United States Department of Agriculture

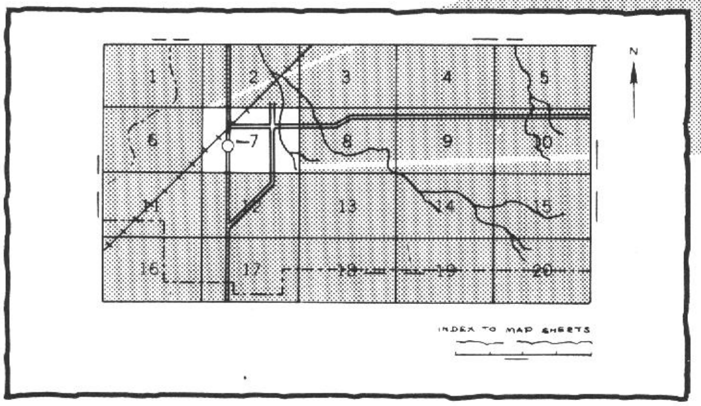
Soil Conservation Service

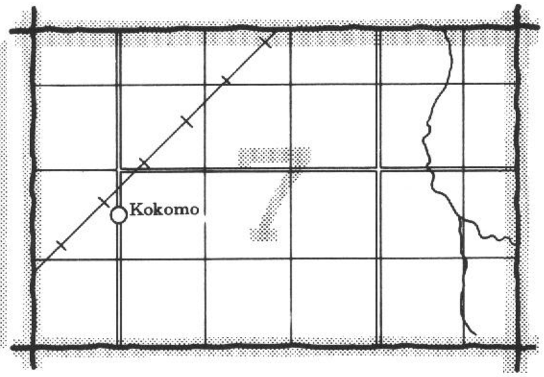
In cooperation with Purdue University Agricultural Experiment Station and Indiana Department of Natural Resources, Soil and Water Conservation Committee

Soil Survey of Greene County, Indiana

HOW TO USE

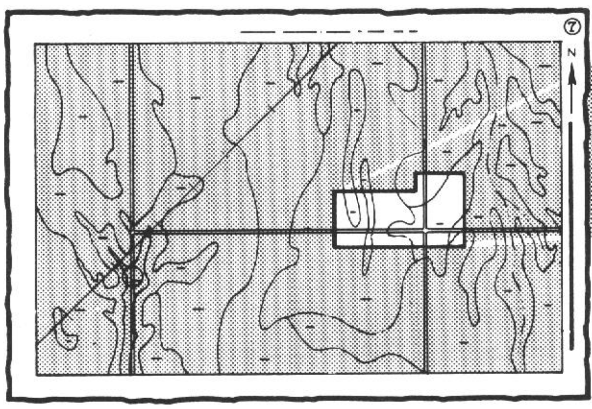
1. Locate your area of interest on the "Index to Map Sheets."

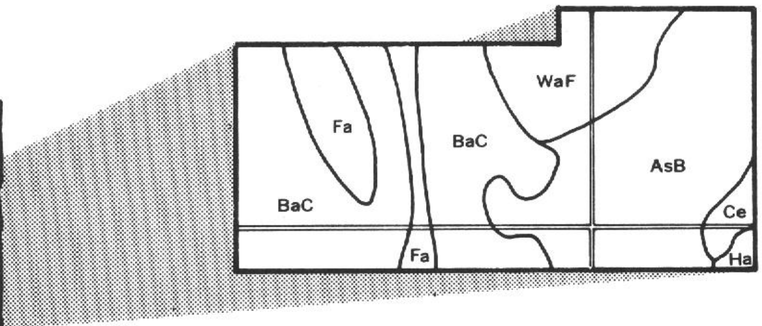




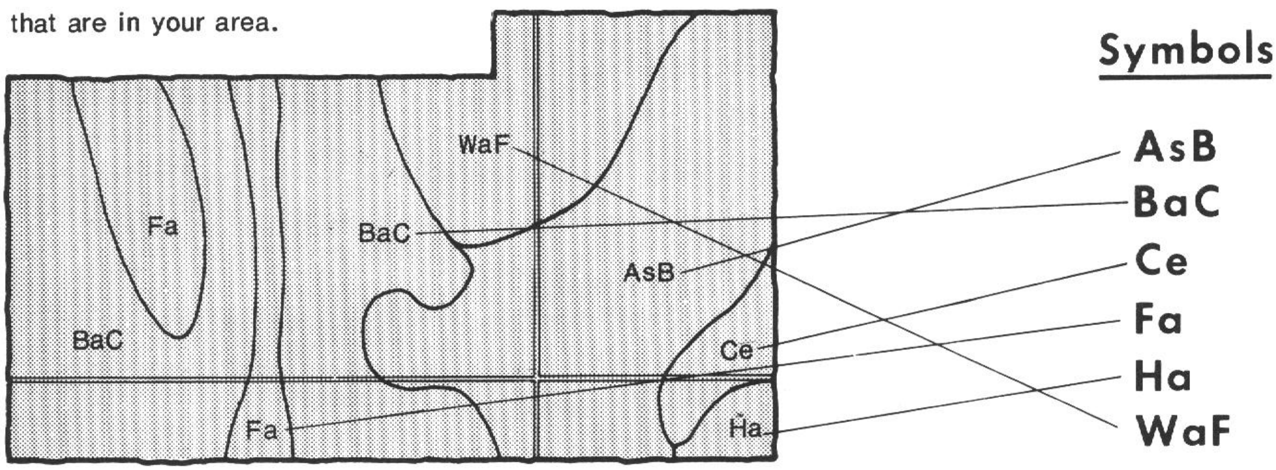
2. Note the number of the map sheet and turn to that sheet.

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



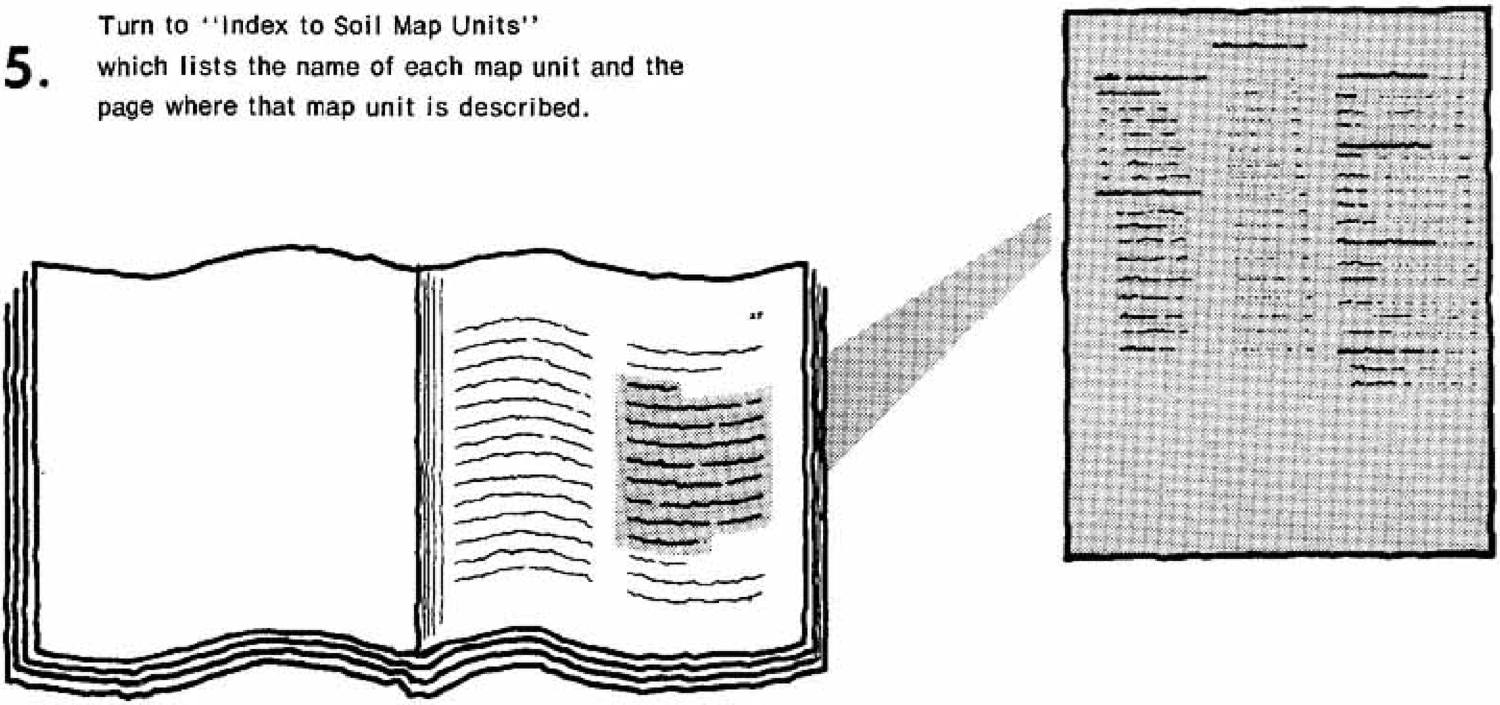


4. List the map unit symbols that are in your area.

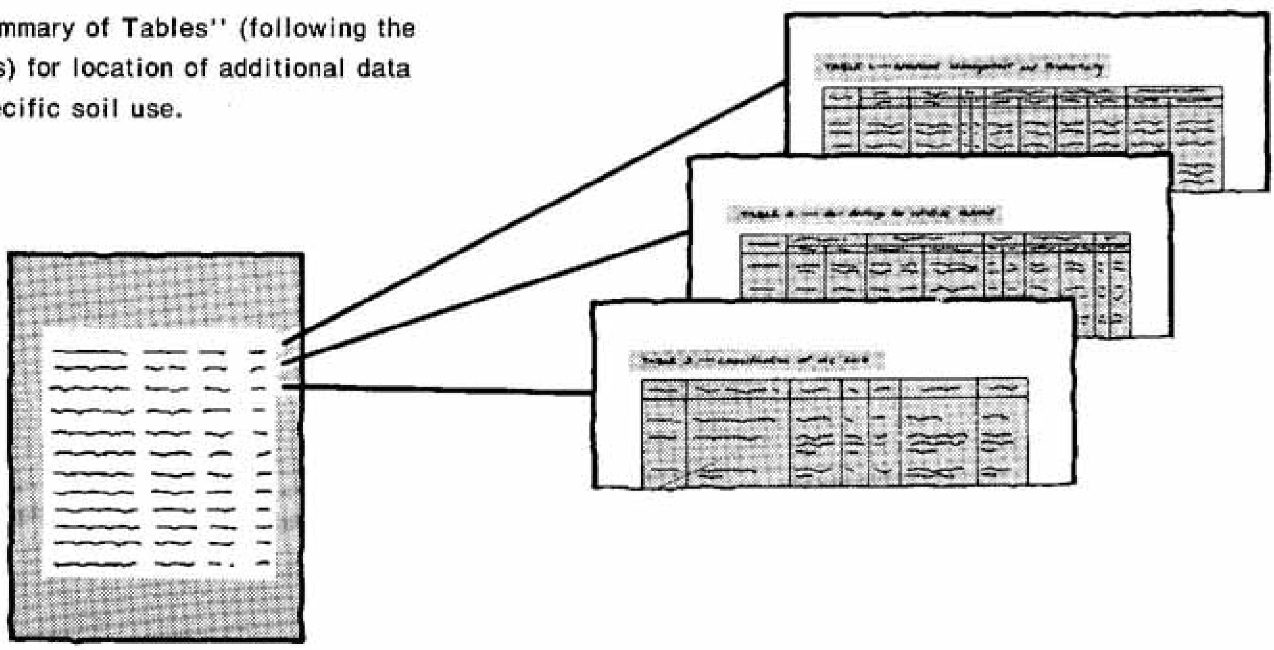


THIS SOIL SURVEY

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, handicap, or age.

Major fieldwork for this soil survey was completed in 1983. Soil names and descriptions were approved in 1984. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1983. This survey was made cooperatively by the Soil Conservation Service, the Purdue University Agricultural Experiment Station, and the Indiana Department of Natural Resources, Soil and Water Conservation Committee. It is part of the technical assistance furnished to the Greene County Soil and Water Conservation District. Financial assistance was made available by the Board of County Commissioners.

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: A farm pond in an area of the Wellston-Zanesville-Gilpin map unit.

Contents

Soil Series

Issued September 1988

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Summary of Tables

Foreword

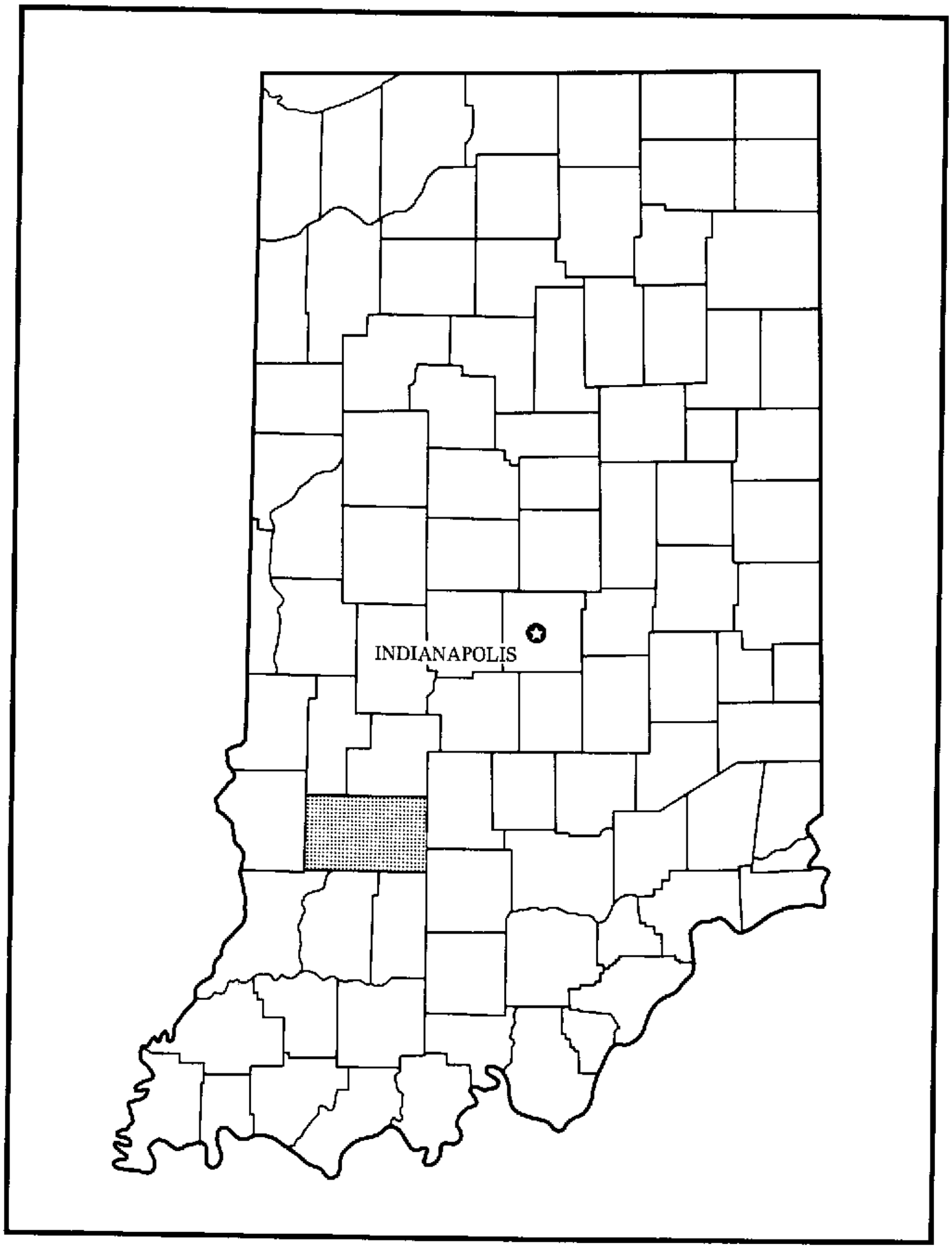
This soil survey contains information that can be used in land-planning programs in Greene County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact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

Robert L. Eddleman
State Conservationist
Soil Conservation Service



Location of Greene County in Indiana.

Soil Survey of
Greene County, Indiana

By Paul McCarter, Jr., Soil Conservation Service

Fieldwork by Paul McCarter, Jr., and George McElrath, Jr., Soil Conservation Service, and S. Joshua Hill, Eric R. Langer, and David K. Lefforge, Indiana Department of Natural Resources, Soil and Water Conservation Committee

United States Department of Agriculture, Soil Conservation Service, in cooperation with
Purdue University Agricultural Experiment Station and Indiana Department of Natural Resources, Soil and Water Conservation Committee

GREENE COUNTY is in the southwestern part of Indiana. It has an area of 349,318 acres, or about 546 square miles. It extends about 30 miles from east to west and 18 miles from north to south. Bloomfield, the county seat, is near the center of the county. The population of Linton, the largest town, was 6,315 in 1980. The population of the county was 30,416.

Most of the county is farmed. Cash-grain and general farming are the main enterprises on the nearly level to moderately sloping soils in the western part of the county, and general farming and beef cattle enterprises are common on the strongly sloping to very steep soils in the eastern part. About 43 percent of the county is cropland, 20 percent is pasture, and 28 percent is woodland. The rest is used for other purposes (*5*). Many small areas near local towns and along highways have been developed as sites for dwellings and businesses.

This soil survey updates the survey of Greene County published in 1907 (*7*). It provides additional information and larger maps, which show the soils in greater detail.

General Nature of the County

This section gives general information about the county. It describes physiography, relief, and drainage; natural resources; water supply; transportation facilities; farming; geology; and climate.

Physiography, Relief, and Drainage

Greene County is made up of two physiographic units—the Wabash Lowland, in the western part of the county, and the Crawford Upland, in the eastern part (*15*). The Wabash Lowland is characterized by broad, nearly level uplands dissected by gently sloping to strongly sloping drainageways. The Crawford Upland is characterized by gently sloping or moderately sloping ridges that are separated by valleys that have steep or very steep sides. Nearly level bottom land is along the streams in areas of both the Wabash Lowland and the Crawford Upland.

The highest elevation in the county is about 930 feet above sea level, in an area of Beech Township. The lowest is about 470 feet, in an area along the White River southeast of Newberry.

Most of the county is drained by the White River and its tributaries. The main streams that drain into the White River are the Eel River, Lattas Creek, Four Mile Ditch, and Black Creek. Indian Creek drains an area in the southeastern part of the county, and Busseron Creek drains an area in the northwest corner.

Natural Resources

Soil is the most important natural resource in the county. It provides a growing medium for crops and for the forage grazed by livestock. Other important natural resources are coal and woodland. Approximately 5 percent of the county has been mined for coal. The trees in the wooded areas can be used for the production of lumber. They also help to protect highly erodible soils.

Water Supply

Drilled wells are the main source of water in Greene County. Some dug wells and a few driven wells and springs are used. Some residents haul water from public water systems for household use.

Most of the wells in upland areas are 75 to 150 feet deep. They generally yield 1 to 20 gallons per minute. Wells drilled into the sand and gravel underlying the bottom land along the Eel and White Rivers can yield several hundred gallons per minute. The towns of Bloomfield, Linton, Lyons, Jasonville, and Worthington and some of the adjacent rural areas obtain water from deep wells.

The quality of water from drilled wells varies greatly. In some areas the content of iron, chloride, or sulphate exceeds federal health standards for drinking water (*14*).

In areas in the eastern part of the county where the amount of water supplied by wells is low, water is pumped from wells along the White River or is hauled from other sources. A large number of small ponds also supply water.

Transportation Facilities

Three railroad lines traverse the county. Bloomfield, Linton, Jasonville, Switz City, and Worthington are served by one or more of these railroads. One U.S. highway and nine state highways traverse the county. Almost all parts of the county are served by paved or graveled county roads. A small airport west of Bloomfield serves private planes.

Farming

The chief farm products in Greene County are grain and livestock. The main crops are corn, soybeans, and wheat. The major kinds of livestock are cattle and hogs. The county has a few dairy farms. In 1978, about 62 percent of the local farm income was derived from the sale of crops and 37 percent from the sale of livestock or livestock products.

The number of farms in the county decreased from 1,221 in 1968 to 1,115 in 1978. The size of the farms increased from 188 to 203 acres. The total acreage of cropland increased from 153,118 to 157,635 acres (*11*). The acreage used for cultivated crops has increased during the last several years.

Geology

Henry H. Gray, head stratigrapher, Geology Section, Geological Survey, Indiana Department of Natural Resources, helped prepare this section.

The soils of Greene County formed in geologic material ranging from limestone, sandstone, and shale bedrock residuum to clay, sand, and silt deposited by glaciers, water, and wind. Some soils formed in two or more of these materials. For example, the upper part of Parke soils formed in loess and the lower part in glacial outwash.

The bedrock in Greene County is part of the Mississippian and Pennsylvanian Periods of the Paleozoic Era. It occurs as layers of shale, sandstone, and limestone rocks that formed in clayey, sandy, or limy sediments in shallow seas about 230 to 250 million years ago (*6*). Mississippian rocks of the Chesterian Series underlie most of the eastern third of the county. These rocks occur as alternating beds of shale, sandstone, and limestone. The bedrock landforms typically consist of trenchlike, flat-bottomed valleys, rock benches, and local structural plains (*15*).

The main rocks near the surface in a 2- to 5- mile strip along the eastern edge of the county are part of the West Baden Group. They consist mostly of shale, some sandstone of the Elwren, Sample, and Bethel Formations, and Reelsville and Beaver Bend limestone (*3*). The cap rock on some of the highest ridges is part of the Stephensport Group. It consists mostly of sandstone and shale of the Big Clifty Formation and Beech Creek and Haney limestone (*3*). Ebal, Gilpin, Wellston, and Zanesville soils formed in this area. Ebal soils are common in benchlike areas where shale has weathered more quickly than the adjacent sandstone layers.

Ste. Genevieve and Paoli limestone of the Blue River Group is at or near the surface in deeply cut valleys along Richland and Little Indian Creeks (*3*). Hagerstown soils formed in these areas.

In the part of the county near Koleen, Ridgeport, and Solsberry, the main rocks near the surface are in the Stephensport Group. They consist mostly of sandstone, shale, and limestone of the Haney, Big Clifty, and Beech Creek Formations (*3*). The cap rocks on some of the highest ridges are assigned to the Pennsylvanian System. They consist mostly of sandstone and shale of the Mansfield Formation. Berks, Ebal, Gilpin, Wellston, and Zanesville soils formed in this area.

Pennsylvanian rocks, which are younger than the Mansfield Formation, underlie the western two-thirds of the county. This bedrock typically occurs as a sequence of shale, sandstone, mudstone, limestone, and coal. It is assigned to the Brazil, Staunton, Linton, Petersburg, and Dugger Formations. Most of this area is covered by Illinoian glacial till (*4*).

Prior to glaciation, most of the bedrock slopes had moderately subdued relief where weak shales permitted valleys to widen to a greater extent than is typical in areas of more resistant rocks (*15*). The glacial till is a mixture of sand, silt, and clay. It is dominantly a few feet to more than 50 feet thick. It generally is thinner east of the White River, where bedrock is exposed in many areas in draws and on side slopes. The glacier did not reach as far east as Solsberry or Koleen. Wellston and Gilpin soils formed in areas where the bedrock is near the surface.

Glacial outwash, which consists of sand and gravel, was deposited by water from the melting ice in some areas on uplands. Chetwynd soils formed in this outwash.

Shallow lake plains and alluvial terraces formed near the margin of the glacier. Meltwater was temporarily ponded when natural drainageways were blocked by masses of glacial drift. Bartle and Pekin soils formed on the alluvial terraces and lake plains near Hendricksville and in areas of the American Bottom.

During the Wisconsinan glacial period, meltwater deposited large amounts of outwash and sediment in the valley of the White River. Elston soils formed in outwash on terraces. Bloomfield soils formed in sandy material that has been reworked by the wind and deposited as dunes in the uplands. Montgomery soils formed in clayey and silty sediments that settled out of the still water in temporary shallow lakes.

A mantle of loess has been deposited in most upland areas throughout the county. Loess is wind-deposited material made up primarily of silt-size particles. It was derived mainly from the flood plains along the Wabash and White Rivers and other rivers. The loess mantle generally ranges from a few inches to more than 7 feet in thickness. It is thinnest in steep areas where much of it has been removed by erosion.

The original uplands and some of the original terraces were dissected by streams and rivers. The resultant modern flood plains have deposits of clay, silt, sand, gravel, and cobbles. Haymond and Stendal soils formed in silty alluvium on these flood plains. Piankeshaw soils, which are in the eastern part of the county, formed in narrow valleys and at the base of steep slopes where the alluvium is primarily channery loam.

Climate

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

Greene County is cold in winter and quite hot in summer. Winter precipitation, which frequently occurs as snow, results in a good accumulation of soil moisture by spring and thus minimizes drought on most soils during summer. The normal annual precipitation is adequate for all of the crops that are suited to the temperature and growing season in the county.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Elliston in the period 1951 to 1974. 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 32 degrees F, and the average daily minimum temperature is 23 degrees. The lowest temperature on record, which occurred at Elliston on February 2, 1951, is -20 degrees. In summer the average temperature is 74 degrees, and the average daily maximum temperature is 86 degrees. The highest recorded temperature, which occurred on June 21, 1953, is 106 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 more than 40 inches. Of this, nearly 23 inches, or about 56 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 20 inches. The heaviest 1-day rainfall during the period of record was 4.75 inches at Elliston on June 12, 1957. Thunderstorms occur on about 45 days each year. Tornadoes and severe thunderstorms strike occasionally. They usually are local in extent and of short duration and cause damage in scattered areas.

The average seasonal snowfall is 14 inches. The greatest snow depth at any one time during the period of record was 8 inches. On the average, 7 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 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 70 percent of the time possible in summer and 40 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 12 miles per hour, in spring.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and 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 is devoid of roots and other living organisms and has not been changed 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, it 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 another 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.

The names, descriptions, and delineations of the soils identified on the general soil map of this county do not always agree or join fully with those of the soils identified on the maps of adjoining counties published at an earlier date. Some differences are the result of changes in concepts of soil series. Other differences result from variations in the extent of the soils. Others are the result of variations in the slope range allowed in the map units.

Soil Descriptions

Nearly Level to Strongly Sloping, Poorly Drained to Well Drained Soils on Uplands

These soils make up about 28 percent of the county. They generally have a substratum of glacial till. They are used mainly for cultivated crops. Many of the more sloping areas are used for hay, pasture, or woodland. Generally, the soils are suited to farming but are poorly suited to building site development and sanitary facilities. Erosion and wetness are the main management concerns.

1. Ava-Cincinnati-Vigo

Deep, nearly level to strongly sloping, moderately well drained, well drained, and poorly drained, medium textured soils formed in loess and the underlying glacial till; on uplands

This map unit consists of soils on ridgetops, on side slopes along drainageways, and on knolls and flats. Most areas are dissected by small streams. Areas vary in size and shape. Slopes range from 0 to 18 percent.

