-loamy, mixed, mesic Typic Hapludults
Cookport	Fine-loamy, mixed, mesic Aquic Fragiudults
Dekalb	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
*Duncannon	Coarse-silty, mixed, mesic Ultic Hapludalfs
Dystrochrepts	Dystrochrepts
Hagerstown	Fine, mixed, mesic Typic Hapludalfs
Hartleton	Loamy-skeletal, mixed, mesic Typic Hapludults
Holly	Fine-loamy, mixed, nonacid, mesic Typic Fluvaquents
Klinesville	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Lackawanna	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Laidig	Fine-loamy, mixed, mesic Typic Fragiudults
Leck Kill	Fine-loamy, mixed, mesic Typic Hapludults
Lehew	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Linden	Coarse-loamy, mixed, mesic Fluventic Dystrochrepts
Lordstown	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Morris	Coarse-loamy, mixed, mesic Aeric Fragiaquepts
Nolo	Fine-loamy, mixed, mesic Typic Fragiaquults
Norwich	Fine-loamy, mixed, mesic Typic Fragiaquepts
Oquaga	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Rexford	Coarse-loamy, mixed, mesic Aeric Fragiaquepts
Shelmadine	Fine-loamy, mixed, mesic Typic Fragiaquults
Swartswood	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Tunkhannock	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Udifluvents	Udifluvents
Udorthents	Udorthents
Washington	Fine-loamy, mixed, mesic Ultic Hapludalfs
Watson	Fine-loamy, mixed, mesic Typic Fragiudults
Weikert	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Wellsboro	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Wheeling	Fine-loamy, mixed, mesic Ultic Hapludalfs
Wurtsboro	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Wyoming	Loamy-skeletal, mixed, mesic Typic Dystrochrepts

*The soil is a taxadjunct to the series. See the series description for a description of those characteristics of the soil that are outside the range of the series.

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