This unit makes up about 24 percent of the county. It is about 33 percent Ava soils, 24 percent Cincinnati soils, 8 percent Vigo soils, and 35 percent soils of minor extent (fig. 1).

Ava soils generally are gently sloping and are on side slopes, on narrow ridgetops, and on knolls. They are moderately well drained. They typically have a surface layer of brown silt loam. The subsoil is silt loam and silty clay loam. It has a fragipan.

Cincinnati soils are moderately sloping or strongly sloping and are on side slopes along draws and on knolls. They are well drained. They typically have a surface layer of yellowish brown silt loam. The subsoil is silt loam, silty clay loam, and loam. It has a fragipan.

Vigo soils are nearly level and are on broad ridgetops and flats. They are poorly drained. They typically have a surface layer of grayish brown silt loam. The subsoil is silty clay loam and silt loam.

The minor soils in this unit are the well drained Alford and somewhat poorly drained and moderately well drained Shakamak soils on side slopes and knolls; the well drained Fairpoint soils in strip-mined areas; the well drained Chetwynd, Hickory, and Wellston soils on breaks and the steeper side slopes of draws; and the moderately well drained Steff and somewhat poorly drained Stendal soils on bottom land. Alford soils formed in more than 60 inches of loess. The content of coarse fragments in Chetwynd, Hickory, and Wellston soils is higher than that in the major soils.

Most of this unit has been cleared and is used for cultivated crops, hay, or pasture. Corn, soybeans, and wheat are the main crops. The pastured areas are on the more sloping parts of the landscape. Erosion and wetness are the main management concerns in farmed areas.

Many draws support mixed hardwoods. The major soils are suited to such trees as white oak, red oak, maple, yellow-poplar, and ash.

Because of the slope and the wetness, the major soils are poorly suited to building site development. They are poorly suited to sanitary facilities because of the wetness and restricted permeability. They are suited to recreational uses, but the wetness is a limitation.

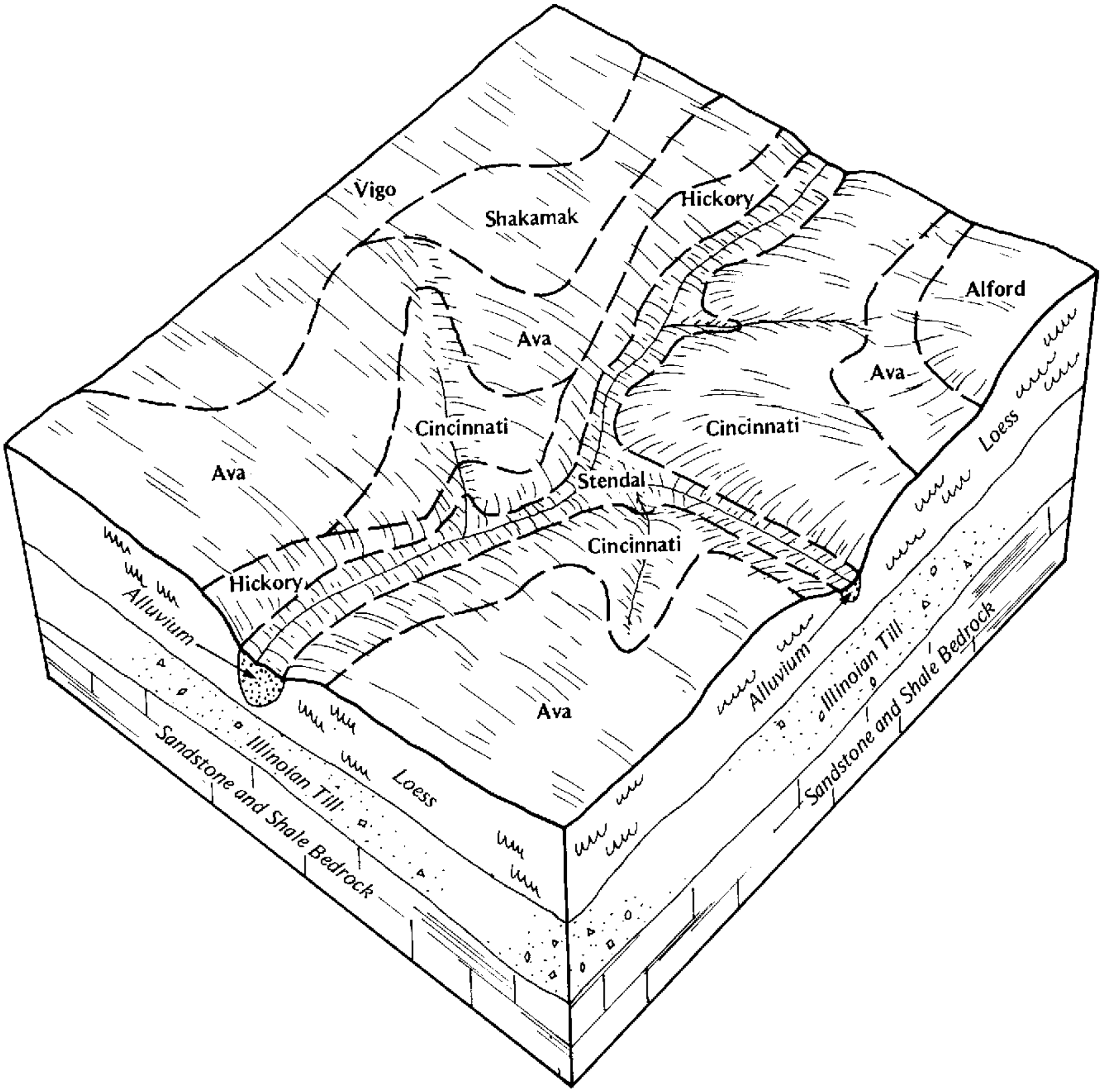


Figure 1.—Pattern of soils and parent material in the Ava-Cincinnati-Vigo map unit.

2. Vigo-Shakamak

Deep, nearly level and very gently sloping, poorly drained to moderately well drained, medium textured soils formed in loess and the underlying glacial till; on uplands

This map unit consists of soils on broad ridgetops and flats, on side slopes along shallow drainageways, and on low knolls. Areas vary in size and shape. Slopes range from 0 to 3 percent.

This unit makes up about 4 percent of the county. It is about 39 percent Vigo soils, 36 percent Shakamak soils, and 25 percent soils of minor extent.

Vigo soils are nearly level and are on broad ridgetops and flats. They are poorly drained. They typically have a surface layer of grayish brown silt loam and a subsurface layer of light gray, mottled silt loam. The subsoil is silty clay loam and silt loam.

Shakamak soils generally are very gently sloping and are on ridgetops and side slopes. They are somewhat poorly drained and moderately well drained. They typically have a surface layer of brown silt loam. The subsoil is silty clay loam, silt loam, loam, and clay loam. It has a fragipan.

The minor soils in this unit are the moderately well drained Ava soils on knolls and on side slopes along drainageways, the well drained Cincinnati soils on side slopes along drainageways, and the well drained Fairpoint soils in strip-mined areas.

Nearly all of this unit has been cleared and is used for cultivated crops. The wetness is the main limitation affecting farm uses and most other uses. The major soils are suited to hay and pasture.

The major soils are suited to such trees as white oak, red oak, maple, yellow-poplar, and ash. The use of logging equipment is limited during wet periods.

Because of the wetness and restricted permeability, the major soils generally are poorly suited to building site development and sanitary facilities. Because of the wetness, they are poorly suited to intensive recreational uses and are only fairly well suited to extensive recreational uses.

Nearly Level, Very Poorly Drained and Somewhat Poorly Drained Soils on Terraces and Lake Plains

These soils make up about 11 percent of the county. They generally have a substratum of outwash or lacustrine sediments. They are used mainly for cultivated crops. Generally, the soils are well suited to farming but are poorly suited to building site development and sanitary facilities. Wetness is the main management concern.

3. Rensselaer-Ayrshire

Deep, nearly level, very poorly drained and somewhat poorly drained, medium textured and moderately coarse textured soils formed in outwash; on terraces

This map unit consists of soils on low terraces that have depressional areas and low rises. Slopes range from 0 to 2 percent.

This unit makes up about 4 percent of the county. It is about 50 percent Rensselaer soils, 21 percent Ayrshire soils, and 29 percent soils of minor extent.

Rensselaer soils generally are in depressions and are very poorly drained. They typically have a surface layer and subsurface layer of very dark gray loam or sandy loam. The subsoil is sandy clay loam and clay loam. The substratum is mottled clay loam and stratified fine sand, sandy loam, and sandy clay loam.

Ayrshire soils generally are on low rises on broad flats and are somewhat poorly drained. They typically have a surface layer of dark grayish brown sandy loam. The subsurface layer is pale brown, mottled sandy loam. The subsoil is mottled fine sandy loam, sandy clay loam, and sandy loam. The substratum is coarse sandy loam, sandy clay loam, coarse sand, and loamy sand.

The minor soils in this unit are the well drained Princeton soils on knolls, the well drained or somewhat excessively drained Bloomfield soils on rises, and the poorly drained Patton soils in depressions.

Nearly all of this unit has been cleared and is used for cultivated crops. Corn, soybeans, and wheat are the main crops. The wetness is the main limitation affecting farm uses and most other uses. Ponding is common in the depressions during winter and spring, especially in undrained areas. The major soils are well suited to hay and pasture.

The major soils are suited to such trees as pin oak, white oak, sweetgum, and red oak. The use of logging equipment is limited during wet periods.

Because of the wetness and the ponding, the major soils generally are poorly suited or unsuited to building site development, sanitary facilities, and recreational uses.

4. Montgomery-Booker-Zipp

Deep, nearly level, very poorly drained, moderately fine textured and fine textured soils formed in clayey and silty sediments; on lake plains

This map unit consists of soils in broad depressions on lake plains. Slopes are 0 to 1 percent.

This unit makes up about 7 percent of the county. It is about 29 percent Montgomery and similar soils, 21 percent Booker soils, 12 percent Zipp soils, and 38 percent soils of minor extent.

Montgomery soils typically have a surface layer of black silty clay loam and a subsurface layer of black silty clay. The subsoil is silty clay and silty clay loam, and the substratum is gray, mottled silty clay loam.

Booker soils typically have a surface layer and subsurface layer of black mucky clay or clay. The subsoil is clay, and the substratum is olive gray, mottled clay.

Zipp soils typically have a surface layer of dark grayish brown silty clay. The subsoil is dark gray and gray, mottled clay, and the substratum is dark gray, mottled clay.

The minor soils in this unit are the somewhat poorly drained Henshaw and McGary soils on low rises and the poorly drained Evansville and Peoga soils on lake plains and low alluvial terraces. Evansville and Peoga soils are less clayey than the major soils.

Nearly all of this unit has been cleared and is used for cultivated crops. Corn and soybeans are the main crops. The wetness is the main limitation affecting farm uses and most other uses. Ponding is common during winter and spring, especially in undrained areas.

The major soils are suited to such trees as pin oak, white oak, sweetgum, and red oak. The use of logging equipment is limited during wet periods.

Because of the ponding, the major soils generally are unsuited to building site development and sanitary facilities and are poorly suited to recreational uses.

Nearly Level, Very Poorly Drained, Poorly Drained, Somewhat Poorly Drained, and Well Drained Soils on Bottom Land

These soils make up about 15 percent of the county. They generally formed in alluvium along rivers and streams. They are used mainly for cultivated crops. They generally are well suited to farming but are unsuited to building site development and sanitary facilities. Flooding and wetness are the main management concerns.

5. Haymond-Nolin

Deep, nearly level, well drained, medium textured soils formed in alluvium; on bottom land

This map unit consists of soils on bottom land along rivers and streams. Areas vary in size and shape. Slopes are 0 to 1 percent.

This unit makes up about 7 percent of the county. It is about 61 percent Haymond soils, 11 percent Nolin soils, and 28 percent soils of minor extent.

Haymond soils typically have a surface layer of dark grayish brown silt loam. The subsoil is brown and yellowish brown silt loam. The substratum is yellowish brown silt loam and fine sandy loam.

Nolin soils typically are silt loam throughout. The surface layer is dark grayish brown, the subsoil is dark brown and yellowish brown, and the substratum is yellowish brown.

The minor soils in this unit are the well drained Armiesburg soils on broad bottom land, the poorly drained Evansville soils on low terraces, the somewhat poorly drained Newark soils in sloughs on the lower bottom land away from the main channels, the very poorly drained Wilhite soils in sloughs, and the well drained Wirt soils along the sloughs. Armiesburg soils have a dark surface layer.

Nearly all of this unit has been cleared and is used for cultivated crops. Flooding is the main hazard affecting farm uses and most other uses. It generally occurs in winter and spring and is of brief duration. Some areas are protected by a levee.

The major soils are well suited to such trees as yellow-poplar, white oak, and black walnut. Plant competition is the main management concern.

Because of the flooding, the major soils are generally unsuited to building site development and sanitary facilities, are poorly suited to intensive recreational uses, and are only fairly well suited to extensive recreational uses.

6. Bonnie-Stendal

Deep, nearly level, somewhat poorly drained to very poorly drained, medium textured soils formed in alluvium; on bottom land

This map unit consists of soils in areas on bottom land that generally are elongated and that vary in size. Slopes are 0 to 1 percent.

This unit makes up about 8 percent of the county. It is about 35 percent Bonnie soils, 35 percent Stendal soils, and 30 percent soils of minor extent.

Bonnie soils are poorly drained or very poorly drained. They typically are silt loam throughout. The surface layer is dark grayish brown, and the substratum is light brownish gray and mottled.

Stendal soils are somewhat poorly drained. They typically have a surface layer of dark grayish brown silt loam. The subsoil also is silt loam. The substratum is light brownish gray and grayish brown, mottled silt loam that has thin strata of silty clay loam in the lower part.

The minor soils in this unit are the well drained Cuba and Piankeshaw soils on bottom land, the poorly drained Evansville soils on low terraces, the poorly drained Peoga soils on lake plains and low alluvial terraces, and the moderately well drained Steff soils on bottom land.

Most of this unit has been cleared and is used for cultivated crops or small grain. Some undrained areas are used as pasture. Flooding is the main hazard affecting farm uses and most other uses. It generally occurs in winter and spring and is of brief duration. The wetness is a limitation.

The major soils are well suited to such trees as pin oak, eastern cottonwood, sweetgum, and American sycamore. The use of logging equipment is limited during wet periods.

Because of the flooding and the wetness, the major soils are generally unsuited to building site development and sanitary facilities and are poorly suited to recreational uses.

Gently Sloping to Very Steep, Well Drained and Somewhat Excessively Drained Soils on Uplands and Terraces

These soils make up about 4 percent of the county. They generally have a substratum of windblown sand. They are used mainly for cultivated crops or small grain. Droughtiness, soil blowing, and erosion are the main management concerns. The soils generally are suited to farming, building site development, and sanitary facilities.

7. Alvin-Bloomfield-Princeton

Deep, gently sloping to very steep, well drained and somewhat excessively drained, moderately coarse textured and coarse textured soils formed in wind-deposited sandy and silty material; on uplands and terraces

This map unit consists of soils on knolls and side slopes and in undulating dunelike areas. Areas generally are small and are irregular in shape. Slopes are short and choppy. They range from 2 to 60 percent.

This unit makes up about 4 percent of the county. It is about 28 percent Alvin soils, 28 percent Bloomfield soils, 17 percent Princeton soils, and 27 percent soils of minor extent.

Alvin soils are gently sloping or moderately sloping. They are well drained. They typically have a surface layer of dark brown loamy sand and a subsurface layer of dark yellowish brown loamy sand. The subsoil is sandy loam, loamy sand, and sand. The substratum is light yellowish brown sand.

Bloomfield soils are gently sloping to very steep. They are well drained or somewhat excessively drained. They typically have a surface layer of brown sand and a subsurface layer of yellowish brown sand and loamy sand. The subsoil is sand that has bands of loamy sand. The substratum is yellowish brown sand.

Princeton soils are gently sloping or moderately sloping. They are well drained. They typically have a surface layer of dark yellowish brown fine sandy loam. The subsoil is fine sandy loam, very fine sandy loam, and loamy fine sand. The substratum is yellowish brown, stratified fine sandy loam, loamy fine sand, and silt.

The minor soils in this unit are the well drained, silty Alford soils on knolls; the somewhat poorly drained Ayrshire and Roby soils on flats between the knolls; and the very poorly drained Rensselaer soils in depressions.

Most of this unit has been cleared and is used for cultivated crops or small grain. Corn, soybeans, and wheat are the main crops. Some of the more sloping areas are used as pasture. Soil blowing, drought, and erosion are the main hazards. The slope is a limitation in some areas.

Many draws support mixed hardwoods. The major soils are suited to such trees as red oak, walnut, white oak, and yellow-poplar. The slope limits the use of logging equipment in some areas.

The major soils generally are well suited to building site development, sanitary facilities, and recreational uses. The slope is the main limitation in the strongly sloping to very steep areas.

Gently Sloping to Very Steep, Well Drained Soils Formed in Mine Spoil

These soils make up about 4 percent of the county. The more sloping areas are used mainly as woodland. The less sloping areas are used mainly as pasture. The hazard of erosion and the slope are the major management concerns. The soils generally are best suited to woodland. They generally are poorly suited to building site development and sanitary facilities because of the slope.

8. Fairpoint

Deep, gently sloping to very steep, well drained, medium textured and moderately fine textured soils formed in mine spoil; on uplands

This map unit consists of soils on the tops and sides of ridges in surface-mined areas. Areas vary in shape. Most are 500 to 3,000 acres in size. Slopes range from 2 to 90 percent.

This unit makes up about 4 percent of the county. It is about 86 percent Fairpoint soils and 14 percent soils of minor extent.

Fairpoint soils typically have a surface layer of dark grayish brown very shaly loam, shaly clay loam, or silt loam. The underlying material is brown extremely shaly loam. It has a high content of rock fragments.

The minor soils in this unit are the moderately well drained Ava and somewhat poorly drained or moderately well drained Shakamak soils on ridgetops, on side slopes along drainageways, and on knolls; the well drained, silty Cincinnati soils on side slopes along drainageways and on knolls; and the poorly drained, nearly level Vigo soils on broad ridgetops.

About 65 percent of this unit is wooded. The rest generally has been partially smoothed and seeded to grass. Most of the grassland is idle, but some of it is used for pasture and hay. In most areas the Fairpoint soils are unsuited to cultivated crops. In the partially smoothed areas, they are suited to pasture and hay. The slope, the hazard of erosion, and the content of rock fragments are the main problems affecting farm uses and other uses.

The Fairpoint soils are suited to such trees as yellow-poplar, cottonwood, sycamore, and white pine. The use of logging equipment is limited by the slope.

Because of the slope, the Fairpoint soils are poorly suited to building site development, sanitary facilities, and intensive recreational uses and are only fairly well suited to extensive recreational uses.

Very Gently Sloping to Very Steep, Well Drained and Moderately Well Drained Soils on Uplands

These soils make up about 30 percent of the county. They generally are on uplands dissected by deep draws. The less sloping areas are used mainly for cultivated crops or for hay and pasture. The hazard of erosion and the slope are the main management concerns in farmed areas. The more sloping draws are used mainly as woodland. In most areas the soils are best suited to pasture and woodland. They generally are suited or poorly suited to building site development, depending on the slope. They generally are poorly suited to sanitary facilities because of the slope and a fragipan in the subsoil.

9. Wellston-Zanesville-Gilpin

Deep and moderately deep, very gently sloping to very steep, well drained and moderately well drained, medium textured soils formed in loess and in sandstone and shale residuum; on uplands

This map unit consists of soils on ridgetops, on side slopes, and in draws. Most areas are deeply dissected by small and large streams bordered by narrow bottom land. The areas generally are large and irregularly shaped. Slopes range from 1 to 60 percent.

This unit makes up about 30 percent of the county. It is about 30 percent Wellston soils, 28 percent Zanesville soils, 18 percent Gilpin soils, and 24 percent soils of minor extent (fig. 2).

Wellston soils generally are strongly sloping or moderately steep and are on side slopes, on ridges and knolls, and in draws. They are well drained and are deep. They typically have a surface layer of very dark grayish brown silt loam and a subsurface layer of brown silt loam. The subsoil is silt loam, channery loam, and channery silty clay loam. The substratum is yellowish brown channery silty clay loam. Bedrock is at a depth of about 53 inches.

Zanesville soils generally are very gently sloping to moderately sloping and are on the tops and sides of ridges, on knolls, and in drainageways. They are well drained or moderately well drained and are deep. They typically have a surface layer of brown silt loam. The subsoil is silty clay loam and silt loam. It has a fragipan. The substratum is strong brown loam.

Gilpin soils generally are strongly sloping to very steep and are in draws and on breaks to bottom land. They are well drained and are moderately deep. They typically have a surface layer of very dark grayish brown silt loam and a subsurface layer of brown silt loam. The subsoil is loam and channery loam. The substratum is strong brown extremely channery loam. Sandstone bedrock is at a depth of about 34 inches.

The minor soils in this unit are the well drained Berks soils in draws and on breaks; the well drained Cuba,

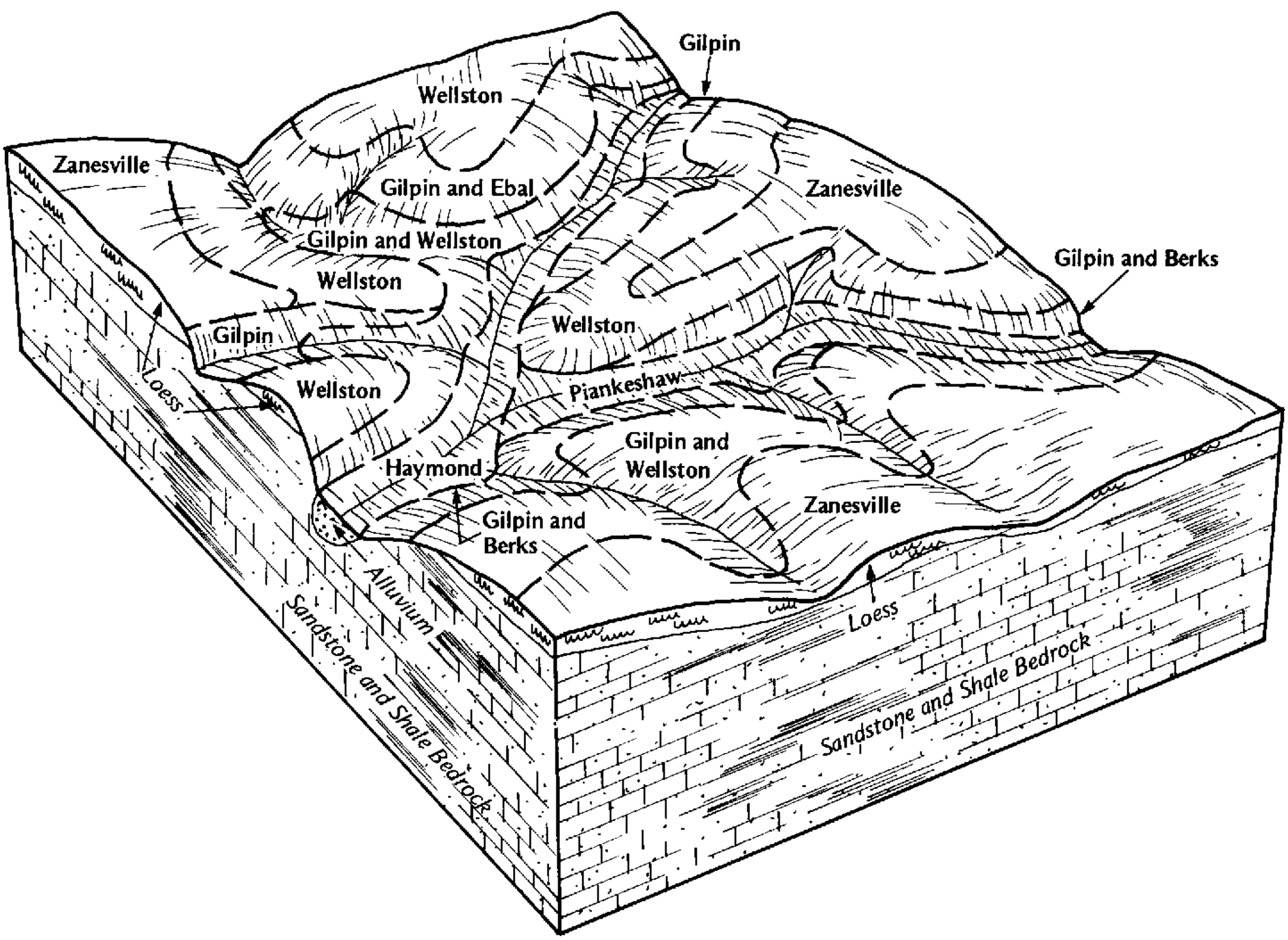


Figure 2.—Pattern of soils and parent material in the Wellston-Zanesville-Gilpin map unit.

Piankeshaw, and Haymond soils on narrow bottom land; the moderately well drained Ebal soils in benchlike areas on the sides of ridges, on knolls, and in draws; and the well drained Hagerstown soils on the sides of ridges, on knolls, and in sinkholes. Berks soils are less silty than the major soils, and Ebal and Hagerstown soils are more clayey.

Most of this unit is pastured or wooded. Because of the slope and the hazard of erosion, the major soils are generally unsuited to cultivated crops. The very gently sloping and gently sloping Zanesville soils on ridgetops, however, are well suited to cultivated crops and hay.

The major soils are fairly well suited to such trees as red oak, white oak, and yellow-poplar. The slope limits the use of logging equipment in many areas. Erosion is a hazard along logging roads and skid trails.

The major soils are poorly suited or generally unsuited to building site development and sanitary facilities, mainly because of the slope and restricted permeability. In some areas the depth to bedrock is a limitation. The soils generally are poorly suited to intensive recreational uses and are fairly well suited to extensive recreational uses. The slope is a limitation, especially in areas of the Gilpin soils.

Gently Sloping to Very Steep, Well Drained Soils on Uplands

These soils make up about 8 percent of the county. They generally have a substratum of glacial outwash or till. The more sloping areas are used mainly as woodland. The less sloping areas are used mainly for cultivated crops or for hay and pasture. The slope and the hazard of erosion are the main management concerns in farmed areas. In most areas the soils are best suited to woodland. They generally are poorly suited to building site development and sanitary facilities because of the slope.

10. Chetwynd-Hickory-Pike

Deep, gently sloping to very steep, well drained, medium textured soils formed in outwash, glacial till, or loess; on uplands

This map unit consists of soils on ridgetops and side slopes and in draws. Most areas are deeply dissected by streams. They are large and irregularly shaped. Slopes range from 2 to 60 percent.

This unit makes up about 8 percent of the county. It is about 25 percent Chetwynd soils, 21 percent Hickory soils, 18 percent Pike soils, and 36 percent soils of minor extent.

Chetwynd soils generally are moderately steep to very steep and are in draws or on breaks to bottom land. They are well drained. They typically have a surface layer of dark brown silt loam and a subsurface layer of brown silt loam. The subsoil is loam, sandy clay loam, and sandy loam.

Hickory soils are strongly sloping to very steep and are in draws or on breaks to bottom land. They are well drained. They typically have a surface layer of very dark grayish brown silt loam or loam and a subsurface layer of dark grayish brown silt loam. The subsoil is silt loam, clay loam, and sandy clay loam. The substratum is yellowish brown, mottled sandy clay loam.

Pike soils are gently sloping or moderately sloping and are on ridgetops, on knolls, and on side slopes along drainageways. They are well drained. They typically have a surface layer of dark yellowish brown silt loam. The subsoil is silty clay loam, silt loam, sandy clay loam, and sandy loam.

The minor soils in this unit are the moderately well drained Ava soils on the top of ridges and knolls, the well drained Gilpin and Wellston soils in draws and on breaks to bottom land, and the well drained Haymond soils on the bottom land. The content of coarse fragments in Gilpin and Wellston soils is higher than that in the major soils.

Most of this unit is wooded. Because of the slope and the hazard of erosion, the major soils are generally unsuited to cultivated crops. The gently sloping Pike soils on ridgetops and knolls, however, are well suited to cultivated crops and to hay and pasture.

The major soils are well suited to such trees as white oak, red oak, ash, and yellow-poplar. The slope limits the use of logging equipment in many areas. Erosion is a hazard along logging roads and skid trails.

The major soils generally are poorly suited to building site development, sanitary facilities, and intensive recreational uses because of the slope. The gently sloping Pike soils, however, are well suited to building site development and to intensive recreational uses. The major soils generally are well suited to extensive recreational uses.

Broad Land Use Considerations

The soils in Greene County vary widely in their suitability for various land uses, including cultivated crops, pasture and hay, woodland, urban development, and recreational development. The general soil map is helpful in broad land use planning, but it cannot be used for the selection of sites for specific uses.

The Vigo-Shakamak and Rensselaer-Ayrshire map units are well suited to cultivated crops, but wetness is a limitation. The Ava-Cincinnati-Vigo, Montgomery-Booker-Zipp, Haymond-Nolin, Bonnie-Stendal, and Alvin-Bloomfield-Princeton map units are fairly well suited to cultivated crops. The wetness of the Bonnie, Booker, Montgomery, Stendal, Vigo, and Zipp soils in these units is a serious limitation. In many areas, however, a sufficient drainage system has been installed. Because of a high content of clay, draining the Booker, Montgomery, and Zipp soils is difficult. As a result, the wetness generally damages crops. Flooding is a hazard on the soils in the Bonnie-Stendal and Haymond-Nolin map units. The soils in the Alvin-Bloomfield-Princeton map unit are subject to soil blowing.

Most of the soils in the county are well suited to pasture and hay. Exceptions are areas in the Fairpoint, Wellston-Zanesville-Gilpin, and Chetwynd-Hickory-Pike map units where management is difficult because of steep or very steep slopes and rock outcrops. Wetness is a limitation in areas of the Rensselaer-Ayrshire, Bonnie-Stendal, Montgomery-Booker-Zipp, and Vigo-Shakamak map units. Water-tolerant grasses and legumes should be favored in these areas.

Most of the soils in the county are well suited or fairly well suited to woodland. Tree growth generally is restricted on the wet soils in the Montgomery-Booker-Zipp, Rensselaer-Ayrshire, and Bonnie-Stendal map units. Also, commercially valuable trees are less common on these wet soils than on other soils. The trees can be harvested only during dry periods or when the ground is frozen. In many areas of the Wellston-Zanesville-Gilpin map unit, the depth to bedrock restricts tree growth and the slope limits the use of harvesting equipment.

Most of the soils in the county are poorly suited to urban development. Flooding is a hazard in areas of the Haymond-Nolin and Bonnie-Stendal map units. A seasonal high water table or a fragipan is a limitation in areas of the Ava-Cincinnati-Vigo and Vigo-Shakamak map units, and a seasonal high water table is a limitation in areas of the Rensselaer-Ayrshire and Montgomery-Booker-Zipp map units. The slope is a limitation in most areas of the Wellston-Zanesville-Gilpin map units. Also, a seasonal high water, a fragipan, and the depth to bedrock are limitations in some areas of this unit. The gently sloping soils in the Alvin-Bloomfield-Princeton and Chetwynd-Hickory-Pike map units are well suited to urban uses, but the steeper soils are poorly suited.

A large part of the county is poorly suited to intensive recreational uses, such as campgrounds and picnic areas, because of the slope, a seasonal high water table, or flooding. The soils in the Ava-Cincinnati-Vigo and Alvin-Bloomfield-Princeton map units are well suited or fairly well suited to these uses. Much of the county is well suited or fairly well suited to extensive recreational uses, such as hiking trails, bridle paths, and nature areas.

Detailed Soil Map Units

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

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

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

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the substratum, 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 substratum. 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, Cincinnati silt loam, 6 to 12 percent slopes, eroded, is a phase of the Cincinnati series.

Some map units are made up of two or more major soils. These map units are called soil complexes. 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. Gilpin-Berks complex, 30 to 60 percent slopes, is an example.

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. The Rock outcrop part of Berks-Rock outcrop complex, 45 to 70 percent slopes, 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.

The names, descriptions, and delineations of the soils identified on the detailed soil maps of this county do not always agree or join fully with those of the soils identified on the maps of adjoining counties published at an earlier date. Some differences are the result of changes in concepts of soil series. Other differences result from variations in the extent of the soils. Others are the result of variations in the slope range allowed in the map units.

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

AlB2—Alford silt loam, 2 to 6 percent slopes, eroded. This gently sloping, deep, well drained soil is on the top and sides of knolls and ridges in the uplands. Most slopes are 150 to 300 feet long. Areas are 5 to 30 acres in size.

In a typical profile, the surface layer is brown silt loam about 6 inches thick. The subsoil is about 55 inches thick. The upper part is brown, friable silt loam; the next part is strong brown, friable and firm silty clay loam; and the lower part is strong brown, friable silt loam. The substratum to a depth of about 80 inches is yellowish brown silt loam. In some small areas reddish brown or yellowish red sandy clay loam or sandy loam outwash is below a depth of 40 inches. Some small, narrow, elongated areas on the top of knolls and ridges are nearly level. A few small areas on the sides of the knolls and ridges are moderately sloping. In places, the surface layer is sandy loam and the subsoil is sandy loam or loam.

Included with this soil in mapping are small areas of the moderately well drained Ava soils on knolls and ridgetops. These soils make up about 5 to 10 percent of the map unit.

The Alford soil has a very high available water capacity and is moderately permeable. The organic matter content is moderate. Runoff is rapid. The surface layer is friable and can be easy tilled throughout a moderately wide range in moisture content.

Most areas of this soil are used for cultivated crops or small grain. A few are used for pasture, hay, or woodlots.

This soil is well suited to corn, soybeans, and small grain. Erosion is the main management concern. Terraces and contour farming slow runoff. Grassed waterways and grade stabilization structures help to prevent gullying. A system of conservation tillage that leaves all or part of the crop residue on the surface minimizes crusting and increases the rate of water infiltration. No-till planting helps to control erosion and conserves moisture. In some areas subsurface drains help to control seepage in drainageways.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as alfalfa, for hay or pasture. A wide variety of grasses and legumes, including alfalfa, can be grown. A cover of grasses and legumes helps to control erosion. Proper stocking rates, pasture rotation, and timely grazing help to keep the pasture in good condition.

This soil is well suited to trees. The main management concern is plant competition. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the shrink-swell potential, this soil is moderately limited as a site for dwellings. Strengthening foundations, footings, and basement walls and backfilling with coarse textured material help to prevent the structural damage caused by shrinking and swelling. The soil is severely limited as a site for local roads and streets because of frost action and low strength. Providing adequate side ditches and culverts and replacing or covering the upper soil layers with better suited base material help to prevent the damage caused by frost action and low strength. The soil is well suited to septic tank absorption fields.

The land capability classification is IIe. The woodland ordination symbol is 5A.

AlC2—Alford silt loam, 6 to 12 percent slopes, eroded. This moderately sloping, deep, well drained soil is on the sides of knolls and ridges in the uplands. Most slopes are 100 to 300 feet long. Areas are 5 to 30 acres in size.

In a typical profile, the surface layer is brown silt loam about 8 inches thick. The subsoil extends to a depth of about 80 inches. The upper part is strong brown, firm silty clay loam, and the lower part is strong brown, dark yellowish brown, and brown, friable silt loam. In some small areas reddish brown or yellowish red sandy clay loam or sandy loam outwash is below a depth of 40 inches. Some small, elongated areas on the top of knolls and ridges are gently sloping. A few strongly sloping areas are on side slopes. In places, the surface layer is sandy loam and the subsoil is sandy loam or loam.

Included with this soil in mapping are small areas of the well drained Cincinnati soils on knolls and ridgetops. These soils are slowly permeable or moderately slowly permeable in the lower part. They make up about 2 to 5 percent of the map unit.

The Alford soil has a very high available water capacity and is moderately permeable. Runoff is rapid. The organic matter content is moderate. The surface layer is friable and can be easily tilled throughout a moderately wide range in moisture content.

Most areas of this soil are used for cultivated crops or small grain. A few are used for pasture, hay, or woodlots.

This soil is fairly well suited to corn, soybeans, and small grain. Erosion is the main management concern. Contour farming and terraces slow runoff. Grassed waterways and grade stabilization structures help to prevent gullying. A system of conservation tillage that leaves all or part of the crop residue on the surface minimizes crusting and increases the rate of water infiltration. No-till planting helps to control erosion and conserves moisture. A cropping sequence that includes close-growing crops helps to control erosion. In some areas subsurface drains help to control seepage in drainageways.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as alfalfa, for hay or pasture. A wide variety of grasses and legumes, including alfalfa, can be grown. A cover of grasses and legumes helps to control erosion. Proper stocking rates, pasture rotation, and timely grazing help to keep the pasture in good condition.

This soil is well suited to trees. The main management concern is plant competition. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the slope and the shrink-swell potential, this soil is moderately limited as a site for dwellings. Buildings should be designed so that they conform to the natural slope of the land. Land shaping and installing retaining walls help to overcome the slope. Areas disturbed during construction should be revegetated as soon as possible. Backfilling with coarse textured material and strengthening foundations, footings, and basement walls help to prevent the structural damage caused by shrinking and swelling.

This soil is severely limited as a site for local roads and streets because of frost action and low strength. Providing adequate side ditches and culverts and replacing or covering the upper soil layers with suitable base material help to prevent the damage caused by frost action and low strength.

This soil is moderately limited as a site for septic tank absorption fields because of the slope. Installing the absorption field on the contour helps to overcome the slope.

The land capability classification is IIIe. The woodland ordination symbol is 5A.

AnB—Alvin-Bloomfield complex, 2 to 6 percent slopes. These gently sloping, deep soils are on ridgetops, knolls, and side slopes and in dunelike areas on uplands and terraces. The Alvin soil is well drained, and the Bloomfield soil is well drained or somewhat excessively drained. Slopes are short and choppy and generally are 30 to 100 feet long. Areas are irregular in shape and are dominantly 5 to 50 acres in size. They are about 50 to 75 percent Alvin soil and 25 to 40 percent Bloomfield soil. The two soils occur as areas so intermingled that mapping them separately is not practical.

In a typical profile of the Alvin soil, the surface layer is dark brown loamy sand about 9 inches thick. The subsoil is about 41 inches thick. It is brown and dark yellowish brown, friable and very friable sandy loam in the upper part and dark brown, very friable loamy sand in the lower part. The substratum to a depth of about 60 inches is brown sand. In some areas, the surface layer is fine sandy loam and the subsoil is mostly sandy clay loam. In some small areas the slope is less than 2 or more than 6 percent.

In a typical profile of the Bloomfield soil, the surface layer is brown sand about 10 inches thick. The subsurface layer is yellowish brown sand about 21 inches thick. The subsoil is about 26 inches of very friable, banded, yellowish brown loamy sand and friable, brown sandy loam. The substratum to a depth of about 80 inches is brownish yellow sand. In some small areas the slope is more than 6 percent.

Included with these soils in mapping are a few small areas of the somewhat poorly drained Ayrshire and Roby soils on flats and in depressions at the base of slopes. Included soils make up about 5 to 15 percent of the map unit.

The Alvin soil has a moderate available water capacity and is moderately permeable or moderately rapidly permeable. The Bloomfield soil has a low available water capacity and is moderately rapidly permeable or rapidly permeable. The organic matter content is moderate in the surface layer of both soils. Runoff is slow.

Most areas of these soils are used for cultivated crops. Some are used for hay and pasture. A few are wooded.

These soils are fairly well suited to corn, soybeans, and small grain. Erosion and soil blowing are management concerns. The moderate or low available water capacity is a limitation. During years when rainfall is below average or poorly distributed, crops can be damaged by drought. Planting early in the spring helps to prevent this damage. A system of conservation tillage that leaves the maximum amount of crop residue on the surface helps to control soil blowing and conserves moisture. No-till planting helps to control erosion and soil blowing and conserves moisture. A cropping sequence that includes close-growing crops also helps to control erosion.

These soils are well suited to grasses, such as orchardgrass, and legumes, such as alfalfa, for hay or pasture. Overgrazing results in surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

The Alvin soil is well suited to trees, and the Bloomfield soil is fairly well suited. Because of the droughtiness and plant competition, seedling mortality is moderate on the Bloomfield soil. Seedlings survive and grow fairly well if competing vegetation is controlled by site preparation or by spraying, cutting, or girdling. Because of seedling mortality, special containerized planting stock and overstocking are needed.

These soils are suitable as sites for dwellings. The Alvin soil is moderately limited as a site for local roads and streets because of frost action. Replacing or covering the upper soil layers with better suited base material and providing adequate side ditches and culverts help to prevent the damage caused by frost action. The Bloomfield soil is severely limited as a site for septic tank absorption fields because of a poor filtering capacity. Seepage of effluent into ground water supplies is a hazard.

The land capability classification of the Alvin soil is IIe, and that of the Bloomfield soil is IIIs. The woodland ordination symbol of the Alvin soil is 4A, and that of the Bloomfield soil is 4S.

AnC—Alvin-Bloomfield complex, 6 to 12 percent slopes. These moderately sloping, deep soils are on ridgetops, knolls, and side slopes and in dunelike areas on uplands and terraces. The Alvin soil is well drained, and the Bloomfield soil is well drained or somewhat excessively drained. Slopes are short and choppy and generally are 30 to 100 feet long. Areas are irregular in shape and are dominantly 20 to 100 acres in size. They are about 45 to 60 percent Alvin soil and 30 to 45 percent Bloomfield soil. The two soils occur as areas so intermingled that mapping them separately is not practical.

In a typical profile of the Alvin soil, the surface layer is dark brown loamy sand about 8 inches thick. The subsurface layer is dark yellowish brown loamy sand about 4 inches thick. The subsoil is about 52 inches thick. The upper part is strong brown, very friable sandy loam and loamy sand, and the lower part is yellowish brown and brown, very friable sand that has dark brown sandy loam bands. The substratum to a depth of about 80 inches is light yellowish brown sand. In places the subsoil is mostly sandy clay loam. In many small areas on the top of knolls, the slope is less than 6 percent.

In a typical profile of the Bloomfield soil, the surface layer is brown sand about 9 inches thick. The subsurface layer is yellowish brown sand and loamy sand about 23 inches thick. The next 28 inches is yellowish brown, loose sand and dark brown, very friable loamy sand. The substratum to a depth of about 80 inches is yellowish brown sand. In a few small areas on breaks, the slope is more than 12 percent.

Included with these soils in mapping are a few small areas of the somewhat poorly drained Ayrshire and Roby soils on flats and in drainageways. Included soils make up about 5 to 15 percent of the map unit.

The Alvin soil has a moderate available water capacity and is moderately permeable or moderately rapidly permeable. The Bloomfield soil has a low available water capacity and is moderately rapidly permeable or rapidly permeable. The organic matter content is moderate in the surface layer of both soils. Runoff is medium.

Most areas of these soils are used for cultivated crops. Some are used for hay and pasture. A few are wooded.

These soils are fairly well suited to corn, soybeans, and small grain. Erosion and soil blowing are management concerns. The moderate or low available water capacity is a limitation. During years when rainfall is below average or poorly distributed, crops can be damaged by drought. Planting early in the spring helps to prevent this damage. No-till planting or another system of conservation tillage that leaves the maximum amount of crop residue on the surface helps to control soil blowing and erosion and conserves moisture. A cropping sequence that includes close-growing crops helps to prevent excessive soil loss.

These soils are well suited to grasses, such as orchardgrass, and legumes, such as alfalfa, for hay and pasture. A cover of grasses and legumes helps to control erosion and soil blowing. Proper stocking rates, pasture rotation, and timely grazing help to keep the pasture in good condition.

The Alvin soil is well suited to trees, and the Bloomfield soil is fairly well suited. Plant competition and seedling mortality are the main management concerns. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling. Because of seedling mortality on the Bloomfield soil, special planting stock and overstocking are needed.

These soils are moderately limited as sites for dwellings because of the slope. Buildings should be designed so that they conform to the natural slope of the land. Land shaping and installing retaining walls help to overcome the slope. Areas disturbed during construction should be revegetated as soon as possible.

These soils are moderately limited as sites for local roads and streets because of the slope and frost action. Constructing the roads and streets on the contour and land shaping help to overcome slope. Providing adequate side ditches and culverts help to prevent the damage caused by frost action.

The Bloomfield soil is severely limited as a site for septic tank absorption fields because of a poor filtering capacity. Seepage of effluent into ground water supplies is a hazard. It can be overcome by adding better filtering material to the bottom of the absorption field.

The land capability classification is IIIe. The woodland ordination symbol of the Alvin soil is 4A, and that of the Bloomfield soil is 4S.

Ao—Ambraw sandy clay loam, rarely flooded. This nearly level, deep, poorly drained soil is on flood plains. It is protected from most floods by the McGinnis Levee. Some areas are ponded by runoff from the higher lying adjacent soils. Areas generally are irregularly shaped and are 20 to 300 acres in size.

In a typical profile, the surface layer is very dark grayish brown sandy clay loam about 8 inches thick. The subsurface also is very dark grayish brown sandy clay loam. It is about 6 inches thick. The subsoil is mottled sandy clay loam about 37 inches thick. The upper part is dark grayish brown and friable, and the lower part is gray and is firm and friable. The substratum to a depth of about 60 inches is gray, mottled, stratified clay loam and sandy clay loam. In some small areas the subsoil is silt loam, loam, sandy loam, or clay loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Ayrshire soils. These soils commonly are on slight rises and around the edge of the mapped areas. They make up about 2 to 5 percent of the map unit.

The Ambraw soil has a high available water capacity and is moderately or moderately slowly permeable. Runoff is slow to ponded. The organic matter content is high in the surface layer. This layer is friable and can be easily tilled under proper moisture conditions. The water table is often at or slightly above the surface in winter and early spring.

Most areas of this soil are drained and are used for corn, soybeans, or small grain. A few are used for pasture, hay, or woodland.

If drained and protected from flooding, this soil is well suited to corn, soybeans, and small grain. A drainage system has been established in most areas, but additional drainage measures are needed. Land smoothing, shallow surface drains, and subsurface drains help to remove excess water. Locating subsurface drain outlets, however, is difficult in some areas. Returning crop residue to the soil and growing green manure crops increase the organic matter content and help to maintain good tilth.

This soil is well suited to grasses, such as orchardgrass, and some legumes, such as red clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of the ponding and frost action. The suitability for legumes depends on completeness of drainage. Grazing when the soil is wet damages the sod and reduces forage yields. Restricted use during wet periods and timely grazing help to keep the pasture in good condition.

This soil is fairly well suited to trees. The equipment limitation, seedling mortality, the windthrow hazard, and plant competition are management concerns. Prolonged seasonal wetness hinders logging activities and the planting of seedlings. Tree seedlings that can withstand the wetness should be favored in timber stands. Some replanting is usually necessary. Equipment should be used only during dry periods or when the ground is frozen. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the ponding and the flooding, this soil is generally unsuitable as a site for dwellings and sanitary facilities. It is severely limited as a site for local roads because of the ponding, frost action, and low strength. Installing a drainage system along the roads helps to lower the water table and thus helps to prevent the damage caused by frost action. Elevating the roadbed with coarse textured fill material helps to prevent the damage caused by ponding and low strength.

The land capability classification is IIw. No woodland ordination symbol is assigned.

Ar—Armiesburg silt loam, occasionally flooded. This nearly level, deep, well drained soil is on broad bottom land. In most areas it is flooded for brief periods, mainly in winter and spring. In some areas, however, it is protected by the McGinnis Levee. Areas generally are irregularly shaped and are 40 to 100 acres in size.

In a typical profile, the surface layer is very dark grayish brown silt loam about 11 inches thick. The subsurface layer also is very dark grayish brown silt loam. It is about 5 inches thick. The subsoil is dark yellowish brown and dark brown, firm silt loam, silty clay loam, and clay loam about 24 inches thick. The substratum to a depth of about 60 inches is yellowish brown loam. In some areas the surface layer is silty clay loam. In other areas the substratum is sandy loam below a depth of 40 inches.

Included with this soil in mapping are small areas of the somewhat poorly drained Newark soils in swales and along sloughs. These soils make up about 2 to 5 percent of the unit.

The Armiesburg soil has a high available water capacity and is moderately permeable. Runoff is slow. The organic matter content is high in the surface layer. This layer is friable and can be easily tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. A few are used for pasture or are wooded.

This soil is well suited to corn, soybeans, and grain sorghum. On rare occasions, replanting is needed because flooding has destroyed stands of corn and soybeans. Wheat is occasionally damaged by flooding in the winter and spring. Dikes and levees help to prevent flooding during the growing season. Subsurface drains are installed in small swales. Returning crop residue to the soil improves soil structure.

The soil is well suited to grasses, such as orchardgrass, and legumes, such as red clover, for hay and pasture. Alfalfa is occasionally damaged by flooding in the winter and spring. Proper stocking rates, pasture rotation, and timely grazing help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is the main management concern. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the flooding, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields. It is severely limited as a site for local roads because of the flooding, frost action, and low strength. Providing adequate ditches and culverts and elevating the roadbed help to prevent the damage caused by frost action and flooding. Replacing or strengthening the upper part of the soil with better suited material improves the ability of the roads to support vehicular traffic.

The land capability classification is IIw. The woodland ordination symbol is 8A.

AvB2—Ava silt loam, 2 to 6 percent slopes, eroded. This gently sloping, deep, moderately well drained soil is on knolls and narrow ridgetops and on side slopes along drainageways in the uplands. Slopes are generally 75 to 250 feet long. Areas are dominantly elongated and irregularly shaped. Most are 2 to 30 acres in size.

In a typical profile, the surface layer is brown silt loam about 7 inches thick. The subsoil extends to a depth of about 80 inches. In sequence downward, it is yellowish brown, firm silt loam; yellowish brown, firm silty clay loam; yellowish brown, mottled, firm silty clay loam; a fragipan of yellowish brown, mottled, very firm, brittle silt loam; and yellowish brown and strong brown, mottled, firm loam. In some small areas the soil is mottled within a depth of 20 inches. In wooded areas it is not eroded and has a very dark grayish brown or dark brown surface layer. In places the substratum is sandstone and shale bedrock residuum. In a few small areas the slope is 0 to 2 percent. In a few areas it is 6 to 10 percent.

Included with this soil in mapping are small areas of the well drained, Cincinnati soils on breaks and knolls. Also included are small areas of the poorly drained, nearly level Vigo soils on ridgetops and in small drainageways. Included soils make up about 5 to 10 percent of the map unit.

The Ava soil has a moderate available water capacity and is very slowly permeable in the fragipan. A perched water table is at a depth of 2 to 4 feet in the winter and early spring. Runoff is rapid. The organic matter content is moderate. The fragipan restricts water movement and plant growth. The surface layer is friable and can be easily tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for crops. Some are used for hay or pasture. A few are used for woodlots.

This soil is well suited to corn, soybeans, and small grain. Erosion is a management concern. Slopes that are long and uniform can be terraced (fig. 3). A cropping sequence that includes close-growing crops helps to control erosion. A system of conservation tillage that leaves all or part of the crop residue on the surface minimizes crusting and increases the rate of water infiltration. No-till planting helps to control erosion and conserves moisture. Grassed waterways and erosion-control structures help to prevent gullying in drainageways. The fragipan restricts root development. The water table is perched on the fragipan. Fieldwork is often delayed by seepage on slopes. Subsurface drains intercept the seepage and help to overcome wetness in drainageways.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as alfalfa or red clover, for hay and pasture. Many grasses and legumes are suited, but deep-rooted legumes, such as alfalfa, are often damaged by frost heaving. A cover of grasses and legumes helps to control erosion. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. The main management concern is plant competition. Competing vegetation can be controlled by cutting, spraying, and girdling.

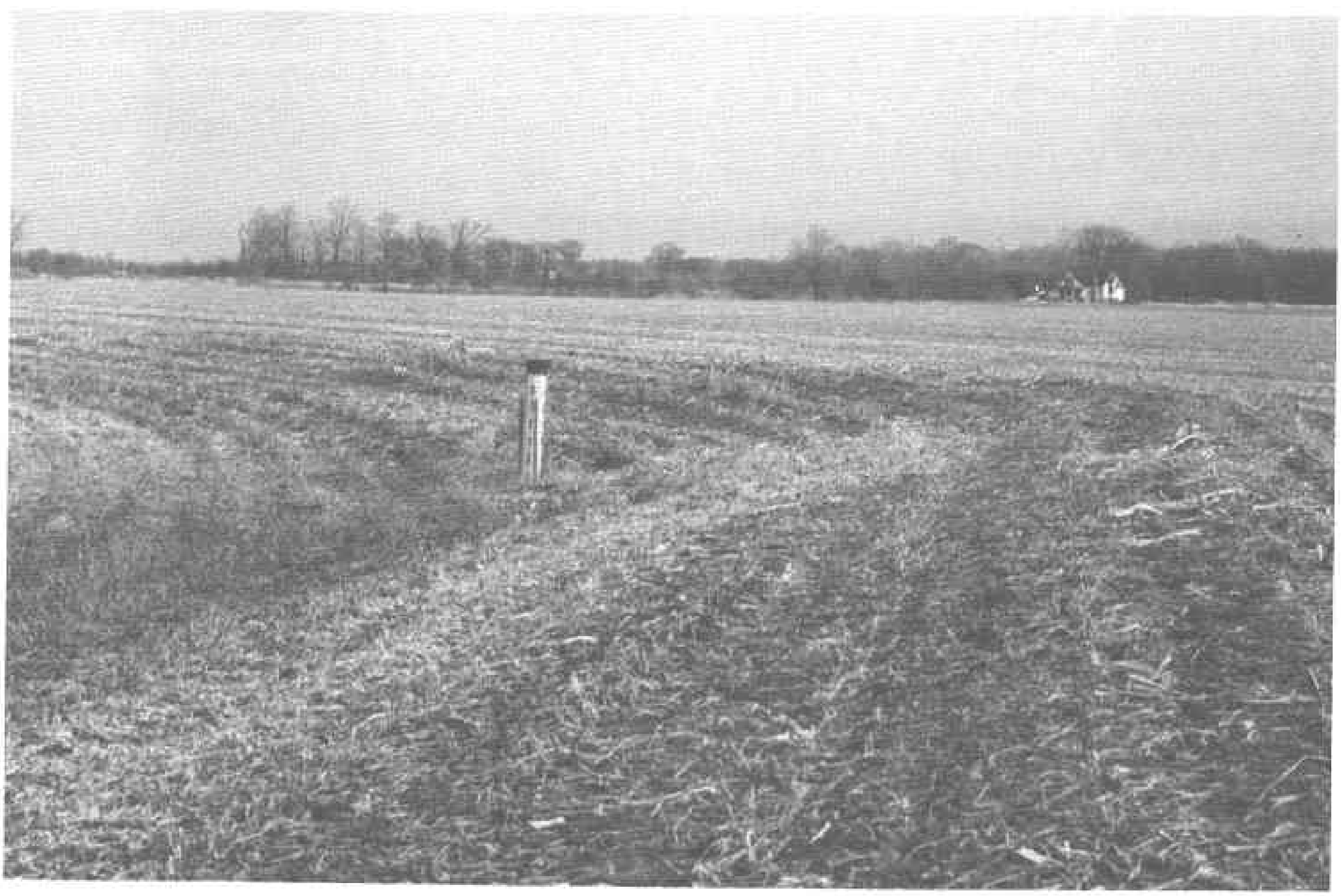


Figure 3.—A terraced area of Ava silt loam, 2 to 6 percent slopes, eroded. Runoff is removed at a controlled rate through a subsurface drain.

Because of the wetness and the shrink-swell potential, this soil is moderately limited as a site for dwellings without basements. It is severely limited as a site for dwellings with basements because of the wetness. Drains around footings help to remove excess water. Strengthening foundations, footings, and basement walls helps to prevent the damage caused by shrinking and swelling.

This soil is severely limited as a site for local roads and streets because of frost action and low strength. Providing adequate side ditches and culverts and replacing the layers that have a moderate shrink-swell potential with better suited material help to prevent the damage caused by low strength and frost action.

This soil is severely limited as a site for septic tank absorption fields because of the very slow permeability of the fragipan and the wetness. Filling or mounding the absorption field with suitable material improves the ability of the field to absorb the effluent. Installing subsurface drains around the absorption field helps to overcome the wetness.

The land capability classification is IIe. The woodland ordination symbol is 4A.

Ay—Ayrshire sandy loam. This nearly level, deep, somewhat poorly drained soil is on low terraces. Areas are irregularly shaped and range from 2 to 25 acres in size.

In a typical profile, the surface layer is dark grayish brown sandy loam about 10 inches thick. The subsurface layer is pale brown, mottled sandy loam about 6 inches thick. The subsoil is about 38 inches thick. The upper part is pale brown and light brownish gray, friable fine sandy loam and sandy clay loam. The next part is yellowish brown, mottled, firm sandy clay loam. The lower part is grayish brown, mottled, friable sandy loam. The substratum to a depth of about 70 inches is grayish brown, stratified coarse sandy loam. In some small areas the soil is somewhat sandier. In a few small areas, the slope is 2 to 4 percent and the upper part of the subsoil does not have grayish mottles. In places the lower part of the subsoil and the substratum are silty clay loam.

Included with this soil in mapping are small areas of the very poorly drained Rensselaer soils. These soils are in swales and depressions. They make up about 5 to 10 percent of the map unit.

The Ayrshire soil has a high available water capacity and is moderately permeable. The water table is about 1 to 3 feet below the surface in winter and early spring. Runoff is slow. The organic matter content is moderate in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content.

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

This soil is well suited to corn, soybeans, and small grain. The wetness is a limitation, and soil blowing is a hazard. A drainage system has been established in most areas, but additional drainage measures are needed in many areas. A subsurface drainage system can lower the water table if adequate outlets are available. Special blinding material helps to keep sand from filling subsurface drains. Land smoothing helps to prevent ponding. A system of conservation tillage that leaves all or part of the crop residue on the surface increases the rate of water infiltration and helps to control soil blowing.

This soil is well suited to grasses, such as orchardgrass, and some legumes, such as red clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of the wetness and frost heaving. The suitability for legumes depends on completeness of drainage. A subsurface drainage system can lower the water table if adequate outlets are available. Overgrazing or grazing when the soil is wet results in surface compaction and poor tilth. Proper stocking rates, pasture rotation, and timely grazing help to keep the pasture in good condition.

A few small areas support native hardwoods. This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

This soil is severely limited as a site for dwellings because of the wetness. Installing subsurface drains at the base of footings and diverting surface water away from the houses by proper grading and landscaping help to overcome the wetness. The soil is severely limited as a site for local roads and streets because of frost action. Providing adequate side ditches and culverts along roads and replacing or strengthening the base with better suited material help to prevent the damage caused by frost action. The soil is severely limited as a site for septic tank absorption fields because of the wetness. Elevating the absorption field with suitable fill material helps to overcome the wetness.

The land capability classification is IIw. The woodland ordination symbol is 5A.

Bb—Bartle silt loam. This nearly level, deep, somewhat poorly drained soil is on ridgetops on dissected old alluvial terraces. Areas are generally long and narrow and are between draws. They are 5 to 20 acres in size.

In a typical profile, the surface layer is dark grayish brown silt loam about 4 inches thick. The subsurface layer is light brownish gray, mottled silt loam about 4 inches thick. The subsoil is about 44 inches thick. The upper part is pale brown and light brownish gray, mottled, friable silt loam, and the lower part is a fragipan of light brownish gray, mottled, firm and brittle silt loam and silty clay loam. The substratum to a depth of about 60 inches is gray, mottled, stratified silty clay loam and silt loam. In some small areas along the edge of the unit, the soil is gently sloping.

Included with this soil in mapping are areas of the moderately well drained, nearly level Pekin soils on ridgetops and side slopes. These soils make up about 5 to 10 percent of the map unit.

The Bartle soil has a moderate available water capacity and is very slowly permeable. A perched water table is at a depth of 1 to 2 feet in the winter and early spring. Runoff is slow. The organic matter content is moderate. The fragipan restricts water movement and root growth. The surface layer is friable and can be easily tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for pasture and hay. Some are used for cultivated crops. Many long, narrow areas between the draws are used as woodland.

If drained, this soil is well suited to corn, soybeans, and small grain. The wetness is the main management concern. The soil is wet and seepy in the spring but may become droughty in the summer. A subsurface drainage system helps to lower the water table. The very slowly permeable fragipan restricts the downward movement of water and the growth of plant roots. A system of conservation tillage that leaves all or part of the crop residue on the surface minimizes crusting and increases the rate of water infiltration.

If drained, this soil is well suited to most grasses, such as orchardgrass, and legumes, such as red clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because the fragipan restricts root growth. Wetness and overgrazing are the main management concerns. A subsurface drainage system helps to overcome the wetness. Overgrazing reduces plant density and plant hardiness and causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is the main management concern. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the wetness, this soil is severely limited as a site for dwellings. It is better suited to dwellings without basements than to dwellings with basements. Installation of subsurface drains and diversion of surface water away from the houses by proper grading and landscaping help to overcome the wetness.

Because of frost action, this soil is severely limited as a site for local roads and streets. Strengthening or replacing the base with better suited material improves the ability of the roads to support vehicular traffic. Installing surface drains along the roads helps to prevent the damage caused by frost action.

This soil is severely limited as a site for septic tank absorption fields because of the wetness and the very slow permeability. Installing subsurface drains around the perimeter of the absorption fields helps to prevent excessive wetness. Filling or mounding the absorption field with suitable material improves the ability of the field to absorb effluent.

The land capability classification is IIw. The woodland ordination symbol is 4A.

BcF—Berks-Ebal complex, 15 to 60 percent slopes. These soils occur as alternating narrow bands on breaks or side slopes and in benchlike areas in the uplands. The steep and very steep, moderately deep, well drained Berks soil is on concave breaks and side slopes, and the strongly sloping, deep, moderately well drained Ebal soil is in the benchlike areas. Slopes generally are 50 to 200 feet long in areas of the Berks soil and 30 to 150 feet long in areas of the Ebal soil. Areas are 60 to 300 acres in size. They are about 50 to 70 percent Berks soil and 20 to 35 percent Ebal soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

In a typical profile of the Berks soil, the surface layer is very dark grayish brown channery silt loam about 3 inches thick. The subsoil is about 20 inches thick. The upper part is brown, friable channery silt loam, and the lower part is yellowish brown, friable very channery loam. Fractured sandstone and shale bedrock is at a depth of about 23 inches. In some small areas sandstone bedrock is at a depth of 12 to 20 inches. In other small areas the content of sandstone fragments is 15 to 35 percent in the solum and on the surface. In some places the soil formed mostly in limestone residuum. In other places, the subsoil is clay loam or silty clay loam and bedrock is at a depth of more than 40 inches. In some areas the slope is more than 60 percent.

In a typical profile of the Ebal soil, the surface layer is very dark grayish brown silt loam about 3 inches thick. The subsurface layer is yellowish brown silt loam about 4 inches thick. The subsoil is about 33 inches thick. The upper part is yellowish brown, friable channery silt loam and silty clay loam. The lower part is yellowish brown, mottled, firm and very firm channery silty clay loam and silty clay. The upper part the substratum is brownish yellow, mottled silty clay. The lower part to a depth of about 60 inches is soft shale.

Included with these soils in mapping are narrow, elongated strips of the somewhat poorly drained Stendal and well drained Piankeshaw soils along drainageways at the bottom of draws. Also included are a few areas of rock outcrops and bedrock escarpments and a few small areas of the well drained, gently sloping Zanesville and Wellston soils on the upper part of slopes and on narrow ridgetops between draws. Included areas make up about 8 to 15 percent of the map unit.

The available water capacity is low in the Berks soil and moderate in the Ebal soil. The Berks soil is moderately permeable or moderately rapidly permeable, and the Ebal soil is very slowly permeable. The Ebal soil has a perched seasonal high water table at a depth of 3 to 6 feet. Runoff is very rapid on breaks and side slopes and rapid in benchlike areas. The organic matter content is moderate in the surface layer of both soils.

Most areas of these soils are wooded. A few of the less sloping areas are used for pasture.

Because of a severe erosion hazard and the slope, these soils are generally unsuited to cultivated crops and to grasses and legumes for hay or pasture. The steep and very steep slope severely hinders the use of farm machinery. Grazing should not be permitted in wooded areas because it increases the susceptibility to erosion.

The Berks soil is fairly well suited to trees, and the Ebal soil is well suited. The trees are mainly native hardwoods. Oaks are dominant in the stands. The main management concerns are erosion, the equipment limitation, and seedling mortality. Erosion is a hazard if the vegetative cover is removed. Because of this hazard, logging roads, skid trails, and landings should be established on gentle grades and water should be removed by water bars, culverts, and drop structures. The use of planting and logging equipment is restricted by the slope. Slopes are short, and the equipment is operated mainly on adjacent ridgetops and bottom land or in the benchlike areas. Operating crawler or rubber-tired tractors is hazardous because of the slope. Special logging methods, such as yarding the logs uphill with a cable, may be necessary. Seedlings survive and grow well if competing vegetation is controlled by proper site preparation or by spraying, cutting, or girdling. Because of seedling mortality, special containerized stock and overstocking are needed.

Because of the slope, these soils are severely limited as sites for dwellings and for local roads. The Ebal soil also is severely limited as a site for dwellings and roads because of the shrink-swell potential. An alternative site should be selected. Houses and roads can commonly be located on the adjacent ridgetops. Dwellings should be designed so that they conform to the natural slope of the land. Foundations, footings, and basement walls should be designed so that they can withstand shrinking and swelling. The design should include adequate reinforcement steel in concrete foundations, sand and gravel backfill, foundation drains, and expansion joints in all concrete. Excavations for basements, foundations, and underground utilities are limited by bedrock. Runoff and erosion can be controlled by leaving as much of the natural forest vegetation on the site as possible.

The Berks soil is severely limited as a site for septic tank absorption fields because of the slope and the depth to bedrock. The Ebal soil is generally unsuitable as a site for these fields because of the very slow permeability. An alternative site should be selected.

The land capability classification of the Berks soil is VIIe, and that of the Ebal soil is IVe. The woodland ordination symbol of the Berks soil is 4F, and that of the Ebal soil is 4R.

BfG—Berks-Rock outcrop complex, 45 to 70 percent slopes. This map unit is in the uplands. It is on breaks to bottom land and in draws. The well drained Berks soil is very steep and moderately deep. Most slopes are 75 to 300 feet long. Most areas are narrow and elongated and are 10 to 50 acres in size. They are about 55 to 75 percent Berks soil and 15 to 25 percent Rock outcrop. The Berks soil and the Rock outcrop occur as areas so intricately mixed that mapping them separately is not practical.

In a typical profile of the Berks soil, the surface layer is very dark grayish brown channery loam about 3 inches thick. The subsurface layer is brown channery loam about 5 inches thick. The subsoil is yellowish brown, friable extremely channery loam about 15 inches thick. Fractured sandstone bedrock is at a depth of about 23 inches. It has brownish yellow sandy loam in cracks between fragments. In some places the sandstone bedrock is at a depth of 12 to 20 inches. In other places the surface layer is flaggy loam or stony loam.

The Rock outcrop consists mainly of sandstone bedrock exposures and large sandstone rocks. Bedrock escarpments are in some areas. In other areas limestone bedrock is exposed.

Included with this unit in mapping are narrow strips of the well drained Piankeshaw soils along drainageways in draws. Also included are the moderately well drained Ebal soils in some narrow, benchlike areas. Included soils make up about 10 to 20 percent of the map unit.

The Berks soil has a low available water capacity and is moderately permeable or moderately rapidly permeable. Runoff is very rapid. The organic matter content is moderate in the surface layer.

Nearly all areas are used for woodland. Because of the slope and the exposed bedrock, this map unit is generally unsuited to cultivated crops and to grasses and legumes for hay and pasture.

The Berks soil is poorly suited to trees. The equipment limitation, the hazard of erosion, and seedling mortality are the main management concerns. Since ordinary crawler tractors and rubber-tired skidders cannot be safely operated on these slopes, special logging methods, such as yarding logs uphill with a cable, may be necessary. Logging roads, skid trails, and landings commonly can be located on the adjacent ridgetops and bottom land. Seedlings survive and grow well if competing vegetation is controlled by proper site preparation or by spraying, cutting, or girdling. Because of seedling mortality, special containerized stock and overstocking are needed.

Because of the slope and the depth to bedrock, this unit is generally unsuitable as a site for dwellings, septic tank absorption fields, and local roads.

The land capability classification of the Berks soil is VIIe, and the woodland ordination symbol is 4F. The Rock outcrop is not assigned to interpretive groups.

BlE—Bloomfield sand, 15 to 25 percent slopes. This strongly sloping or moderately steep, deep, somewhat excessively drained soil is on knolls or in draws on terraces and uplands. Slopes are generally 30 to 100 feet long. Areas are irregularly shaped. Most range from 5 to 30 acres in size.

In a typical profile, the surface layer is brown sand about 9 inches thick. The subsurface layer is dark yellowish brown and yellowish brown sand about 22 inches thick. The next 29 inches is brown and yellowish brown, very friable loamy sand and sand. The loamy sand occurs as bands that total about 7 inches thick. The substratum to a depth of about 80 inches is brown sand. In places the subsoil is mostly sandy loam. In some areas the slope is more than 25 or less than 15 percent.

Included with this soil in mapping are small areas of the somewhat poorly drained Roby soils in drainageways. These soils make up about 2 to 5 percent of the map unit.

The Bloomfield soil has a low available water capacity and is moderately rapidly permeable or rapidly permeable. Runoff is medium or rapid. The organic matter content is moderate in the surface layer. This soil can be easily tilled when moist. When dry, however, it is loose and traction is poor.

Most areas of this soil are used for grasses and legumes for hay and pasture. A few are used for cultivated crops or are wooded. This soil is generally unsuited to cultivated crops because of the slope and the hazard of erosion.

This soil is fairly well suited to grasses and legumes for pasture. It is poorly suited to hay. A cover of pasture plants helps to control erosion and soil blowing. Proper stocking rates, pasture rotation, and timely grazing help to keep the pasture in good condition.

This soil is fairly well suited to trees. Erosion is a moderate hazard if the vegetative cover is disturbed. The equipment limitation and seedling mortality also are management concerns. The slope limits the use of planting and logging equipment. Locating logging roads, skid trails, and landings on gentle slopes helps to control erosion. Because of seedling mortality, special containerized planting stock and overstocking are needed.

Because of the slope, this soil is generally unsuitable as a site for buildings and sanitary facilities. Although the soil readily absorbs septic tank effluent, pollution of ground water supplies is a hazard because of a poor filtering capacity. The soil is severely limited as a site for local roads because of the slope. The roads should be designed so that they conform to the natural slope of the land. Cutting and filling are generally needed. Areas disturbed during construction should be vegetated as soon as possible.

The land capability classification is VIe. The woodland ordination symbol is 4R.

BIG—Bloomfield sand, 35 to 60 percent slopes. This very steep, deep, somewhat excessively drained soil is on breaks to bottom land and in draws on uplands and terraces. Slopes are 50 to 100 feet long. Areas are generally narrow and elongated. Most range from 5 to 30 acres in size.

In a typical profile, the surface layer is very dark grayish brown sand about 3 inches thick. The subsurface layer is yellowish brown sand about 19 inches thick. The next 38 inches is yellowish brown, very friable loamy sand and dark brown loamy sand. The loamy sand occurs as bands and masses that total about 10 inches thick. The substratum to a depth of about 80 inches is yellowish brown sand. In places silt loam, loam, or clay loam is between depths of 40 and 80 inches. In a few areas sandstone and shale bedrock is at a depth of 40 to 80 inches. In some small areas the slope is more than 60 percent. In a few areas on the top of ridges, it is less than 35 percent.

Included with this soil in mapping are a few small areas of the well drained Princeton soils on narrow breaks and in draws. Also included are some narrow, gently sloping ridgetops between draws and areas where sandstone crops out in some of the draws. Included areas make up about 5 to 10 percent of the map unit.

The Bloomfield soil has a low available water capacity and is moderately rapidly permeable or rapidly permeable. Runoff is rapid. The organic matter content is moderate in the surface layer.

Most areas of this soil are wooded. A few are pastured.

This soil is generally unsuited to cultivated crops because of the hazards of runoff and erosion. It also is generally unsuited to grasses and legumes for hay and pasture. The very steep slope severely hinders the use of tillage and harvesting machinery.

This soil is fairly well suited to trees. The erosion hazard, the equipment limitation, and seedling mortality are the main management concerns. A cover of woody vegetation is effective in controlling erosion. Ordinary crawler tractors and rubber-tired skidders cannot be operated safely on these slopes. Special logging methods, such as yarding the logs uphill with a cable, may be needed. Logging roads commonly can be located on ridgetops. Because of seedling mortality, special containerized planting stock and overstocking are needed. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the slope, this soil is generally unsuitable as a site for dwellings. Some of the included areas on narrow ridgetops between the draws are well suited to buildings. The soil is severely limited as a site for local roads because of the slope. Extensive cutting and filling are needed to overcome the slope. The soil is severely limited as a site for septic tank absorption fields because of the slope and a poor filtering capacity. Although the effluent is readily absorbed by the soil, pollution of ground water supplies is a hazard. The less sloping adjacent soils commonly can be used as sites for septic tank absorption fields.

The land capability classification is VIIe. The woodland ordination symbol is 4R.

Bo—Bonnie silt loam, frequently flooded. This nearly level, deep, poorly drained and very poorly drained soil is on broad bottom land. It is subject to ponding and flooding. The flooding is generally of brief duration and occurs mainly in spring and summer. Areas are irregularly shaped and are 80 to 400 acres in size.

In a typical profile, the surface layer is dark grayish brown silt loam about 8 inches thick. The substratum to a depth of about 60 inches is light brownish gray, mottled, friable silt loam. In places the substratum has strata of fine sandy loam below a depth of 48 inches. In some areas the soil is somewhat poorly drained. In other areas it is only rarely flooded.

This soil has a high available water capacity and is moderately slowly permeable. The water table is near or slightly above the surface in the winter and early spring. Runoff is very slow or ponded. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to puddle and crust after heavy rains.

Most areas of this soil are used for cultivated crops. A few are used for pasture or are wooded.

This soil is fairly well suited to corn, soybeans, and grain sorghum. Most areas have been drained so that crops can be grown. In some years replanting is needed because flooding has destroyed stands. Dikes and levees generally are not used along small streams since most bottoms are narrow; however, dikes and levees can help to prevent flooding on the broader bottoms. The wetness is a limitation, and a drainage system is needed. A subsurface drainage system can lower the water table if adequate outlets are available. In places, outlets are hard to locate and surface drains are needed. Land smoothing and shallow surface drains help to remove excess surface water. A system of conservation tillage that leaves all or part of the crop residue on the surface, cover crops, and green manure crops help to increase or maintain the organic matter content and good tilth. Minimizing tillage helps to maintain good tilth.

This soil is well suited to grasses, such as orchardgrass, and some legumes, such as red clover, for hay and pasture. It is not well suited to deep-rooted legumes, such as alfalfa, because of the wetness, frost heaving, and the flooding. Overgrazing or trampling by livestock when the soil is wet results in surface compaction and poor tilth. Proper stocking rates, pasture rotation, and timely grazing help to keep the pasture in good condition. Scour damage often results when livestock damage the vegetative cover on streambanks. A permanent cover of grasses, shrubs, and trees helps to prevent this damage.

This soil is fairly well suited to trees. Many areas, particularly those on narrow bottoms that are adjacent to steep or very steep soils, are used for woodland. Plant competition, the equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Trees survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling. Seasonal wetness may hinder planting and harvesting. Equipment should be used only during dry periods or when the ground is frozen. The wetness restricts root growth. Species that can withstand wet conditions should be favored in timber stands. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced.

This soil is generally unsuitable as a site for dwellings and sanitary facilities because of the flooding and the ponding. It is severely limited as a site for local roads because of the flooding, the ponding, frost action, and low strength. Replacing the layers that have low strength with suitable soil material, constructing the roads on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by flooding and frost action and help to overcome the low strength.

The land capability classification is IIIw. The woodland ordination symbol is 5W.

Br—Booker clay. This nearly level, deep, very poorly drained soil is in depressions on broad lake plains. It is subject to ponding by runoff from the higher lying adjacent areas and by backwater from Black Creek when the White River floods. This unit occurs as one irregularly shaped area about 3,000 acres in size.

In a typical profile, the surface layer is very dark gray clay about 6 inches thick. The subsurface layer also is very dark gray clay about 6 inches thick. The subsoil is gray and dark gray, mottled, very firm, very sticky clay about 40 inches thick. The substratum to a depth of about 60 inches is dark gray, mottled clay. In some areas the soil contains less clay. In other areas it is silty clay loam or silty clay throughout.

This soil has a moderate available water capacity and is very slowly permeable. The water table is often at or slightly above the surface in winter and early spring. Runoff is very slow or ponded. The organic matter content is high in the surface layer. This layer is very sticky when wet and is very hard and cloddy when dry. If plowed when too wet or dry, the soil is difficult to work.

Nearly all areas are used for cultivated crops. If drained, this soil is fairly well suited to corn and soybeans. The wetness is a serious limitation. Pumping is generally necessary to remove ponded surface water when outlets are blocked by backwater from the White River. Levees are used in an attempt to keep the backwater from covering this soil. A drainage system has been established in most areas so that crops can be grown, but additional drainage measures are needed in many areas. Because of the restricted permeability, subsurface drains should be closely spaced. Land smoothing and shallow surface drains help to remove excess surface water. Returning crop residue to the soil and minimizing tillage improve tilth and help to maintain the organic matter content. Winter small grain crops can be damaged by ponding in the winter and early spring. Seedbeds are difficult to prepare. Fall plowing is generally beneficial.

This soil is well suited to grasses and some legumes for hay and pasture. It is unsuited to deep-rooted legumes, such as alfalfa. The suitability for legumes is restricted by the seasonal wetness. A drainage system has been established in most areas, but additional drainage measures are needed in many areas. Pumping is generally necessary to remove ponded surface water when outlets are blocked by backwater from the White River. Levees are used in an attempt to keep the backwater from covering this soil. Grazing when the soil is wet damages the sod and reduces forage yields. Timely grazing and restricted use during wet periods help to keep the pasture in good condition.

This soil is fairly well suited to trees. The equipment limitation is severe because of the wetness. Plant competition, seedling mortality, and the windthrow hazard also are severe. Equipment should be used only during dry periods or when the ground is frozen. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling. Because of seedling mortality, overstocking is needed. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced.

This soil is generally unsuitable as a site for dwellings because of the ponding and the shrink-swell potential and as a site for septic tank absorption fields because of the ponding and the very slow permeability. An alternative site should be selected. The soil is severely limited as a site for local roads because of the ponding, the shrink-swell potential, and low strength. A drainage system along the roads helps to lower the water table. Elevating the roadbed helps to prevent the damage caused by ponding. Strengthening or replacing the base with better suited material helps to overcome the low strength.

The land capability classification is IIIw. The woodland ordination symbol is 4W.

Bs—Booker mucky clay. This nearly level, deep, very poorly drained soil is in depressions on broad lake plains. It is subject to ponding by runoff from the higher lying adjacent soils. Areas are irregularly shaped. One area is about 2,000 acres in size. The rest are 20 to 40 acres in size.

In a typical profile, the surface layer is black mucky clay about 7 inches thick. The subsurface layer also is black mucky clay. It is about 5 inches thick. The subsoil is about 43 inches thick. The upper part is very dark gray and dark gray, mottled, very firm and very sticky clay. The lower part is gray and dark gray, mottled, firm and sticky clay. The substratum to a depth of 60 inches is olive gray, mottled clay. In some small areas the surface layer is silty clay or clay. In places the soil is silty clay loam throughout.

This soil has a moderate available water capacity and is very slowly permeable. The water table is near or slightly above the surface in the winter and early spring. Runoff is very slow or ponded. The organic matter content is very high in the surface layer.

Nearly all areas are used for cultivated crops. If drained, this soil is fairly well suited to corn and soybeans. The wetness is a serious limitation. A drainage system has been established in most areas, but additional drainage measures are needed in many areas. Because of the restricted permeability, subsurface drains should be closely spaced. Land smoothing and shallow surface drains help to remove excess surface water. Returning crop residue to the soil and minimizing tillage improve tilth. Winter grain crops can be damaged by ponding in the winter and early spring. The depth of plowing should be carefully regulated to keep the sticky subsoil from being mixed with the plow layer. The soil becomes hard and cloddy if worked when wet.

This soil is well suited to grasses and some legumes for hay and pasture. It is not suited to deep-rooted legumes, such as alfalfa. The suitability for legumes is restricted by the seasonal wetness. Grazing when the soil is wet damages the sod and reduces forage yields. Timely grazing and restricted use during wet periods help to keep the pasture in good condition.

This soil is fairly well suited to trees. The equipment limitation is severe because of the wetness. Plant competition, seedling mortality, and the windthrow hazard also are severe. Equipment should be used only during dry periods or when the ground is frozen. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling. Because of seedling mortality, overstocking is needed.

This soil is generally unsuitable as a site for dwellings because of the ponding and the shrink-swell potential and as a site for septic tank absorption fields because of the ponding and the very slow permeability. An alternative site should be selected. The soil is severely limited as a site for local roads because of the ponding, the shrink-swell potential, and low strength. A drainage system along the roads helps to lower the water table. Elevating the roadbed helps to prevent the damage caused by ponding. Strengthening or replacing the base with better suited material improves the ability of the roads to support vehicular traffic.

The land capability classification is IIIw. The woodland ordination symbol is 4W.

CcE2—Chetwynd silt loam, 18 to 25 percent slopes, eroded. This moderately steep, deep, well drained soil is in the uplands. It is on concave slopes in draws and on breaks to bottom land. Most of the slopes are 75 to 150 feet long. Most areas in draws are narrow and elongated, but some are irregularly shaped where several draws are close together. Most areas are 5 to 30 acres in size.

In a typical profile, the surface layer is brown silt loam about 7 inches thick. The subsoil extends to a depth of about 80 inches. In sequence downward, it is brown and strong brown, friable silty clay loam; yellowish red and strong brown, friable sandy clay loam; and yellowish red, very friable sandy loam. In some small areas the slope is more than 25 or less than 18 percent. In some areas on the lower part of the slopes, the soil formed in glacial till.

Included with this soil in mapping are small areas of the gently sloping, well drained Pike soils on narrow ridgetops between draws. These soils are less sandy than the Chetwynd soil. Also included is a narrow strip of the somewhat poorly drained Stendal soil along drainageways at the bottom of draws. Included soils make up about 10 to 15 percent of the map unit.

The Chetwynd soil has a high available water capacity and is moderately permeable. Runoff is very rapid. The organic matter content is moderate. The surface layer is friable and can be easily worked throughout a wide range of moisture content.

Most areas of this soil are used for pasture (fig. 4). A few are used for woodland.

Because of the slope and the hazard of erosion, this soil is generally unsuited to cultivated crops. The moderately steep slope hinders the use of farm machinery. Small grain is grown occasionally when pasture is reseeded.

This soil is fairly well suited to grasses, such as orchardgrass, and legumes, such as alfalfa, for pasture. It is poorly suited to hay. The moderately steep slope hinders the use of harvesting machinery. A cover of grasses and legumes helps to prevent excessive runoff and helps to control erosion. Overgrazing causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and timely grazing help to keep the pasture in good condition.

This soil is fairly well suited to trees. Some areas have been reforested by natural seeding or by planting. The hazard of erosion, the equipment limitation, and plant competition are the main management concerns. Properly managing the ground cover, building logging roads on the contour, and using equipment only when the soil is dry and firm help to control erosion. Seedlings

Figure 4.—A pastured area of Chetwynd silt loam, 18 to 25 percent slopes, eroded.

survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the slope, this soil is generally unsuitable as a site for buildings and sanitary facilities and is severely limited as a site for local roads. Constructing local roads and streets on the contour, land shaping, and installing retaining walls help to overcome the slope.

The land capability classification is VIe. The woodland ordination symbol is 7R.

CcF—Chetwynd silt loam, 25 to 60 percent slopes. This steep and very steep, deep, well drained soil is in the uplands. It is on concave slopes in draws and on breaks to bottom land. Most slopes are 50 to 150 feet long. Most areas in draws are narrow and elongated, but some are irregularly shaped where several draws are close together. Areas generally are 20 to 80 acres in size.

In a typical profile, the surface layer is dark brown silt loam about 3 inches thick. The subsurface layer is brown silt loam about 2 inches thick. The subsoil extends to a depth of about 80 inches. In sequence downward, it is brown, friable loam; strong brown, friable sandy clay loam and sandy loam; yellowish red and reddish brown, friable sandy loam; and strong brown, friable sandy loam. In some small areas the slope is more than 60 or less than 25 percent. In some areas on the lower part of the slopes, the soil formed in glacial till.

Included with this soil in mapping are narrow strips of the well drained Parke and Pike soils on ridgetops between draws and a narrow strip of the somewhat poorly drained Stendal soils along drainageways at the bottom of draws. Parke and Pike soils are less sandy than the Chetwynd soil. Also included, east of the White River, are areas where sandstone bedrock is exposed at the bottom of draws. Included areas make up about 10 to 15 percent of the map unit.

The Chetwynd soil has a high available water capacity and is moderately permeable. Runoff is very rapid. The organic matter content is moderate in the surface layer.

Nearly all areas of this soil are used for woodland. Small parts of a few areas are pastured.

This soil is generally unsuited to cultivated crops and to grasses and legumes for hay and pasture because of the slope. The slope severely hinders the use of tillage and harvesting machinery.

This soil is fairly well suited to trees. The equipment limitation and erosion are the main management concerns. Erosion is a hazard if the vegetative cover is removed. Since ordinary crawler tractors and rubber-tired skidders cannot be operated safely on these slopes, special logging methods, such as yarding logs uphill with a cable, may be necessary. Building logging roads, skid trails, and landings on the adjacent ridgetops and bottom land helps to control erosion.

Because of the slope, this soil is generally unsuitable as a site for dwellings and sanitary facilities and is severely limited as a site for local roads. Cutting and filling are needed. Building the roads on the contour where possible and providing adequate side ditches and culverts help to prevent excessive erosion. Areas disturbed during construction should be revegetated as soon as possible.

The land capability classification is VIIe. The woodland ordination symbol is 7R.

CfC2—Cincinnati silt loam, 6 to 12 percent slopes, eroded. This moderately sloping, deep, well drained soil is in the uplands. It is on concave breaks or side slopes along drainageways and on knolls and ridges between steeply sloping draws. Slopes are mostly 75 to 150 feet long. Areas along drainageways are generally narrow and elongated and are 5 to 30 acres in size. Those on knolls are irregularly shaped and are 10 to 50 acres in size.

In a typical profile, the surface layer is yellowish brown silt loam about 8 inches thick. The subsoil extends to a depth of about 80 inches. It is yellowish brown and is mottled below a depth of about 13 inches. In sequence downward, it is friable silt loam; firm silty clay loam; a fragipan of firm and very firm, brittle silt loam; and firm silt loam and loam. In wooded areas the soil is not eroded and has the original surface layer. In some small areas the slope is more than 12 or less than 6 percent.

Included with this soil in mapping are small, narrow, elongated areas of the moderately well drained Ava soils on ridgetops and knolls and a narrow band of the somewhat poorly drained Stendal soils at the bottom of many draws. Included soils make up about 5 to 10 percent of the map unit.

The Cincinnati soil has a moderate available water capacity. It is moderately permeable above the fragipan and slowly permeable or moderately slowly permeable in the fragipan. A perched water table is at a depth of 2.5 to 4.0 feet in winter and early spring. Runoff is rapid. The fragipan restricts water movement and the growth of plant roots. The organic matter content is moderate in the surface layer. This layer is friable and can be easily worked throughout a fairly wide range in moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay or pasture. Some are wooded.

This soil is fairly well suited to corn, soybeans, and small grain. The hazard of erosion is the main management concern. A system of conservation tillage that leaves part or all of the crop residue on the surface minimizes crusting and increases the rate of water infiltration. No-till planting helps to control erosion and conserves moisture. A cropping sequence that includes close-growing crops helps to control erosion. Contour farming slows runoff. Slopes that are long and uniform can be terraced. A cover of grass helps to control erosion. Subsurface drains are often used to intercept seepage on side slopes. The fragipan limits the available water capacity. During years when rainfall is below average or poorly distributed, the soil becomes somewhat droughty and crop yields are reduced.

This soil is well suited to grasses, such as orchardgrass, and some legumes, such as alfalfa and red clover, for hay and pasture. A cover of grasses and legumes helps to control erosion. Stands of alfalfa and other deep-rooted crops are often damaged by frost heaving. The fragipan restricts root and water penetration. Overgrazing and grazing when the soil is wet are the major management concerns. They result in reduced plant density, surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is a management concern. Seedlings survive and grow well if competing vegetation is controlled by proper site preparation or by cutting, spraying, or girdling.

Because of the slope, this soil is moderately limited as a site for dwellings. Buildings should be designed so that they conform to the natural slope of the land. Land shaping and installing retaining walls help to overcome the slope. Areas disturbed during construction should be revegetated as soon as possible. The wetness is a problem on sites for dwellings with basements. Drains around footings help to lower the water table.

This soil is severely limited as a site for local roads and streets because of frost action and low strength. Replacing the layers that have low strength with suitable base material helps to prevent the damage caused by low strength and frost action.

This soil is severely limited as a site for septic tank absorption fields because of the slow or moderately slow permeability and the wetness. Filling or mounding the absorption field with suitable material improves the ability of the field to absorb the effluent. Installing perimeter drains around the absorption field helps to overcome the wetness.

The land capability classification is IIIe. The woodland ordination symbol is 4A.

CfC3—Cincinnati silt loam, 6 to 12 percent slopes, severely eroded. This moderately sloping, deep, well drained soil is in the uplands. It is on concave breaks or side slopes along drainageways and on knolls and ridges. Slopes are generally 50 to 150 feet long. Areas along drainageways are generally elongated and are 3 to 40 acres in size. Those on knolls are irregularly shaped and are 2 to 20 acres in size.

In a typical profile, the surface layer is yellowish brown silt loam about 7 inches thick. The subsoil extends to a depth of about 80 inches. It is yellowish brown. In sequence downward, it is friable silt loam; mottled, firm silty clay loam; a fragipan of mottled, firm, brittle silty clay loam and silt loam; and mottled, firm clay loam. In some small areas on the top of knolls and on narrow ridges, the soil is not severely eroded and the surface layer is mostly brown silt loam. In places the fragipan is at a depth of 12 to 18 inches. In some small areas the slope is more than 12 or less than 6 percent. In places the lower part of the subsoil and the substratum formed in sandstone and shale residuum.

Included with this soil in mapping are elongated areas of the somewhat poorly drained Stendal soils at the bottom of draws. Also included are a few gullies and some elongated, gently sloping areas of the moderately well drained Ava soils on narrow ridgetops between draws. Included soils make up about 5 to 10 percent of the map unit.

The Cincinnati soil has a moderate available water capacity. It is moderately permeable above the fragipan and moderately slowly permeable or slowly permeable in the fragipan. A perched water table is at a depth of 2.5 to 4.0 feet in winter and early spring. Runoff is rapid. The fragipan restricts water movement and the growth of roots. The organic matter content is low in the surface layer. This layer is friable when moist but becomes hard and cloddy if tilled when wet.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. Some are wooded.

This soil is poorly suited to corn, soybeans, and small grain. The hazard of erosion is the main management concern. A system of conservation tillage that leaves part or all of the crop residue on the surface minimizes excessive crusting and increases the rate of water infiltration. No-till planting helps to control erosion and conserves moisture. A cropping sequence that includes close-growing crops helps to control erosion. Contour farming slows runoff. Grassed waterways, water- and sediment-control basins, and grade stabilization structures help to prevent gullying (fig. 5). Subsurface drains are often used to intercept seepage on side slopes. The fragipan limits the available water capacity. During years when rainfall is below average or is poorly distributed, the soil becomes somewhat droughty and crop yields are reduced.

This soil is fairly well suited to grasses, such as orchardgrass, and some legumes, such as alfalfa and red clover, for hay and pasture. A cover of grasses and legumes helps to control erosion. Stands of alfalfa and other deep-rooted crops are often damaged by frost heaving. The fragipan restricts root and water penetration. Overgrazing and grazing when the soil is wet are the major management concerns. They cause reduced plant density, surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is a management concern. Seedlings survive and grow well if competing vegetation is controlled by proper site preparation or by cutting, spraying, or girdling.

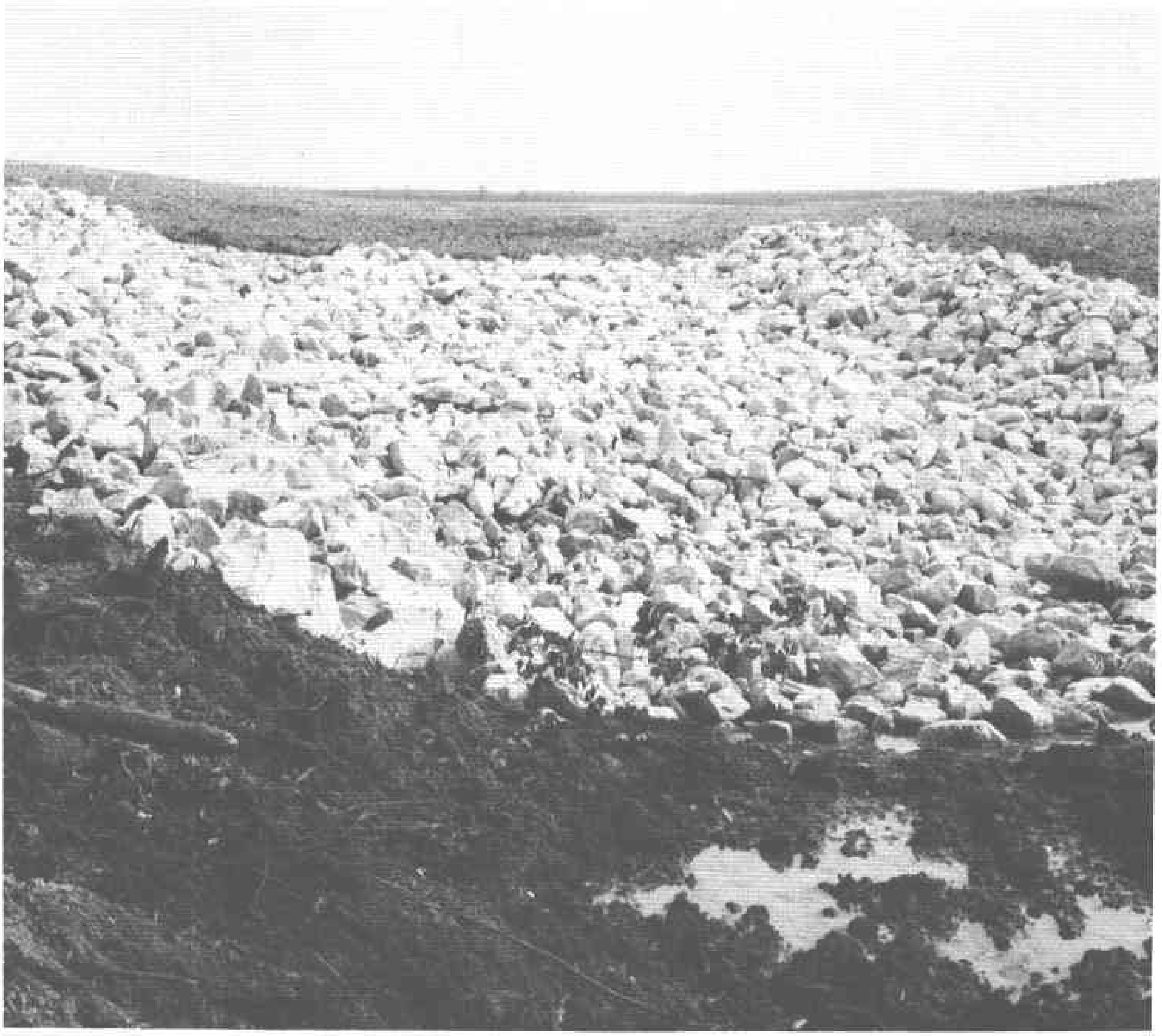


Figure 5.—A rock chute at the end of a grassed waterway in an area of Cincinnati silt loam, 6 to 12 percent slopes, severely eroded. The rock chute helps to stabilize the grade and prevent gullying where the waterway empties into a drainage ditch.

Because of the slope, this soil is moderately limited as a site for dwellings. Buildings should be designed so that they conform to the natural slope of the land. Land shaping and installing retaining walls help to overcome the slope. Areas disturbed during construction should be revegetated as soon as possible. The wetness is a problem on sites for dwellings with basements. Drains around footings help to lower the water table.

This soil is severely limited as a site for local roads and streets because of frost action and low strength. Replacing the layers that have low strength with suitable base material helps to prevent the damage caused by low strength and frost action.

This soil is severely limited as a site for septic tank absorption fields because of the slow or moderately slow permeability and the wetness. Filling or mounding the absorption field with suitable material improves the ability of the field to absorb the effluent. Installing perimeter drains around the absorption field helps to overcome the wetness.

The land capability classification is IVe. The woodland ordination symbol is 4A.

CfD2—Cincinnati silt loam, 12 to 18 percent slopes, eroded. This strongly sloping, deep, well drained soil is on the sides of draws in the uplands and on breaks between the uplands and bottom land. Slopes generally are 50 to 150 feet long. Areas are narrow and elongated and are 5 to 30 acres in size.

In a typical profile, the surface layer is brown silt loam about 3 inches thick. The subsurface layer also is brown silt loam. It is about 4 inches thick. The subsoil extends to a depth of about 80 inches. It is yellowish brown. In sequence downward, it is firm silty clay loam and silt loam; mottled, very firm, brittle silt loam; a fragipan of very firm, brittle silt loam; and mottled, firm loam. In some areas the soil has a substratum of loam below a depth of 60 inches. In some small areas the slope is less than 12 or more than 18 percent. In places the soil does not have a fragipan. In some areas, particularly those used as woodland, the soil is not eroded.

Included with this soil in mapping are elongated, gently sloping areas of the moderately well drained Ava soils on narrow ridgetops between draws. Also included are some narrow, elongated areas of the somewhat poorly drained Stendal soils at the bottom of draws. Included soils make up about 5 to 10 percent of the map unit.

The Cincinnati soil has a moderate available water capacity. It is moderately permeable above the fragipan and moderately slowly permeable or slowly permeable in the fragipan. A perched water table is at a depth of 2.5 to 4.0 feet in the winter and early spring. Runoff is very rapid. The fragipan restricts water movement and the growth of roots. The organic matter content is moderate. The surface layer is friable throughout a fairly wide range in moisture content.

Most areas of this soil are pastured or wooded. Some are used as cropland.

Because of the slope and the hazard of erosion, this soil is poorly suited to cultivated crops, such as corn and soybeans. A system of conservation tillage that leaves all or part of the crop residue on the surface helps to minimize crusting and increases the rate of water infiltration. No-till planting helps to control erosion and conserves moisture. A cropping sequence that includes close-growing crops helps to control erosion. Contour farming slows runoff. The fragipan limits the available water capacity. Grassed waterways, water- and sediment-control basins, and grade stabilization structures help to prevent gullying.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as alfalfa and red clover, for hay and pasture. A cover of grasses and legumes helps to control erosion. Overgrazing is the main management concern. It reduces plant density and plant hardiness. It also causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and deferment of grazing during wet and dry periods help to keep the pasture in good condition.

This soil is well suited to trees. The hazard of erosion, seedling mortality, the equipment limitation, and plant competition are the main management concerns. Properly managing the ground cover, building logging roads on the contour, and using equipment only when the topsoil is dry and firm help to control erosion. Seedlings survive fairly well and grow well if competing vegetation is controlled by cutting, spraying, or girdling. Because of seedling mortality, special containerized planting stock or overstocking is needed.

Because of the slope, this soil is severely limited as a site for dwellings and septic tank absorption fields. The restricted permeability and the wetness also are severe limitations on sites for septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Land shaping and installing retaining walls help to overcome the slope. Areas disturbed during construction should be revegetated as soon as possible. Land shaping and installing the distribution lines across the slope help to ensure that septic tank absorption fields function properly. Filling or mounding the absorption field with suitable material improves the ability of the field to absorb the effluent.

This soil is severely limited as a site for local roads and streets because of the slope, frost action, and low strength. Building the roads and streets on the contour and land shaping help to overcome the slope. Strengthening or replacing the base with better suited material helps to overcome low strength.

The land capability classification is IVe. The woodland ordination symbol is 4R.

CfD3—Cincinnati silt loam, 12 to 18 percent slopes, severely eroded. This strongly sloping, deep, well drained soil is on the sides of draws and on breaks between the uplands and bottom land. Slopes are 50 to 150 feet long. Areas are narrow and elongated and are 3 to 30 acres in size.

In a typical profile, the surface layer is yellowish brown silt loam about 8 inches thick. The subsoil extends to a depth of about 80 inches. It is yellowish brown. In sequence downward, it is friable silt loam; mottled, friable silt loam; mottled, very firm, brittle silt loam; a fragipan of mottled, very firm, brittle loam and clay loam; and mottled, firm clay loam and loam. In places where the soil is less eroded, the surface layer is brown silt loam. In some small areas the slope is less than 12 or more than 18 percent. In other small areas the soil does not have a fragipan.

Included with this soil in mapping are small areas of the gently sloping, moderately well drained Ava soils on narrow ridgetops between draws. Also included are some narrow, elongated areas of the somewhat poorly drained Stendal soils at the bottom of draws. Included soils make up about 5 to 10 percent of the map unit.

The Cincinnati soil has a moderate available water capacity. It is moderately permeable above the fragipan and moderately slowly permeable or slowly permeable in the fragipan. A perched water table is at a depth of 2.5 to 4.0 feet in winter and early spring. Runoff is very rapid. The organic matter content is low. The surface layer is sticky when wet and hard and cloddy when dry.

Most areas are used for hay and pasture. Some that are adjacent to less sloping soils are used for corn, soybeans, and small grain. This soil is generally unsuited to cultivated crops because of the slope and the hazard of erosion. It is poorly suited to grasses, such as orchardgrass, and legumes, such as alfalfa and red clover, for hay and is fairly well suited to pasture. A cover of grasses and legumes helps to control erosion. Overgrazing is the major management concern. It reduces plant density and plant hardiness and causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Some areas have been reforested by natural seeding or by planting. The hazard of erosion, seedling mortality, the equipment limitation, and plant competition are the main management concerns. Properly managing the ground cover, building logging roads on the contour, and using equipment only when the topsoil is dry and firm help to control erosion. Seedlings survive fairly well and grow well if competing vegetation is controlled by cutting, spraying, or girdling. Because of seedling mortality, special containerized planting stock or overstocking is needed.

Because of the slope, this soil is severely limited as a site for dwellings and septic tank absorption fields. The restricted permeability and the wetness also are severe limitations on sites for septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. Land shaping and installing retaining walls help to overcome the slope. Areas disturbed during construction should be revegetated as soon as possible. Land shaping and installing the distribution lines across the slope help to ensure that septic tank absorption fields function properly. Filling or mounding the absorption field with suitable material improves the ability of the field to absorb the effluent.

This soil is severely limited as a site for local roads and streets because of the slope, frost action, and low strength. Building the roads and streets on the contour and land shaping help to overcome the slope. Strengthening or replacing the base with better suited material helps to overcome low strength.

The land capability classification is VIe. The woodland ordination symbol is 4R.

ChC2—Cincinnati silt loam, channery substratum, 6 to 12 percent slopes, eroded. This moderately sloping, deep, well drained soil is in the uplands. It is on convex breaks or side slopes along drainageways and on knolls. Slopes are mostly 100 to 200 feet long. Areas are irregularly shaped and are 10 to 60 acres in size.

In a typical profile, the surface layer is brown silt loam about 6 inches thick. The subsoil is about 68 inches thick. In sequence downward, it is yellowish brown, friable silt loam and firm silty clay loam; yellowish brown, mottled, firm, brittle silt loam; a fragipan of brown, mottled, very firm, brittle clay loam; strong brown, mottled, firm clay loam; and strong brown, firm channery clay loam. The substratum to a depth of about 80 inches is strong brown extremely channery sandy loam. Strong brown, fractured sandstone bedrock is at a depth of about 80 inches. In some areas the soil formed entirely in glacial till and does not have sandstone fragments. In some small areas the slope is more than 12 or less than 6 percent. In severely eroded areas the surface layer is mostly yellowish brown subsoil material. In some areas, particularly those used as woodland, the soil is not eroded.

Included with this soil in mapping are narrow, elongated areas of the somewhat poorly drained Stendal soils at the bottom of draws. These soils make up about 2 percent of the map unit.

The Cincinnati soil has a moderate available water capacity. It is moderately permeable above the fragipan and moderately slowly permeable or slowly permeable in the fragipan. A perched water table is at a depth of 2.5 to 4.0 feet in the winter and early spring. Runoff is rapid. The fragipan restricts water movement and the growth of roots. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled throughout a fairly wide range in moisture content.

Many areas of this soil are used for grasses and legumes for hay and pasture. Some are used for cultivated crops. A few small areas are wooded.

This soil is fairly well suited to corn, soybeans, and small grain. The hazard of erosion is the main management concern. A system of conservation tillage that leaves part or all of the crop residue on the surface helps to prevent excessive crusting and increases the rate of water infiltration. No-till planting helps to control erosion and conserves moisture. A cropping sequence that includes close-growing crops helps to control erosion. Contour farming slows runoff. Slopes that are long and uniform can be terraced. Subsurface drains are often used to intercept seepage on side slopes. The fragipan limits the available water capacity. During years when rainfall is below average or is poorly distributed, the soil becomes somewhat droughty and crop yields are likely to be reduced.

This soil is well suited to grasses, such as orchardgrass, and some legumes, such as red clover, for hay and pasture. A cover of grasses and legumes helps to control erosion. Stands of alfalfa and other deep-rooted crops are often damaged by frost heaving. The fragipan restricts root growth and water penetration. Overgrazing and grazing when the soil is wet are the major management concerns. They cause reduced plant density, surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is a management concern. Seedlings survive and grow well if competing vegetation is controlled by proper site preparation and by cutting, spraying, or girdling.

Because of the slope, this soil is moderately limited as a site for dwellings. The wetness is a limitation on sites for dwellings with basements. Buildings should be designed so that they conform to the natural slope of the land. Land shaping and installing retaining walls help to overcome the slope. Drains around footings help to control the wetness. In places bedrock limits the depth of basement excavations and restricts the placement of underground utilities. Areas disturbed during construction should be revegetated as soon as possible.

This soil is severely limited as a site for local roads and streets because of frost action and low strength. Replacing the upper layers of the soil with suitable soil material helps to prevent the damage caused by low strength and frost action.

This soil is severely limited as a site for septic tank absorption fields because of the slow or moderately slow permeability and the wetness. The slope is a moderate limitation. Filling or mounding the absorption field with suitable material improves the ability of the field to absorb the effluent. Installing perimeter drains around the absorption field helps to overcome the wetness. Installing the absorption field on the contour helps to overcome the slope.

The land capability classification is IIIe. The woodland ordination symbol is 4A.

Cu—Cuba silt loam, frequently flooded. This nearly level, deep, well drained soil is on bottom land. Areas generally are elongated and are parallel to streams. Most are 40 to 200 acres in size.

In a typical profile, the surface layer is brown silt loam about 9 inches thick. The subsoil is brown and dark yellowish brown, friable silt loam about 16 inches thick. The substratum to a depth of about 60 inches is yellowish brown, dark yellowish brown, and light yellowish brown silt loam. In some areas adjacent to the stream channels, the subsoil is neutral. In a few areas, the subsoil is loam and the substratum is sandy loam. In places the surface layer and subsoil are sandy loam. In a few small areas on low terraces, the soil is moderately well drained and has a fragipan.

Included with this soil in mapping are narrow strips of the somewhat poorly drained Stendal soils. These soils are adjacent to the uplands. They make up about 2 to 5 percent of the map unit.

The Cuba soil has a high available water capacity and is moderately permeable. Runoff is slow. The organic matter content is moderate. The surface layer is friable and can be easily tilled throughout a fairly wide range of moisture content.

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

This soil is well suited to corn, soybeans, and grain sorghum. The frequent flooding is a hazard. In some years replanting is needed because flooding has destroyed stands. The flooding is generally of short duration. Since flooding is more likely during the winter and early spring, small grain and alfalfa are subject to damage. Dikes and levees help to prevent flooding along large streams, but they generally are not built along small streams where bottoms are narrow. A system of conservation tillage that leaves protective amounts of crop residue on the surface and cover crops increase the organic matter content and help to maintain good tilth. A permanent cover of grasses, shrubs, and trees helps to prevent scouring on streambanks.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as red clover, for hay and pasture. Alfalfa is occasionally damaged by flooding in the winter and spring. Proper stocking rates, pasture rotation, and timely deferment of grazing when the soil is wet help to keep the pasture in good condition.

This soil is well suited to trees. No major hazards or limitations affect planting or harvesting.

This soil is generally unsuitable as a site for dwellings and sanitary facilities because of the flooding. It is severely limited as a site for local roads because of the flooding and frost action. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding and frost action.

The land capability classification is IIw. The woodland ordination symbol is 8A.

EcD—Ebal-Gilpin silt loams, 12 to 18 percent slopes. These strongly sloping, deep and moderately deep, moderately well drained and well drained soils are in the uplands. They are in narrow, elongated benchlike areas adjacent to steep or very steep soils. The Ebal soil is mostly on the middle and lower parts of the benchlike areas, and the Gilpin soil is on the upper parts. Slopes are generally 150 to 300 feet long. Most areas are 5 to 25 acres in size. They are about 50 to 75 percent Ebal soil and 20 to 30 percent Gilpin soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

In a typical profile of the Ebal soil, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is about 31 inches thick. In sequence downward, it is yellowish brown, friable silt loam; brownish yellow, firm silty clay loam; brownish yellow and yellowish brown, mottled, firm silty clay; and yellowish brown, mottled, very firm clay. The upper 12 inches of the substratum is yellowish brown, mottled silty clay. The lower part to a depth of about 57 inches is mottled light olive brown and light olive gray silty clay. Soft, weathered, clayey shale is below a depth of about 57 inches. In some areas sandstone bedrock is at a depth of about 45 inches. In other areas the content of sandstone fragments is as much as 35 percent in the upper 24 inches. In some benchlike areas and on narrow ridgetops between draws, the subsoil and substratum are silt loam and sandstone bedrock is below a depth of 40 inches. In a few areas the soil has a weak fragipan. In eroded areas the surface layer is yellowish brown silt loam.

In a typical profile of the Gilpin soil, the surface layer is brown silt loam about 8 inches thick. The subsoil is about 27 inches thick. The upper part is dark yellowish brown, friable silt loam; the next part is yellowish brown, friable silty clay loam; and the lower part is yellowish brown, friable channery silty clay loam. The substratum is yellowish brown very channery silty clay loam about 13 inches thick. Mottled, strong brown and light brownish gray shale is at a depth of about 48 inches. In some areas the content of sandstone fragments in the subsoil is 35 to 60 percent. In some small areas the slope is more than 18 or less than 12 percent.

Included with these soils in mapping are areas of the well drained Haymond soils along drainageways at the bottom of draws and a few areas of the moderately well drained, gently sloping Zanesville soils on narrow ridgetops between draws. Also included are a few areas of exposed sandstone bedrock. Included areas make up about 5 to 10 percent of the map unit.

The Ebal soil has a moderate available water capacity, and the Gilpin soil has a low available water capacity. The Ebal soil is very slowly permeable, and the Gilpin soil is moderately permeable. The Ebal soil has a perched seasonal high water table at a depth of 3 to 6 feet. Runoff is rapid on both soils. The organic matter content is moderate.

Most areas of these soils are wooded. Some are pastured. A few small areas are used for cultivated crops.

Because of the slope and the hazard of erosion, these soils are poorly suited to cultivated crops, such as corn and soybeans. A system of conservation tillage that leaves all or part of the crop residue on the surface minimizes crusting and increases the rate of water infiltration. No-till planting helps to control erosion and conserves moisture. A cropping sequence that is dominated by close-growing crops helps to control erosion.

These soils are fairly well suited to grasses and legumes for hay and are well suited to pasture. A cover of grasses and legumes helps to control erosion. The growth of deep-rooted legumes may be restricted by the clayey shale or sandstone bedrock. Overgrazing and grazing when the soil is wet are the major management concerns. They reduce plant density and plant hardiness and cause surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

These soils are fairly well suited to trees. Seedling mortality and the windthrow hazard are management concerns on the Ebal soil, and erosion and the equipment limitation are management concerns on the Gilpin soil. Building logging roads, skid trails, and landings on gentle grades and removing water with water bars, culverts, and drop structures help to control erosion. The use of planting and logging equipment is limited during wet periods. Seedlings survive and grow well if competing vegetation is controlled by proper site preparation and by cutting, spraying, or girdling. When the Ebal soil is wet, roads tend to be slippery and ruts form quickly. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced. Special site preparation, such as furrowing before planting, reduces the seedling mortality rate.

Because of the slope, these soils are severely limited as sites for dwellings and for local roads and streets. Also, the Ebal soil is severely limited as a site for dwellings because of the shrink-swell potential and as a site for local roads and streets because of the shrink-swell potential and low strength. Dwellings should be designed so that they conform to the natural slope of the land. Strengthening foundations, footings, and basement walls, including adequate reinforcement steel in concrete foundations, and backfilling with coarse textured material help to prevent the structural damage caused by shrinking and swelling. Building local roads on the contour and land shaping help to overcome the slope. Strengthening or replacing the base with better suited material helps to overcome low strength.

These soils are severely limited as sites for septic tank absorption fields because of the slope of the Gilpin soil and the slope, wetness, and very slow permeability of the Ebal soil. Installing the absorption field on the contour helps to overcome the slope. Replacing the slowly permeable material in the Ebal soil with more permeable material improves the ability of the field to absorb the effluent. Curtain subsurface drains help to lower the water table in the Ebal soil and remove excess surface water.

The land capability classification is IVe. The woodland ordination symbol of the Ebal soil is 4C, and that of the Gilpin soil is 4R.

EfD2—Ebal-Wellston silt loams, 10 to 18 percent slopes, eroded. These moderately sloping and strongly sloping, deep, moderately well drained and well drained soils are in draws and on the sides of ridges in the uplands. Slopes are 200 to 400 feet long. Most areas are elongated and are 15 to 50 acres in size. They are about 45 to 60 percent Ebal soil and 30 to 40 percent Wellston soil. The two soils occur as areas so intricately mixed that mapping them separately is not practical.

In a typical profile of the Ebal soil, the surface layer is dark yellowish brown silt loam about 6 inches thick. The subsoil is about 27 inches thick. The upper part is strong brown, friable silty clay loam; the next part is yellowish brown, mottled, firm silty clay loam and silty clay; and the lower part is brownish yellow, mottled, very firm silty clay. The substratum is yellowish brown and brownish yellow, mottled silty clay about 21 inches thick. Soft, brownish yellow shale is at a depth of 54 inches.

In a typical profile of the Wellston soil, the surface layer is brown silt loam about 8 inches thick. The subsoil is yellowish brown, friable silt loam about 28 inches thick. The substratum is strong brown channery silt loam about 18 inches thick. Sandstone and shale bedrock is at a depth of about 54 inches. In some areas the soil has a fragipan. In some small areas the slope is less than 10 or more than 18 percent.

Included with these soils in mapping are small areas of the well drained Gilpin soils in draws and on side slopes, narrow strips of the well drained Haymond soils along drainageways in some draws, and small areas of the well drained or moderately well drained, gently sloping Zanesville soils on a few ridgetops. The subsoil of the Gilpin soils contains more sandstone fragments than that of the Ebal and Wellston soils. Haymond soils are more silty than the Ebal and Wellston soils. Included soils make up about 5 to 12 percent of the map unit.

The Ebal soil has a moderate available water capacity, and the Wellston soil has a high available water capacity. The Ebal soil is very slowly permeable, and the Wellston soil is moderately permeable. The Ebal soil has a perched seasonal high water table at a depth of 3 to 6 feet. The organic matter content is moderate in the surface layer of both soils. Runoff is very rapid.

Most areas of of these soils are pastured. Some are used for cultivated crops or are wooded.

Because of the slope and the hazard of erosion, these soils are poorly suited to corn and soybeans. A system of conservation tillage that leaves all or part of the crop residue on the surface minimizes crusting and increases the rate of water infiltration. No-till planting helps to control erosion and conserves moisture. Grassed waterways and diversions help to prevent gullying. A cropping sequence that is dominated by close-growing crops helps to control erosion.

These soils are fairly well suited to grasses, such as orchardgrass, and legumes, such as alfalfa and red clover, for hay and are well suited to pasture. Deep-rooted legumes, such as alfalfa, are well suited to the Wellston soil but are poorly suited to the Ebal soil. The slope and the hazard of erosion are the main management concerns. Erosion is a concern when the soils are reseeded to hay or pasture. Overgrazing also is a management concern. It reduces plant density and plant hardiness and causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and timely deferment of grazing during dry periods help to keep the pasture in good condition.

These soils are fairly well suited to trees. The slope and plant competition are management concerns on both soils. Seedling mortality and the windthrow hazard also are concerns on the Ebal soil, and the hazard of erosion and the equipment limitation are concerns on the Wellston soil. Diverting runoff away from logging roads that run up and down the hill helps to control erosion. The use of planting and logging equipment is limited during wet periods. Competing plants can be controlled by cutting, spraying, or girdling. Because of seedling mortality, special planting stock and overstocking are needed. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced.

Because of the slope, these soils are severely limited as sites for dwellings. The shrink-swell potential of the Ebal soil also is a severe limitation. Strengthening foundations, footings, and basement walls, backfilling with coarse textured material, and including reinforcement steel in concrete foundations help to prevent the damage caused by shrinking and swelling. Buildings should be designed so that they conform to the natural slope of the land. Grading also helps to overcome the slope. Graded areas should be vegetated as soon as possible. Topsoil is often stockpiled and spread over areas where vegetation is difficult to establish.

These soils are severely limited as sites for local roads and streets, mainly because of the slope of both soils and low strength and the shrink-swell potential in the Ebal soil. The roads and streets should be built on the contour. Cutting and filling may be needed but may be limited by the depth to bedrock. Strengthening or replacing the upper layers of the Ebal soil with better suited base material helps to prevent the damage caused by low strength and by shrinking and swelling.

Because of the slope, these soils are severely limited as sites for septic tank absorption fields. The Ebal soil is also limited by the very slow permeability and the wetness. Installing the absorption field on the contour helps to overcome the slope. Replacing the very slowly permeable material with more permeable material improves the ability of the field to absorb effluent. Curtain subsurface drains help to lower the water table in the Ebal soil and remove excess surface water.

The land capability classification is IVe. The woodland ordination symbol of the Ebal soil is 4C, and that of the Wellston soil is 4R.

EnA—Elston loam, 0 to 2 percent slopes. This nearly level, deep, well drained soil is on terraces near the White River. Areas are broad and irregularly shaped and are 300 to 500 acres in size.

In a typical profile, the surface layer is very dark grayish brown loam about 8 inches thick. The subsurface layer also is very dark grayish brown loam about 8 inches thick. The subsoil is about 37 inches thick. The upper part is dark brown and brown, friable loam; the next part is brown, very friable sandy loam; and the lower part is dark brown, very friable loamy sand and gravelly sandy loam. The substratum to a depth of about 60 inches is brown gravelly coarse sand. In places the surface layer is sandy loam. In a few small areas the upper part of the subsoil is clay loam or sandy clay loam. In some places the break to the bottom land has a slope of more than 2 percent. In other places the surface layer is dark brown.

Included with this soil in mapping are narrow, elongated areas of the frequently flooded Haymond soils in drainageways and shallow swales and a few small areas of Rensselaer soils in depressions. Haymond soils are less sandy than the Elston soil. Included soils make up about 2 to 5 percent of the map unit.

The Elston soil has a moderate available water capacity and is moderately rapidly permeable. Runoff is slow. The organic matter content is high in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content.

Nearly all areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain. During years when rainfall is below average or poorly distributed, crops can be damaged by drought. A system of conservation tillage that leaves all or part of the crop residue on the surface helps to maintain good tilth and conserves moisture. The soil is well suited to no-till farming. It is suited to sprinkler irrigation.

This soil is well suited to grasses and legumes for hay and pasture. A wide variety of grasses and legumes, including orchardgrass and alfalfa, grow well. Proper stocking rates, pasture rotation, and timely grazing help to keep the pasture in good condition.

This soil is well suited to trees. Walnut trees grow well. Competing vegetation can be controlled by proper site preparation or by cutting, spraying, or girdling.

This soil is suitable as a site for dwellings, septic tank absorption field, and local roads and streets.

The land capability classification is IIs. No woodland ordination symbol is assigned.

Ev—Evansville silt loam, rarely flooded. This nearly level, deep, poorly drained soil is on low terraces and lake plains. It is flooded for brief periods, mainly in winter and spring. It is often ponded by surface water from the higher lying adjacent soils. Areas are irregularly shaped and are 25 to 100 acres in size.

In a typical profile, the surface layer is dark grayish brown silt loam about 11 inches thick. The subsoil is gray, mottled, firm silty clay loam about 39 inches thick. The substratum to a depth of about 60 inches is light brownish gray, mottled silty clay loam. In some small areas, the soil is more acid and the subsoil contains more clay. In other areas the soil is more clayey throughout.

Included with this soil in mapping are small areas of the moderately well drained Pekin soils on terraces. These soils have a fragipan. They make up about 5 to 10 percent of the map unit.

The Evansville soil has a high available water capacity and is moderately permeable. The water table is often near or slightly above the surface in winter and early spring. Runoff is slow to ponded. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. A few are used for hay and pasture or are wooded.

If drained and protected from flooding, this soil is well suited to corn, soybeans, and small grain. The wetness is a limitation. A drainage system has been established in most areas, but additional drainage measures are needed in many areas. Subsurface drains help to overcome the wetness. Surface drains are needed to provide outlets for subsurface drains in many areas. Land smoothing and shallow surface drains help to remove excess surface water. A system of conservation tillage that leaves crop residue on the soil, cover crops, and green manure crops increase the organic matter content and help to maintain good tilth. Ridge tillage helps to prevent compaction.

This soil is well suited to grasses, such as orchardgrass, and some legumes, such as red clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of the wetness and frost heaving. The suitability for legumes depends on the completeness of drainage. Overgrazing or grazing when the soil is wet damages the sod, reduces plant density and forage yields, and causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is fairly well suited to trees. Plant competition and the equipment limitation are severe, and seedling mortality and the windthrow hazard are moderate. Competing vegetation can be controlled by cutting, spraying, or girdling. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced. Prolonged seasonal wetness hinders logging and planting. Equipment should be used only during dry periods or when the ground is frozen. In some areas special site preparation, such as bedding, may be necessary to achieve better seedling survival.

Because of the ponding, this soil is generally unsuitable as a site for dwellings and sanitary facilities. It is severely limited as a site for local roads because of the ponding, frost action, and low strength. Replacing the layers that have a moderate shrink-swell potential with suitable soil material helps to overcome the low strength. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding and frost action.

The land capability classification is IIw. The woodland ordination symbol is 5W.

FaB—Fairpoint silt loam, reclaimed, 2 to 6 percent slopes. This gently sloping, deep, well drained soil is in areas on uplands that formerly were surface mined for coal. It consists of partially smoothed mine spoil that has been covered mainly by 15 to 30 inches of silt loam, silty clay loam, or clay loam subsoil and substratum material. The mine spoil consists mainly of masses of shale fragments, moderately fine textured and medium textured soil material, and sandstone fragments. Slopes are undulating and generally are 200 to 400 feet long. Most areas are 100 to 600 acres in size.

In a typical profile, the surface layer is brown silt loam about 5 inches thick. The upper part of the substratum is yellowish brown, mottled, very compact silty clay loam; the next part is dark grayish brown, mottled shaly silty clay loam; and the lower part to a depth of about 60 inches is mottled yellowish brown and dark grayish brown extremely shaly silty clay loam. In a few small areas, the slope is less than 2 percent on the top of knolls or more than 6 percent on side slopes. In a few places the mine spoil is at the surface. In some small areas 30 to 50 inches of soil material overlies the mine spoil.

Included with this soil in mapping are several small unmined areas where part of the soil has been removed. Also included are some areas of soils that are slowly permeable. Included soils make up about 5 to 10 percent of the map unit.

The Fairpoint soil has a moderate available water capacity and is moderately slowly permeable. The organic matter content is low in the surface layer. Runoff is rapid. The soil is very compact.

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

This soil is fairly well suited to corn and soybeans. The hazards of erosion and drought are the main management concerns. The very compact substratum restricts root growth and limits the amount of water available to plants. In prolonged periods of low rainfall, crops are adversely affected by drought. Large sandstone fragments hinder tillage in places. No-till planting or another system of conservation tillage that leaves all or part of the crop residue on the surface helps to control erosion and conserves moisture. Slopes that are long and uniform can be terraced. Contour farming slows runoff. Grassed waterways and drop structures help to prevent gullying. If seeded in the fall, small grain can make good use of the available water.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as alfalfa, for hay and pasture. A cover of grasses and legumes helps to control erosion. The very compact substratum restricts root growth and limits the amount of available water. In prolonged periods of low rainfall, grasses and legumes are adversely affected by drought. Overgrazing is the main management concern. It results in reduced plant density, surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and timely grazing help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is the main management concern. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the shrink-swell potential, this soil is moderately limited as a site for dwellings. Differential settling rates may occur because of variations in fill material and compaction during reclamation of the soil. Strengthening foundations, footings, and basement walls and backfilling with coarse textured material help to prevent the structural damage caused by shrinking and swelling. Excavating large stones may be difficult.

This soil is moderately limited as a site for local roads and streets because of the shrink-swell potential and frost action. Replacing the layers that have a moderate shrink-swell potential with suitable soil material helps to prevent the damage caused by shrinking and swelling and by frost action. Additional reinforcement may be needed to compensate for differential settling rates. Disturbed areas should be revegetated as soon as possible after construction.

This soil is severely limited as a site for septic tank absorption fields because of the moderately slow permeability. Replacing the soil with more permeable material improves the ability of the field to absorb the effluent.

The land capability classification is IIIs. No woodland ordination symbol is assigned.

FcC—Fairpoint shaly clay loam, 2 to 12 percent slopes. This gently sloping and moderately sloping, deep, well drained soil is in areas on uplands that formerly were surface mined for coal. It consists of partially smoothed mine spoil. The mine spoil consists mainly of masses of soft shale fragments, moderately fine textured and medium textured soil material, loamy glacial till, and sandstone fragments. Most of the sandstone fragments larger than 6 inches have been buried or removed. The soil is mostly neutral in reaction, but some spots are extremely acid and some areas are mildly alkaline. Many depressional areas have no outlet for surface drainage and contain water during part of the year. Slopes are undulating and generally are 50 to 200 feet long. Most areas are 100 to 500 acres in size.

In a typical profile, the surface layer is dark grayish brown shaly clay loam about 4 inches thick. The substratum to a depth of about 60 inches is dark grayish brown, mottled, friable very shaly clay loam. In places the slope is less than 2 or more than 12 percent. Some areas are filled with waste material from coal preparation plants. This waste material consists mostly of coal dust and fragments of shale and sandstone that are covered with a few inches of mine spoil.

Included with this soil in mapping are former sites for coal preparation and loading plants and piles of coal fragments that have been smoothed. Also included are areas where a few large sandstone fragments are on the surface and some areas that have not been mined but have been disturbed and the soil partially removed. Included soils make up about 5 to 10 percent of the map unit.

The Fairpoint soil has a moderate available water capacity and is moderately slowly permeable. Runoff is rapid. In most areas the organic matter content is low in the surface layer. This layer is friable and can be easily tilled when moist. It is somewhat sticky when wet and is hard and cloddy when dry. In some areas sandstone fragments restrict plant growth.

Most areas of this soil are used for pasture or hay. A few areas are used for cultivated crops.

This soil is poorly suited to corn and soybeans. Erosion is the main management concern. Sandstone fragments hinder tillage in some areas. These fragments can be removed. In prolonged periods of low rainfall, crops are damaged by drought. No-till planting or another system of conservation tillage that leaves all or part of the crop residue on the surface helps to control erosion and conserves moisture. Contour farming slows runoff. Slopes that are long and uniform can be terraced. Grassed waterways and drop structures help to prevent gullying. A cropping sequence that includes close-growing crops helps to control erosion.

This soil is fairly well suited to grasses and legumes for hay and is well suited to pasture. Sandstone fragments near the surface of the soil hinder tillage and harvesting in some areas. A wide variety of grasses and legumes, including orchardgrass and alfalfa, can be grown. A cover of hay and pasture plants helps to control erosion. Overgrazing is the main management concern. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is the main management concern. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the shrink-swell potential and the large stones, this soil is moderately limited as a site for dwellings. Strengthening foundations, footings, and basement walls and backfilling with coarse textured material help to prevent the structural damage caused by shrinking and swelling. Excavating large stones may be difficult. Differential settling rates may occur because of variations in fill material and compaction during reclamation of the soil.

This soil is moderately limited as a site for local roads and streets because of the shrink-swell potential and frost action. Replacing the layers that have a moderate shrink-swell potential with suitable soil material and providing suitable base material help to prevent the damage caused by shrinking and swelling and by frost action. Additional reinforcement may be needed to compensate for differential settling rates. Disturbed areas should be revegetated as soon as possible after construction.

This soil is severely limited as a site for septic tank absorption fields because of the moderately slow permeability. Replacing the soil with more permeable material improves the ability of the field to absorb the effluent.

The land capability classification is IVs. No woodland ordination symbol is assigned.

FcE—Fairpoint shaly clay loam, 18 to 35 percent slopes. This moderately steep and steep, deep, well drained soil is in areas on the uplands that formerly were surfaced mined for coal. It consists of partially smoothed mine spoil. The mine spoil consists mainly of masses of shale fragments, moderately fine textured and medium textured soil material, loamy glacial till, and sandstone fragments. The soil is mostly neutral in reaction, but some areas are extremely acid and some are mildly alkaline. Slopes are generally 50 to 200 feet long. They are mostly on breaks to narrow, elongated pits, along drainageways, and at the edge of mined areas. Many of the pits contain water. Most areas are 20 to 200 acres in size.

In a typical profile, the surface layer is dark grayish brown shaly clay loam about 3 inches thick. The substratum to a depth of about 60 inches is dark grayish brown, mottled, friable very shaly and extremely shaly clay. Parts of some breaks have slopes of 35 to 50 percent, and some narrow ridges have slopes of 6 to 18 percent.

Included with this soil in mapping are narrow, elongated pits that contain water and areas where many large sandstone fragments are on the surface. Also included are some areas that have not been mined but have been disturbed and the soil partially removed.

Included soils make up about 2 to 5 percent of the map unit.

The Fairpoint soil has a moderate available water capacity and is moderately slowly permeable. Runoff is very rapid. The organic matter content is low in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content. In places, however, sandstone fragments restrict tillage and plant growth.

Nearly all areas of this soil are used for pasture. Most areas have a good vegetative cover, but a few small, extremely acid areas are nearly bare.

Because of the slope and the hazard of erosion, this soil is generally unsuited to corn, soybeans, and small grain. It is poorly suited to grasses, such as orchardgrass, and legumes, such as alfalfa, for hay and is fairly well suited to pasture. The steep and moderately steep slopes hinder the use of tillage or harvesting machinery. A cover of grass helps to control erosion. Overgrazing results in reduced plant density and plant hardiness. Proper stocking rates and pasture rotation help to keep the pasture in good condition.

This soil is fairly well suited to trees. The hazard of erosion, the equipment limitation, and seedling mortality are management concerns. Special logging methods, such as yarding logs uphill with a cable, may be needed. Because of seedling mortality, special planting stock and overstocking are needed. Locust trees have been planted in places.

This soil is generally unsuitable as a site for dwellings and sanitary facilities because of the moderately steep and steep slopes and the hazard of slippage of large masses of earth when the slopes are excavated. The moderately slow permeability also is a severe limitation on sites for septic tank absorption fields. The soil is severely limited as a site for local roads because of the moderately steep and steep slopes and the hazard of slippage. Cutting and filling are generally needed during road construction. When the slopes are excavated, slippage of large volumes of soil can occur if the soil is saturated and has zones of weakness. Additional reinforcement may be needed to compensate for differential settling rates. Disturbed areas should be revegetated as soon as possible after construction.

The land capability classification is VIs. No woodland ordination symbol is assigned.

FcG—Fairpoint very shaly loam, 35 to 90 percent slopes. This very steep, deep, well drained soil is in the uplands. It consists of a series of narrow, elongated mounds that are mostly 15 to 40 feet high. These mounds are piles of spoil from surface mining for coal. They are mainly masses of shale, soil material, glacial till, and sandstone fragments. The spoil is mostly neutral in reaction, but some areas are extremely acid and other areas are mildly alkaline. The reaction changes abruptly within an inch or two in places. Most areas are 40 to 1,000 acres in size.

In a typical profile, the surface layer is dark grayish brown very shaly loam about 3 inches thick. The substratum to a depth of about 60 inches is brown, friable extremely shaly loam. In some small areas the soil has been partially smoothed. In some areas piles of spoil, mainly shale, carbonaceous shale, and low-grade coal, are on the surface. The spoil is from underground mines. In other areas many large sandstone fragments are on the surface. In some small areas the slope is more than 90 or less than 35 percent.

Included with this soil in mapping are narrow, elongated pits that contain water. Also included are some areas that have not been mined but formerly were sites for coal preparation and loading facilities or for coal stockpiles. These areas consist mainly of coal dust and fragments of shale and sandstone. Some small included areas have not been mined but have been disturbed and the soil partially removed. Included areas make up about 5 to 10 percent of the map unit.

The Fairpoint soil has a moderate available water capacity and is moderately slowly permeable. Runoff is very rapid. The organic matter content of the surface layer is low in recently mined areas and moderate in areas that have been heavily vegetated for many years. In most areas rock fragments restrict the development of roots and the amount of water available for plant growth. In many areas the surface is partially covered with flat coarse fragments. These fragments cause a shingle effect that results in high runoff and prevents plant growth.

Nearly all areas of this soil are used for woodland (fig. 6). Most have a dense cover of forest vegetation, but a few extremely acid or very rocky areas are nearly bare.

Because of the severe hazard of erosion and the slope, this soil is generally unsuited to corn, soybeans, and small grain. The slope severely hinders the use of tillage and harvesting machinery.

Some areas are pastured. The vegetation in these areas consists mainly of mixed trees, weeds, shrubs, and grasses. This soil is generally unsuited to grasses and legumes for hay and is poorly suited to pasture. The slope hinders the use of tillage and harvesting machinery. Pastures generally are not improved unless the spoil is partially smoothed so that farm equipment can be used.

This soil is poorly suited to trees. Pine, locust, cottonwood, and sycamore are the dominant species. The slope hinders the use of planting and logging equipment. Onsite evaluation is needed to determine the species suitable for planting and the needed management practices.

Because of soil slippage and the slope, this soil is generally unsuitable as a site for dwellings and sanitary facilities and is severely limited as a site for local roads. In addition, it is severely limited as a site for septic tank

Figure 6.—A wooded area of Fairpoint very shaly loam, 35 to 90 percent slopes, on a long, narrow ridge of mine spoil.

absorption fields because of the moderately slow permeability. Cutting and filling are necessary during the construction of roads, even when the roads are built on the contour. When the slopes are excavated, slippage of large volumes of soil can occur if the soil is saturated and has zones of weakness. The soil does not have the normal cohesiveness characteristic of natural soils; therefore, special precautions are needed to prevent slippage during road construction.

The land capability classification is VIIe. No woodland ordination symbol is assigned.

GcE2—Gilpin silt loam, 18 to 25 percent slopes, eroded. This moderately steep, moderately deep, well drained soil is on knolls and on side slopes along drainageways in the uplands. Slopes are dominantly 100 to 250 feet long. Areas generally are 5 to 40 acres in size.

In a typical profile, the surface layer is brown silt loam about 5 inches thick. The subsoil is about 21 inches thick. The upper part is yellowish brown, friable silt loam, and the lower part is strong brown, friable silt loam and channery loam. The substratum is strong brown extremely channery loam about 7 inches thick. Fractured sandstone bedrock is at a depth of about 33 inches. In some places a very channery substratum extends to a depth of 50 inches. In other places the subsoil is loamy glacial till and has many sandstone fragments. In some small areas the slope is less than 18 or more than 25 percent. In some areas the subsoil is mostly silt loam. In other areas the soil has a lower content of sandstone fragments and a higher content of clay.

Included with this soil in mapping are small, elongated areas of the somewhat poorly drained Stendal soils along drainageways at the bottom of draws. Also included are a few gullies, areas where a few large sandstone fragments are on the surface and within the soil, and a few areas of the well drained, gently sloping Zanesville soils on narrow ridgetops. Included areas make up about 10 to 15 percent of the map unit.

The Gilpin soil has a low available water capacity and is moderately permeable. Runoff is very rapid. The organic matter content is moderate in the surface layer. If worked when wet, this soil is sticky and becomes hard and cloddy when dry.

Most areas of this soil are used for pasture. Some formerly cropped or pastured areas have reverted back to woodland or have been left idle.

Because of the slope and the hazard of erosion, this soil is generally unsuited to cultivated crops. It is fairly well suited to grasses, such as orchardgrass, and legumes, such as alfalfa, for pasture. A cover of grasses and legumes helps to control erosion. The slope hinders the use of farm machinery. Overgrazing is the main management concern. It reduces plant density and plant hardiness and causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates and pasture rotation help to keep the pasture in good condition.

This soil is fairly well suited to trees. The hazard of erosion, the equipment limitation, and plant competition are the main management concerns. Because of the hazard of erosion, logging roads, skid trails, and landings should be established on gentle grades and water should be removed by water bars, culverts, and drop structures. The use of planting or logging equipment is limited during wet periods. Seedlings survive and grow well if competing vegetation is controlled by proper site preparation or by cutting, spraying, or girdling.

Because of the slope, this soil is generally unsuitable as a site for dwellings and sanitary facilities and is severely limited as a site for local roads. The depth to bedrock limits excavations for septic tank absorption fields, basements, and underground utilities. It also is a concern when road cuts are made. Local roads and streets should be built on the contour. Also, land shaping is needed.

The land capability classification is VIe. The woodland ordination symbol is 4R.

GfF—Gilpin-Berks complex, 30 to 60 percent slopes. These steep and very steep, moderately deep, well drained soils are in the uplands. They are in draws and on breaks to bottom land. Most slopes are 75 to 250 feet long. Most areas are irregularly shaped and are 15 to 100 acres in size. They are about 45 to 60 percent Gilpin soil and 25 to 40 percent Berks soil. The two soils occur as areas so intricately mixed that mapping them separately is not practical.

In a typical profile of the Gilpin soil, the surface layer is very dark grayish brown silt loam about 4 inches thick. The subsurface layer is brown silt loam about 4 inches thick. The subsoil is about 21 inches thick. The upper part is yellowish brown and strong brown, friable loam, and the lower part is strong brown, friable channery loam. The substratum is strong brown extremely channery loam about 5 inches thick. Fractured sandstone bedrock is at a depth of about 34 inches. It has pale brown sandy loam in cracks between fragments. In places the substratum is channery loam that extends to bedrock at a depth of 40 to 60 inches. In some small areas the slope is less than 30 percent. In places the subsoil is mostly silt loam.

In a typical profile of the Berks soil, the surface layer is very dark grayish brown loam about 3 inches thick. The subsurface layer is brown loam about 2 inches thick. The subsoil is about 23 inches thick. It is yellowish brown and friable. The upper part is loam and channery loam, and the lower part is very channery loam. The substratum is yellowish brown extremely channery loam. Fractured sandstone bedrock is at a depth of about 33 inches. It has brownish yellow sandy loam in cracks between fragments. In places the substratum is very channery loam that extends to bedrock at a depth of 40 to 54 inches. In some small areas the slope is more than 60 percent.

Included with these soils in mapping are narrow strips of the well drained Piankeshaw soils along drainageways in draws; some areas of the well drained, deep, moderately sloping and strongly sloping Wellston soils on the upper and lower parts of slopes and on narrow ridgetops between draws; some small, narrow areas of Ebal soils on the sides of draws; and some small areas of the well drained, gently sloping and moderately sloping Zanesville soils on narrow ridgetops. Wellston soils are more silty than the Gilpin and Berks soils, and Ebal soils are more clayey. Included soils make up about 10 to 20 percent of the map unit.

The available water capacity is low in the Gilpin and Berks soils. The Gilpin soil is moderately permeable, and the Berks soil is moderately permeable or moderately rapidly permeable. Runoff is very rapid on both soils. The organic matter content is moderate in the surface layer.

Nearly all areas are used for woodland. These soils are generally unsuited to cultivated crops because of the hazard of erosion and the slope. The slope severely hinders the use of farm machinery.

These soils are generally unsuited to grasses and legumes for hay and pasture. The slope severely hinders the use of tillage and harvesting machinery. Wooded areas should not be grazed.

These soils are fairly well suited to trees. The trees in the stands are mainly native hardwoods. Oaks are dominant. The main management concerns are erosion and the slope. Erosion is a hazard if the vegetative cover is removed. Because of this hazard, logging roads, skid trails, and landings should be established on gentle grades and water should be removed by water bars, culverts, and drop structures. The use of planting and logging equipment is restricted by the slope. Slopes are short, and the equipment is operated mainly on the adjacent ridgetops or bottom land. Operating crawler or rubber-tired tractors is hazardous because of the slope. Special logging methods, such as yarding the logs uphill with a cable, may be necessary.

These soils are generally unsuitable as sites for dwellings, sanitary facilities, and local roads because of the slope and the depth to bedrock.

The land capability classification is VIIe. The woodland ordination symbol of the Gilpin soil is 4R, and that of the Berks soil is 4F.

GgE—Gilpin-Ebal silt loams, 18 to 30 percent slopes. The moderately steep and steep soils are in draws and on the sides of knolls and ridges in the uplands. The moderately deep, well drained Gilpin soil is on concave breaks and side slopes. The deep, moderately well drained Ebal soil is in convex benchlike areas. Slopes generally are 50 to 200 feet long in areas of the Gilpin soil and 100 to 200 feet long in areas of the Ebal soil. Areas are mainly narrow and elongated and are 50 to 300 acres in size. They are about 40 to 60 percent Gilpin soil and 30 to 45 percent Ebal soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

In a typical profile of the Gilpin soil, the surface layer is very dark grayish brown silt loam about 2 inches thick. The subsurface layer is brown silt loam about 3 inches thick. The subsoil is about 23 inches thick. The upper part is yellowish brown, friable silt loam, and the lower part is strong brown, friable channery silty clay loam. The substratum is strong brown channery loam about 14 inches thick. Sandstone and shale bedrock is at a depth of about 42 inches. In places the channery loam substratum extends to bedrock at a depth of 40 to 60 inches. In a few places, the subsoil is silty clay and the bedrock is limestone. In some areas the subsoil is mostly silt loam to a depth of 40 inches or more. In other areas the slope is more than 30 percent.

In a typical profile of the Ebal soil, the surface layer is very dark grayish brown silt loam about 2 inches thick. The subsurface layer is brown silt loam about 3 inches thick. The subsoil is about 33 inches thick. The upper part is yellowish brown and strong brown, friable silt loam and silty clay loam, and the lower part is yellowish red, mottled, very firm silty clay. The substratum to a depth of about 60 inches is strong brown, mottled clay. In some benchlike areas the slope is less than 15 percent.

Included with these soils in mapping are moderately sloping areas of the well drained Wellston and Zanesville soils on side slopes and on narrow ridgetops between draws; narrow strips of the somewhat poorly drained Stendal soils along drainageways in draws; and some small areas of the moderately well drained, gently sloping Zanesville soils on narrow ridgetops. Included soils make up about 5 to 15 percent of the map unit.

The available water capacity is low in the Gilpin soil and moderate in the Ebal soil. The Gilpin soil is moderately permeable, and the Ebal soil is very slowly permeable. The Ebal soil has a perched seasonal high water table at a depth of 3 to 6 feet. Runoff is rapid on both soils. The organic matter content is moderate.

Most areas of these soils are used for woodland. Some formerly cropped areas have become revegetated with trees and shrubs. Some areas are pastured.

Because of the hazard of erosion and the slope, these soils are generally unsuited to corn, soybeans, and small grain. The slope hinders the use of farm machinery.

These soils are poorly suited to grasses, such as orchardgrass, and legumes, such as alfalfa and red clover, for hay and are fairly well suited to pasture. The growth of deep-rooted legumes is restricted by the depth to bedrock. Rapid runoff and erosion are the main management concerns. A permanent cover of vegetation helps to control erosion. Overgrazing is a management concern. It reduces the density and hardiness of plants. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

These soils are fairly well suited to trees. A cover of woody vegetation helps to prevent excessive runoff and erosion. The hazard of erosion, the equipment limitation, and plant competition are management concerns on both soils. Seedling mortality and the windthrow hazard are additional concerns on the Ebal soil. The slope limits the use of planting and logging equipment. Diverting runoff away from logging roads that run up and down the hill helps to control erosion. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling. Because of seedling mortality, special planting stock and overstocking are needed. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced.

These soils are generally unsuitable as sites for dwellings, local roads, and sanitary facilities because the slope is a severe limitation. The shrink-swell potential, wetness, and very slow permeability of the Ebal soil also are severe limitations.

The land capability classification is VIe. The woodland ordination symbol is 4R.

GmE—Gilpin-Wellston silt loams, 18 to 25 percent slopes. These moderately steep, well drained soils are in the uplands. They are in draws, on hillsides, and on breaks to bottom land. The moderately deep Gilpin soil is generally on the more sloping parts of the landscape. The deep Wellston soils are generally on the upper and lower parts of the slopes. Most slopes are 100 to 400 feet long. Most areas are narrow and elongated and are 50 to 300 acres in size. They are about 45 to 60 percent Gilpin soil and 25 to 40 percent Wellston soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

In a typical profile of the Gilpin soil, the surface layer is very dark grayish brown silt loam about 2 inches thick. The subsurface layer is light yellowish brown silt loam about 3 inches thick. The subsoil is about 28 inches thick. It is yellowish brown. The upper part is friable loam and clay loam, and the lower part is channery and very channery loam. The substratum is yellowish brown very channery loam about 16 inches thick. Fractured sandstone bedrock is at a depth of about 49 inches. In some small areas many sandstone fragments are on the surface. In some areas the slope is more than 25 percent.

In a typical profile of the Wellston soil, the surface layer is very dark grayish brown silt loam about 2 inches thick. The subsurface layer is brown silt loam about 3 inches thick. The subsoil is about 37 inches thick. It is yellowish brown. The upper part is friable silt loam, and the lower part is friable or firm channery loam and channery silty clay loam. The substratum is yellowish brown channery silty clay loam about 11 inches thick. Sandstone and shale bedrock is at a depth of about 53 inches. In places the bedrock is at a depth of 30 to 40 inches. In some small areas the slope is less than 18 percent. In areas where the soil formed in glacial till, the subsoil is clay loam.

Included with these soils in mapping are narrow strips of the frequently flooded, somewhat poorly drained Stendal soils along drainageways at the bottom of draws and a few areas that have bedrock outcrops, bedrock escarpments, and short, steep slopes. Also included are small, narrow areas of the moderately well drained Ebal soils in benchlike positions and some small areas of the moderately well drained, gently sloping Zanesville soils on narrow ridgetops. Ebal soils are more clayey than the Gilpin and Wellston soils. Included areas make up about 5 to 15 percent of the map unit.

The available water capacity is high in the Wellston soil and low in the Gilpin soil. Permeability is moderate in both soils. Runoff is rapid. The organic matter content is moderate in the surface layer.

Most areas are wooded. Some are pastured (fig. 7). Because of the slope and the hazard of erosion, these soils are generally unsuited to cultivated crops. They are poorly suited to grasses, such as orchardgrass, and legumes, such as alfalfa and red clover, for hay and are fairly well suited to pasture. The growth of deep-rooted legumes is restricted by the depth to bedrock. The rapid runoff and the hazard of erosion are the main management concerns. A permanent cover of vegetation helps to control erosion. Overgrazing reduces the density and hardiness of plants. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This soil is fairly well suited to trees. The trees in the stands are mainly native hardwoods. Oaks are dominant. The main management concerns are the hazard of erosion when the vegetative cover is disturbed, the equipment limitation, and plant competition. Since slopes are short, logging roads generally can be built on the adjacent ridgetops and bottom land. Seedlings survive and grow fairly well if competing vegetation is controlled by proper site preparation or by cutting, spraying, or girdling.

Because of the slope, these soils are generally unsuitable as sites for dwellings and sanitary facilities and are severely limited as sites for local roads. Houses and roads commonly can be built on the adjacent ridgetops. The roads should be built on the contour. Also, land shaping is needed. Areas disturbed during construction should be vegetated as soon as possible.

The land capability classification is VIe. The woodland ordination symbol is 4R.

HaE2—Hagerstown silt loam, 18 to 25 percent slopes, eroded. This moderately steep, deep, well drained soil is on the sides of ridges and in draws on uplands. Slopes are dominantly 200 to 400 feet long. Areas generally are 20 to 50 acres in size.

In a typical profile, the surface layer is brown silt loam about 6 inches thick. The subsoil is about 46 inches thick. The upper part is brown and yellowish red, friable silt loam and firm silty clay loam, and the lower part is yellowish red, firm silty clay. The substratum is red clay about 6 inches thick. Limestone bedrock is at a depth of about 58 inches. In some areas limestone or sandstone bedrock is at a depth of 20 to 40 inches. In some wooded areas the soil is not eroded. In places silt loam extends to a depth of 45 inches. In a few places the bedrock is sandstone. In some areas the slope is less than 18 or more than 25 percent. In other areas the soil is underlain by soft, weathered shale.

Included with this soil in mapping are severely eroded and gullied areas. In these areas limestone bedrock is within a depth of 20 inches or is exposed. Also included are areas of the well drained Haymond soils along drainageways at the bottom of draws. Included areas make up about 2 to 5 percent of the map unit.

The Hagerstown soil has a high available water capacity and is moderately permeable. Runoff is very rapid. The organic matter content is moderate in the surface layer. If worked when wet, this soil is sticky and becomes hard and cloddy when it dries.

Most areas are becoming naturally revegetated with grasses, weeds, shrubs, and trees (fig. 8). Some areas are used for pasture. This soil is generally unsuited to cultivated crops because of the slope and the hazard of erosion.

This soil is fairly well suited to grasses, such as orchardgrass, and legumes, such as alfalfa, for pasture.

Figure 7.—A pastured and wooded area of Gilpin-Wellston silt loams, 18 to 25 percent slopes, in the background. Cuba soils are on the bottom land in the foreground.

Figure 8.—An idle area of Hagerstown silt loam, 18 to 25 percent slopes, eroded, that is becoming naturally revegetated with cedar and deciduous trees.

It is poorly suited to hay because the slope hinders the use of harvesting machinery. If the soil is reseeded to pasture, erosion is a hazard. Overgrazing also is a management concern. It reduces plant density and plant hardiness and causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This soil is well suited to trees. The use of planting and logging equipment is limited by the slope. Establishing logging roads, skid trails, and landings on gentle grades and diverting runoff away from logging roads that run up and down the hill help to control erosion. During wet periods, roads tend to be slippery and ruts form quickly. Seedlings survive and grow well if competing vegetation is controlled by proper site preparation or by cutting, spraying, or girdling.

This soil is generally unsuitable as a site for dwellings and septic tank absorption fields because of the slope. It is severely limited as a site for local roads because of low strength and the slope. Building the roads on the contour helps to overcome the slope. Cutting and filling may be needed, but they may be limited by the depth to bedrock. Roads commonly can be built on the adjacent bottom land or ridgetops.

The land capability classification is VIe. The woodland ordination symbol is 5C.

Hb—Haymond silt loam, frequently flooded. This nearly level, deep, well drained soil is on broad bottom land. It is flooded for brief periods, mainly in winter and spring. Areas are typically elongated and are parallel to the adjacent sloughs. Most are 40 to 200 acres in size.

In a typical profile, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is brown and yellowish brown, friable silt loam about 31 inches thick. The substratum to a depth of about 60 inches is yellowish brown silt loam and fine sandy loam. In some areas near drainageways or sloughs, the surface layer and subsoil are loam. In some places the substratum is loamy fine sand or fine sand below a depth of 40 inches. In other places sand and gravel are below a depth of 60 inches.

Included with this soil in mapping are small areas of well drained, sandy and gravelly soils near streams, drainageways, or sloughs and narrow, elongated strips of the somewhat poorly drained Newark soils in swales and meander channels. Also included are areas of rarely flooded soils on natural levees, commonly on the highest part of the bottom land. Included soils make up about 5 to 12 percent of the map unit.

The Haymond soil has a high available water capacity and is moderately permeable. Runoff is slow. The organic matter content is moderate. The surface layer is friable and can be easily tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. A few are used for small grain, hay, pasture, or woodland.

This soil is well suited to corn and soybeans. Wheat is occasionally damaged by flooding in the winter and early spring. Replanting is occasionally needed because flooding has destroyed stands. In the frequently flooded sloughs, crops generally are severely damaged. Dikes and levees help to prevent flooding during the growing season. Applying a system of conservation tillage that leaves protective amounts of crop residue on the surface and growing winter cover crops increase the organic matter content and improve tilth.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as alfalfa and red clover, for hay and pasture. Alfalfa is damaged by flooding in the winter and spring. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is the main management concern. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

This soil is generally unsuitable as a site for dwellings and sanitary facilities and is severely limited as a site for local roads because of the flooding and frost action. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding and frost action.

The land capability classification is IIw. The woodland ordination symbol is 8A.

Hc—Haymond silt loam, rarely flooded. This nearly level, deep, well drained soil is on broad bottom land along the White River. It is protected from most floods by the McGinnis Levee. Most areas are 80 to 200 acres in size. They are typically elongated and are parallel to the adjacent sloughs.

In a typical profile, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is brown and yellowish brown, friable silt loam about 31 inches thick. The substratum to a depth of about 60 inches is yellowish brown silt loam and fine sandy loam. In some areas near drainageways and sloughs, the surface layer and subsoil are loam. In places the substratum is loamy fine sand below a depth of 40 inches.

Included with this soil in mapping are a few narrow, elongated areas of the somewhat poorly drained Newark soils in swales and meander channels. These soils make up about 2 to 5 percent of the map unit.

The Haymond soil has a high available water capacity and is moderately permeable. The organic matter content is moderate. Runoff is slow. The surface layer is friable and can be easily tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. A few are used for small grain, hay, or pasture. A few small areas adjacent to sloughs are wooded.

This soil is well suited to corn and soybeans. The rare flooding is a hazard. Crops can be damaged if floodwater overtops the levee during the growing season. Applying a system of conservation tillage that leaves protective amounts of crop residue on the surface and growing winter cover crops increase the organic matter content and improve tilth.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as alfalfa, for hay and pasture. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is the main management concern. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the flooding, this soil is generally unsuitable as a site for dwellings. It is severely limited as a site for local roads because of frost action. Providing adequate side ditches and culverts helps to prevent the damage caused by flooding and frost action. The soil is moderately limited as a site for septic tank absorption fields because it could be flooded if the levee were to fail.

The land capability classification is I. The woodland ordination symbol is 8A.

HdA—Henshaw silt loam, 1 to 3 percent slopes. This very gently sloping, deep, somewhat poorly drained soil is on slight rises on low terraces. Areas are irregularly shaped and are 2 to 20 acres in size.

In a typical profile, the surface layer is dark grayish brown silt loam about 11 inches thick. The subsoil is about 43 inches thick. The upper part is light olive brown and light yellowish brown, mottled, firm silty clay loam, and the lower part is light brownish gray, mottled, firm silt loam. The substratum to a depth of about 60 inches is light brownish gray, mottled silty clay loam. In a few small areas, the slope is less than 1 or more than 3 percent. In some small areas the surface layer and subsoil are loam.

Included with this soil in mapping are small areas of the poorly drained Patton soils in narrow depressions. Also included are small areas of soils that are loamy sand in the surface layer and in the upper part of the subsoil. These soils are near sand dunes. Included soils make up about 2 to 5 percent of the map unit.

The Henshaw soil has a high available water capacity and is moderately slowly permeable. The water table is at a depth of 1 to 2 feet during the winter and early spring. Runoff is slow. Organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. A few are used for hay or pasture or are wooded.

This soil is well suited to corn, soybeans, and small grain. The wetness is a limitation. Erosion is a hazard where slopes are 2 to 3 percent. A subsurface drainage system can lower the water table if adequate outlets are available. A system of conservation tillage that leaves all or part of the crop residue on the surface increases the rate of water infiltration and helps to control erosion.

This soil is well suited to grasses, such as orchardgrass, and some legumes, such as red clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of the wetness and frost heaving. The suitability for legumes depends on the completeness of drainage. A subsurface drainage system can lower the water table if adequate outlets are available. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This soil is well suited to trees. The windthrow hazard, the equipment limitation, and plant competition are management concerns. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced. The seasonal wetness may slightly delay harvesting or planting. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the wetness, this soil is severely limited as a site for dwellings. Drains around footings help to lower the water table. The soil is severely limited as a site for local roads and streets because of low strength and frost action. Providing an adequate drainage system along the roads and replacing or strengthening the base with better suited material help to prevent the damage caused by low strength and frost action. The soil is severely limited as a site for septic tank absorption fields because of the moderately slow permeability and the wetness. Filling or mounding the absorption field with suitable material improves the ability of the field to absorb the effluent. Installing perimeter drains around the absorption field helps to overcome the wetness.

The land capability classification is IIw. The woodland ordination symbol is 5W.

HeD2—Hickory silt loam, 12 to 18 percent slopes, eroded. This strongly sloping, deep, well drained soil is on the sides of draws in the uplands and on breaks between the uplands and bottom land. Slopes are generally 50 to 150 feet long. Areas are narrow and elongated. Most are 5 to 30 acres in size.

In a typical profile, the surface layer is brown silt loam about 9 inches thick. The subsoil extends to a depth of about 80 inches. The upper part is yellowish brown, friable silt loam and silty clay loam; the next part is yellowish brown, firm and friable clay loam; and the lower part is strong brown, firm clay loam. In wooded areas the surface layer is very dark grayish brown. In some small areas the slope is more than 18 or less than 12 percent. In some areas east of the White River, the substratum has many small sandstone fragments. In some places the subsoil and substratum are silty clay loam. In other places the soil has a fragipan.

Included with this soil in mapping are elongated areas of the somewhat poorly drained Stendal soils along drainageways at the bottom of draws. Also included are some narrow, elongated areas of the gently sloping, moderately well drained Ava and moderately sloping, well drained Cincinnati soils on ridgetops between draws. Included soils make up about 10 to 15 percent of the map unit.

The Hickory soil has a high available water capacity and is moderately permeable. Runoff is very rapid. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled.

Most areas of this soil are pastured or wooded. Some are used as cropland.

This soil is fairly well suited to corn, soybeans, and small grain. The hazards of erosion and runoff are management concerns. A cropping sequence that includes close-growing crops helps to control erosion. Contour farming helps to control erosion in areas where slopes are long and uniform. Grassed waterways, water- and sediment-control basins, and grade stabilization structures help to prevent gullying. A system of conservation tillage that leaves all or part of the crop residue on the surface minimizes crusting and increases the rate of water infiltration. No-till planting helps to control erosion and conserves moisture. Including legumes and grasses in the cropping sequence improves soil structure, fertility, and permeability.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as alfalfa, for hay and pasture. A cover of grasses and legumes helps to control runoff and erosion. Overgrazing is the main management concern. It reduces plant density and causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This soil is well suited to trees. The main management concern is plant competition. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the slope, this soil is severely limited as a site for dwellings. Buildings should be designed so that they conform to the natural slope of the land. Areas disturbed during construction should be revegetated as soon as possible. The soil is severely limited as a site for local roads and streets because of the slope and low strength. Replacing the layers that have low strength with suitable soil material and adding suitable base material help to prevent the damage caused by low strength. The soil is severely limited as a site for septic tank absorption fields because of the slope. Installing the absorption field on the contour helps to overcome the slope.

The land capability classification is IIIe. The woodland ordination symbol is 5A.

HeE—Hickory silt loam, 18 to 25 percent slopes. This moderately steep, deep, well drained soil is in the uplands. It is on concave breaks in draws and on side slopes along ridges. Most slopes are 50 to 150 feet long. Most areas are 3 to 30 acres in size and are narrow and elongated.

In a typical profile, the surface layer is very dark grayish brown silt loam about 2 inches thick. The subsurface layer is dark grayish brown silt loam about 4 inches thick. The subsoil extends to a depth of about 66 inches. The upper part is yellowish brown and strong brown, friable and firm silt loam and clay loam, and the lower part is yellowish brown, mottled, friable sandy clay loam. The substratum to a depth of about 80 inches is yellowish brown, mottled sandy clay loam. In some small areas the slope is more than 25 or less than 18 percent. In areas east of the White River, the substratum has many small sandstone fragments. In places the lower part of the subsoil and the substratum are silty clay.

Included with this soil in mapping are narrow, elongated areas of the moderately well drained Ava soils on ridgetops between draws. Also included are narrow strips of the somewhat poorly drained Stendal soils along drainageways at the bottom of draws. Included soils make up about 8 to 15 percent of the map unit.

The Hickory soil has a high available water capacity and is moderately permeable. Runoff is rapid. The organic matter content is moderate. The surface layer is friable and can be easily tilled.

Most areas of this soil are wooded or pastured. A few small areas are used as cropland.

Because of the slope and the hazard of erosion, this soil is generally unsuited to corn and soybeans. The slope hinders the use of farm machinery. When pasture is reseeded, small grain is grown as a companion crop.

This soil is fairly well suited to grasses, such as orchardgrass, and legumes, such as alfalfa, for pasture. The slope hinders the use of harvesting machinery. A cover of grasses and legumes helps to prevent excessive runoff and erosion. Overgrazing causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and timely grazing help to keep the pasture in good condition.

This soil is fairly well suited to trees. Some areas have been reforested by natural seeding or by planting. The hazard of erosion, the equipment limitation, and plant competition are the main management concerns. Properly managing the ground cover, building logging roads on the contour, and using equipment only when the topsoil is dry and firm help to control erosion. Logging roads, skid trails, and landings commonly can be built on the adjacent ridgetops. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

This soil is generally unsuitable as a site for dwellings and sanitary facilities because of the slope. It is severely limited as a site for local roads because of the slope and low strength. Constructing the roads on the contour and land shaping help to overcome the slope. Strengthening or replacing the base with better suited material improves the ability of the roads to support vehicular traffic.

The land capability classification is VIe. The woodland ordination symbol is 5R.

HeG—Hickory loam, 30 to 60 percent slopes. This steep and very steep, deep, well drained soil is in the uplands. It is on concave breaks in draws and on narrow breaks to bottom land. Most slopes are 75 to 150 feet long. Most areas are narrow and elongated and are 10 to 100 acres in size.

In a typical profile, the surface layer is very dark grayish brown loam about 3 inches thick. The subsurface layer is pale brown loam about 4 inches thick. The subsoil is about 30 inches thick. It is yellowish brown. The upper part is friable loam, and the lower part is firm clay loam and loam. The substratum to a depth of about 60 inches is yellowish brown loam. In some small areas the slope is more than 60 or less than 30 percent. In some areas east of the White River, the substratum has many small sandstone fragments.

Included with this soil in mapping are narrow, elongated areas of the moderately well drained Ava soils on ridgetops between draws and a narrow strip of the somewhat poorly drained Stendal soils along drainageways at the bottom of draws. Also included, east of the White River, are some areas where sandstone bedrock is exposed at the bottom of draws and on the lower part of breaks to bottom land. Included areas make up about 10 to 15 percent of the map unit.

The Hickory soil has a high available water capacity and is moderately permeable. Runoff is very rapid. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled.

Nearly all areas are wooded. A few are pastured. Because of the slope, this soil is generally unsuited to cultivated crops and is poorly suited to grasses and legumes for hay and pasture.

This soil is fairly well suited to trees. The equipment limitation and the hazard of erosion are the main management concerns. Since ordinary crawler tractors and rubber-tired skidders cannot be operated safely on these slopes, special logging methods, such as yarding the logs uphill with a cable, may be necessary. Logging roads, skid trails, and landings commonly can be built on the adjacent ridgetops and bottom land.

This soil is generally unsuitable as a site for dwellings and sanitary facilities because of the slope. It is severely limited as a site for local roads because of the slope and low strength. Cutting and filling are needed, and the roads should be built on the contour where possible. Providing adequate side ditches and culverts helps to prevent excessive erosion. Areas disturbed during construction should be revegetated as soon as possible.

The land capability classification is VIIe. The woodland ordination symbol is 5R.

MbB2—Markland silty clay loam, 2 to 6 percent slopes, eroded. This gently sloping, deep, well drained and moderately well drained soil is on breaks along drainageways and in depressions on terraces. Slopes generally are 100 to 200 feet long. Areas are narrow and elongated and are 3 to 30 acres in size.

In a typical profile, the surface layer is dark grayish brown silty clay loam about 9 inches thick. The subsoil is olive brown, mottled, firm silty clay about 14 inches thick. The upper part of the substratum is light olive brown, mottled silty clay. The lower part to a depth of about 60 inches is light olive brown, stratified silt loam and silty clay loam. In some severely eroded spots, the surface layer is silty clay. In some small areas the slope is more than 6 or less than 2 percent.

Included with this soil in mapping are small areas of the somewhat poorly drained, nearly level McGary soils. These soils are in drainageways and on small flats. Also included are some very narrow breaks along streams. The breaks have a slope of 6 to 12 percent. Included soils make up about 5 to 10 percent of the map unit.

The Markland soil has a high available water capacity and is slowly permeable. A perched water table is at a depth of 3 to 6 feet during early spring. Runoff is rapid. The organic matter content is moderate. The surface layer becomes hard and cloddy if worked when wet.

Most areas of this soil are used for cultivated crops. A few are used for hay or pasture or are wooded.

This soil is fairly well suited to corn, soybeans, and small grain. The hazard of erosion is the main management concern. The depth of plowing should be regulated so that the silty clay subsoil is not mixed into the plow layer. A system of conservation tillage that leaves all or part of the crop residue on the surface minimizes crusting and increases the rate of water infiltration. No-till planting helps to control erosion and conserves moisture. Contour farming slows runoff. A cropping system that includes close-growing crops helps to control erosion. Subsurface drains in draws help to drain seepy areas. Grassed waterways help to prevent gullying in drainageways.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as alfalfa and red clover, for hay and pasture. A cover of grasses and legumes helps to control erosion. Overgrazing and grazing when the soil is wet are the main management concerns. Overgrazing reduces plant density and plant hardiness and causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture in good condition.

This soil is fairly well suited to trees. Seedling mortality, the windthrow hazard, and plant competition are management concerns. Because of seedling mortality, overstocking is needed. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced. Competing vegetation can be controlled by cutting, spraying, or girdling.

Because of the shrink-swell potential, this soil is severely limited as a site for dwellings. Because of the wetness, it is better suited to dwellings without basements than to dwellings with basements. Drains around footings help to remove excess water. Strengthening foundations and basement walls and backfilling with coarse textured material help to prevent the structural damage caused by shrinking and swelling.

This soil is severely limited as a site for local roads and streets because of the shrink-swell potential and low strength. Strengthening or replacing the base with better suited material improves the ability of the roads to support vehicular traffic.

This soil is severely limited as a site for septic tank absorption fields because of the slow permeability and the wetness. Filling or mounding the absorption field with suitable material improves the ability of the field to absorb the effluent. Installing perimeter drains around the absorption field helps to overcome the wetness.

The land capability classification is IIIe. The woodland ordination symbol is 4C.

MgA—McGary silt loam, 0 to 2 percent slopes. This nearly level, deep, somewhat poorly drained soil is on low rises on low terraces and lake plains. Areas are irregularly shaped and are 3 to 80 acres in size.

In a typical profile, the surface layer is gray silt loam about 11 inches thick. The subsoil is mottled, firm silty clay about 28 inches thick. The upper part is brown, and the lower part is grayish brown and gray. The substratum to a depth of about 60 inches is gray, mottled, stratified silty clay loam and clay. In some areas the subsoil is silty clay loam. In some small areas the slope is more than 2 percent.

Included with this soil in mapping are many strips of the very poorly drained Booker and Montgomery soils in narrow drainageways and swales. Also included are a few very small areas of the well drained and moderately well drained Markland soils on narrow, low breaks adjacent to drainageways. Included soils make up about 5 to 10 percent of the map unit.

The McGary soil has a high available water capacity and is slowly permeable or very slowly permeable. The water table is at a depth of 1 to 3 feet in the winter and early spring. Runoff is slow. The organic matter content is moderate in the surface layer. If worked when it is too wet, the soil becomes hard and cloddy when dry.

Most areas of this soil are used for cultivated crops. A few are used for hay or pasture or for woodlots.

This soil is fairly well suited to corn, soybeans, and small grain. The wetness is the main limitation. A subsurface drainage system can lower the water table if adequate outlets are available. Because of the restricted permeability, subsurface drains should be closely spaced. Land smoothing and shallow surface drains help to remove surface water. A system of conservation tillage that leaves all or part of the crop residue on the surface helps to prevent excessive crusting and increases the rate of water infiltration.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as red clover, for hay and pasture. It is not so well suited to deep-rooted legumes as to shallow-rooted forage plants. The suitability for legumes depends on the completeness of drainage. Grazing when the soil is wet causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods minimize surface compaction and help to maintain good tilth and plant density.

This soil is poorly suited to trees. The equipment limitation, seedling mortality, and the windthrow hazard are the main management concerns. The use of equipment is limited during wet periods, when the soil is sticky. The wetness may slightly delay harvesting or planting. Because of seedling mortality, special planting stock and overstocking are needed. Special site preparation, such as bedding, is needed in some areas. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced.

Because of the wetness and the shrink-swell potential, this soil is severely limited as a site for dwellings. Diverting surface water away from houses by proper grading and landscaping helps to overcome the wetness. Strengthening foundations and basement walls and backfilling with coarse textured material help to prevent the structural damage caused by shrinking and swelling. Subsurface drains and drains around footings help to lower the water table.

This soil is severely limited as a site for local roads and streets because of the shrink-swell potential and low strength. A drainage system along the roads helps to lower the water table. Strengthening or replacing the base with better suited material helps to prevent the damage caused by shrinking and swelling and by low strength.

This soil is severely limited as a site for septic tank absorption fields because of the wetness and the slow or very slow permeability. Filling or mounding the absorption field with suitable material improves the ability of the field to absorb the effluent. Installing perimeter drains around the absorption field helps to overcome the wetness.

The land capability classification is IIIw. The woodland ordination symbol is 4W.

Mo—Montgomery silty clay loam. This nearly level, deep, very poorly drained soil is on broad lake plains. It is frequently ponded by runoff from the higher lying adjacent soils. Areas are irregularly shaped and are 200 to 1,000 acres in size.

In a typical profile, the surface layer is black silty clay loam about 11 inches thick. The subsurface layer is black silty clay about 4 inches thick. The subsoil is about 23 inches thick. It is dark gray, grayish brown, and gray, mottled, firm silty clay and silty clay loam. The substratum to a depth of about 60 inches is gray, mottled silty clay loam. In places the soil is silty clay loam throughout.

Included with this soil in mapping are a few small areas of the somewhat poorly drained McGary soils on slight rises. These soils make up about 2 to 5 percent of the map unit.

The Montgomery soil has a high available water capacity and is slowly permeable. The water table is near or slightly above the surface in the winter and early spring. Runoff is very slow or ponded. The organic matter content is high in the surface layer. This layer becomes cloddy and difficult to work if plowed when too wet or too dry. It is sticky when wet.

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

If drained, this soil is fairly well suited to corn, soybeans, and small grain. The wetness is the main limitation. Ponding sometimes damages the crops. It can damage small grain in winter and early spring. A drainage system has been established in most areas, but additional drainage measures are needed in many areas. A subsurface drainage system can lower the high water table if adequate outlets are available (fig. 9). Because of the restricted permeability, subsurface drains should be closely spaced. Land smoothing and shallow surface drains help to remove excess surface water. Returning crop residue to the soil and growing green manure crops improve tilth and help to maintain the organic matter content. Minimizing tillage helps to maintain good tilth.

This soil is well suited to some grasses and legumes for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of the wetness and frost heaving. The suitability for legumes is limited by the seasonal wetness. Overgrazing or grazing when the soil is wet damages the sod, reduces plant density and forage yields, and causes surface compaction and poor tilth. Proper stocking rates, timely deferment of grazing, and restricted use during wet periods minimize surface compaction and help to keep the pasture in good condition.

This soil is fairly well suited to trees. The equipment limitation, plant competition, seedling mortality, and the windthrow hazard are management concerns. Equipment should be used only during dry periods or when the ground is frozen. Special site preparation, such as

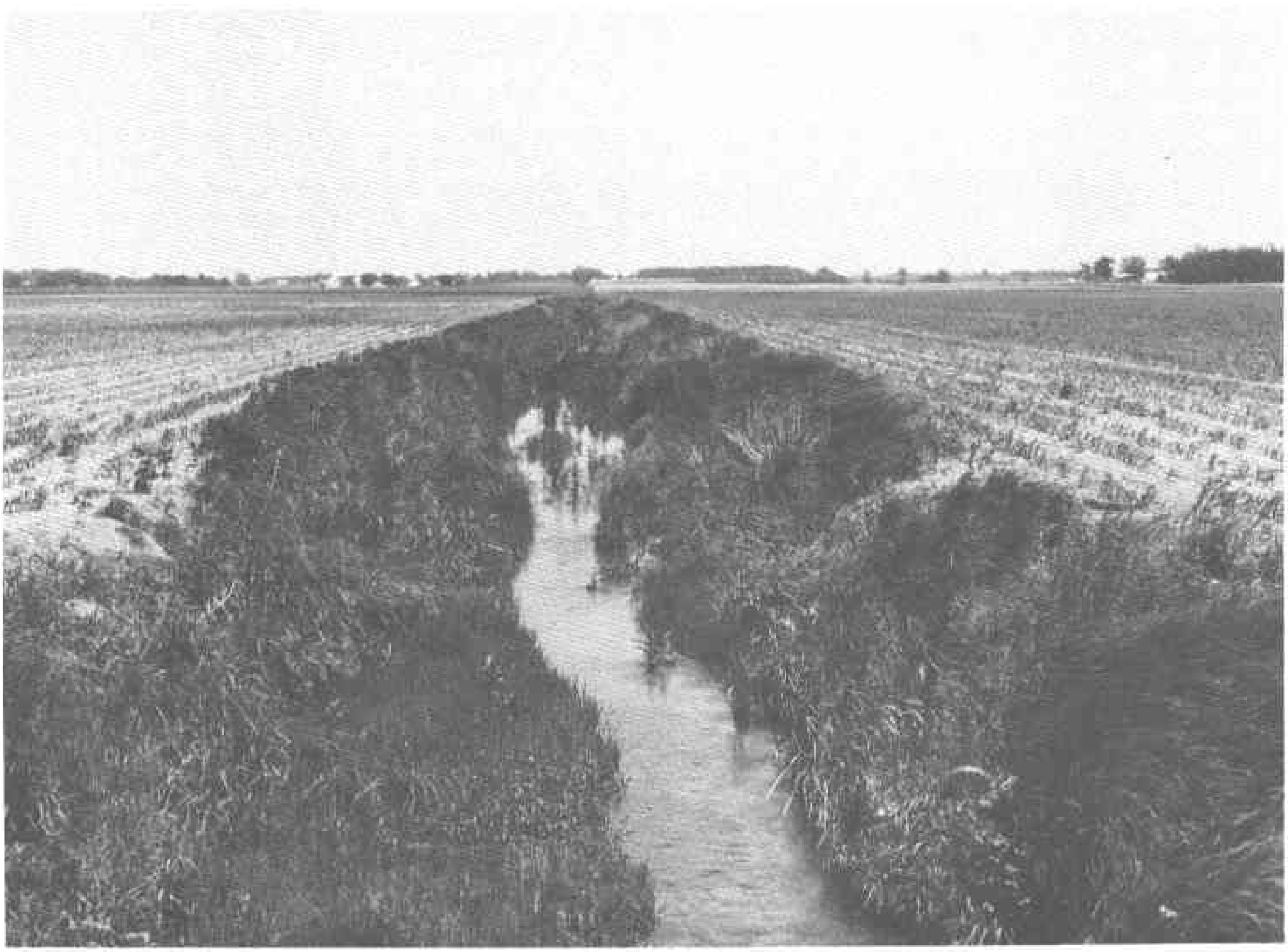


Figure 9.—A drainage ditch used as an outlet for subsurface tile in an area of Montgomery silty clay loam.

bedding, is needed in some areas. Seedlings survive and grow fairly well if competing vegetation is controlled by cutting, spraying, or girdling. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced.

This soil is generally unsuitable as a site for dwellings because of the ponding and the shrink-swell potential and as a site for septic tank absorption fields because of the ponding and the slow permeability. It is severely limited as a site for local roads because of the ponding, the shrink-swell potential, and low strength. Replacing the layers that have a high shrink-swell potential with suitable soil material helps to prevent the damage caused by shrinking and swelling and by low strength. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by ponding.

The land capability classification is IIIw. The woodland ordination symbol is 5W.

Mu—Muskego muck. This nearly level, deep, very poorly drained soil is in depressions on low terraces. It is often ponded by runoff from the higher lying adjacent soils. Areas are irregularly shaped and are 40 to 100 acres in size.

In a typical profile, the upper part of the soil is black muck about 19 inches thick. The substratum to a depth of about 60 inches is very dark gray and dark olive gray coprogenous earth that contains numerous white shell fragments. In places the coprogenous earth has been dug up and spread over the muck. Near the edge of areas of this soil, the layer of muck is very thin and fragments of coprogenous earth have been mixed with the surface layer by plowing.

Included with this soil in mapping are small areas where a thin layer of muck overlies sand or sandy loam. These areas make up about 5 to 15 percent of the map unit.

The Muskego soil has a very high available water capacity and is slowly permeable. The water table is often near or slightly above the surface in the winter and early spring. Runoff is very slow or ponded. The organic matter content is very high in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content.

Nearly all areas of this soil are drained and are used for cultivated crops. The soil is poorly suited to corn and soybeans. The wetness is the main limitation. A drainage system has been established in most areas, but additional drainage measures are generally needed. Seepage from the higher lying adjacent areas results in some extremely wet spots. Subsurface drains help to lower the water table, but locating outlets is sometimes difficult. Surface drains function as outlets for subsurface drains and also help to remove excess surface water. In places oxidation and subsidence of the muck have lowered the surface of the soil so much that drainage outlets are now too high. Keeping the water table high when crops are not being grown helps to prevent oxidation of the muck. Tillage and earth moving should not leave the coprogenous material at the surface. Dry coprogenous material is very difficult to rewet and work when a seedbed is prepared. The muck is subject to soil blowing when dry. Growing winter cover crops helps to control soil blowing. Since the muck will burn, fires should be prevented.

This soil is fairly well suited to grasses for hay and pasture. It is well suited to reed canarygrass. The suitability for legumes depends on the completeness of the drainage system. Grazing when the soil is wet damages the stand. Proper stocking rates, pasture rotation, restricted use during wet periods, and timely deferment of grazing help to keep the pasture in good condition.

This soil is poorly suited to trees. The main management concerns are the equipment limitation, seedling mortality, and the windthrow hazard. Unless the soil is drained, prolonged wetness hinders logging and planting. Logging is generally limited to periods when the soil is frozen. Overstocking and special site preparation, such as bedding, are needed in some areas. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced.

Because of the ponding and low strength, this soil is generally unsuitable as a site for dwellings. It is severely limited as a site for local roads because of subsidence, frost action, and the ponding. The muck and coprogenous earth should be replaced with better suited material when roads are built. The soil is generally unsuitable as a site for septic tank absorption fields because of the ponding and the slow permeability.

The land capability classification is IVw. The woodland ordination symbol is 3W.

Ne—Newark loam, frequently flooded. This nearly level, deep, somewhat poorly drained soil is in shallow sloughs and on broad bottom land. It is flooded for brief periods, mainly in winter and spring. Areas are typically elongated and are parallel to the adjacent sloughs. They are 10 to 50 acres in size.

In a typical profile, the surface layer is dark grayish brown loam about 10 inches thick. The subsoil is grayish brown and light brownish gray, mottled, friable silty clay loam and silt loam about 22 inches thick. The substratum to a depth of 60 inches is light brownish gray and grayish brown, stratified fine sandy loam, loam, and silt loam. In places the surface layer and subsoil are loam or fine sandy loam.

Included with this soil in mapping are small areas of the very poorly drained Wilhite soils in drainageways and sloughs and some small areas of a moderately well drained soil on swells on the bottom land. Included soils make up about 5 to 10 percent of the map unit.

The Newark soil has a high available water capacity and is moderately permeable. The water table is at a depth of 0.5 foot to 1.5 feet during late winter and during spring. Runoff is very slow. The organic matter content is moderate. The surface layer is friable and can be easily tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. A few are used for pasture or are wooded.

This soil is well suited to corn, soybeans, and grain sorghum. The flooding and the wetness are the main management concerns. In some years replanting is needed because flooding has destroyed stands. Dikes and levees help to prevent flooding along large streams, but they generally are not used along small streams where bottoms are narrow. Most areas have been drained. A subsurface drainage system can lower the water table if adequate outlets are available. Land smoothing and shallow surface drains help to remove excess surface water from low spots. A system of conservation tillage that leaves all or part of the crop residue on the surface, cover crops, and green manure crops increase or maintain the organic matter content and help to maintain good tilth.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as red clover, for hay and pasture. It is not well suited to deep-rooted legumes, such as alfalfa, because of the wetness, frost heaving, and the flooding. A subsurface drainage system can lower the water table if adequate outlets are available. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition. Scouring often results when livestock damage the vegetative cover on streambanks. A permanent cover of grasses, shrubs, and trees is needed on the streambanks.

This soil is well suited to trees. A few areas are wooded, particularly those on narrow bottoms that are adjacent to steep or very steep soils. The main management concerns are the equipment limitation and the windthrow hazard. Trees survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling. Equipment should be used only during dry periods. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced.

This soil is generally unsuitable as a site for dwellings and sanitary facilities because of the flooding and the wetness. It is severely limited as a site for local roads because of the flooding, low strength, and frost action. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding, frost action, and low strength.

The land capability classification is IIw. The woodland ordination symbol is 5W.

No—Nolin silt loam, occasionally flooded. This nearly level, deep, well drained soil is on broad bottom land. It is subject to fooding. The flooding generally is of short duration and occurs mainly in winter and spring. Areas generally are irregularly shaped and are 50 to 200 acres in size.

In a typical profile, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is dark brown and yellowish brown, firm and friable silt loam about 40 inches thick. The substratum to a depth of about 60 inches is yellowish brown silt loam. In some swales and sloughs, the surface layer is very dark grayish brown silty clay loam. In places the substratum is loam or sandy loam below a depth of 48 inches. In some narrow strips along sloughs, the soil is fine sandy loam throughout.

Included with this soil in mapping are small areas of the somewhat poorly drained Newark soils in swales and along sloughs. Also included are narrow strips of well drained sands or gravelly coarse sands along a few sloughs. Included soils make up about 2 to 5 percent of the map unit.

The Nolin soil has a very high available water capacity and is moderately permeable. The water table is at a depth of 3 to 6 feet during early spring. Runoff is slow. The organic matter content is moderate. The surface layer is friable and can be easily tilled only when the soil is at the proper moisture content.

Most areas of this soil are used for cultivated crops. A few are used for small grain or pasture. A few small areas are wooded.

This soil is well suited to corn and soybeans. Replanting is occasionally needed because flooding can destroy the stands. In frequently flooded sloughs, crops generally are severely damaged. Wheat is occasionally damaged by flooding in the winter and early spring. Dikes and levees help to prevent flooding during the growing season. Cover crops and a system of conservation tillage that leaves protective amounts of crop residue on the surface increase the organic matter content and improve tilth.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as alfalfa and red clover, for hay and pasture. A wide variety of grasses and legumes, including alfalfa, can be grown. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is the main management concern. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

This soil is generally unsuitable as a site for dwellings and sanitary facilities because of the flooding. It is severely limited as a site for local roads because of low strength, the flooding, and frost action. Constructing the roads on raised, well compacted fill material, providing adequate side ditches and culverts along the roads, and replacing or strengthening the base with better suited material help to prevent the damage caused by flooding, frost action, and low strength.

The land capability classification is IIw. The woodland ordination symbol is 8A.

Nr—Nolin silt loam, rarely flooded. This nearly level, deep, well drained soil is on broad bottom land along the White River. It is protected from most floods by the McGinnis Levee. Areas generally are irregularly shaped and are 30 to 100 acres in size.

In a typical profile, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is dark brown and yellowish brown, firm and friable silt loam about 40 inches thick. The substratum to a depth of about 60 inches is yellowish brown silt loam. In some swales and sloughs, the surface layer is very dark grayish brown silty clay loam. In places the substratum is loam or sandy loam below a depth of 48 inches.

Included with this soil in mapping are small areas of the somewhat poorly drained Newark soils in swales and sloughs. These soils make up about 2 to 5 percent of the map unit.

The Nolin soil has a very high available water capacity and is moderately permeable. The organic matter content is moderate. The water table is at a depth of 3 to 6 feet during early spring. Runoff is slow. The surface layer is friable and can be easily tilled only when the soil is at the proper moisture content.

Most areas of this soil are used for cultivated crops. A few are used for small grain or pasture.

This soil is well suited to corn, soybeans, and grain sorghum. The rare flooding is a hazard. Crops can be damaged if floodwater overtops the levee during the growing season. A subsurface drainage system is needed to drain small swales. Cover crops and a system of conservation tillage that leaves all or part of the crop residue on the surface increase the organic matter content and improve tilth.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as alfalfa and red clover, for hay and pasture. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is the main management concern. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the flooding, this soil is generally unsuitable as a site for dwellings. Flooding is a hazard because the floodwater could overtop the levee. The soil is severely limited as a site for local roads because of low strength and frost action. Providing adequate side ditches and culverts and replacing or strengthening the base with better suited material help to overcome these limitations. The soil is moderately limited as a site for septic tank absorption fields because of the flooding and the wetness.

The land capability classification is I. The woodland ordination symbol is 8A.

PbC2—Parke silt loam, 6 to 12 percent slopes, eroded. This moderately sloping, deep, well drained soil is on the sides of ridges and knolls and along drainageways in the uplands. Slopes are generally 75 to 200 feet long. Areas are mostly elongated and narrow and are 10 to 40 acres in size.

In a typical profile, the surface layer is dark yellowish brown silt loam about 7 inches thick. The subsoil extends to a depth of about 80 inches. The upper part is dark yellowish brown and dark brown, friable and firm silty clay loam and clay loam. The lower part is yellowish red and red, firm sandy clay loam. In some places the surface layer is brown. In other places the slope is less than 6 or more than 12 percent. In some areas on the top of ridges and knolls, the subsoil is silt loam or silty clay loam more than 40 inches thick.

Included with this soil in mapping are small areas of the well drained Chetwynd soils in draws. These soils are less silty than the Parke soil. They make up about 5 to 10 percent of the map unit.

The Parke soil has a high available water capacity and is moderately permeable. Runoff is rapid. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled when moist. It is somewhat sticky when wet and becomes hard and cloddy when dry.

Most areas of this soil are used for cultivated crops. A few small areas are used for hay or pasture or are wooded.

This soil is fairly well suited to corn, soybeans, and small grain. Erosion is a hazard. A system of conservation tillage that leaves all or part of the crop residue on the surface minimizes crusting and increases the rate of water infiltration. A cropping sequence that includes close-growing crops helps to control erosion. No-till planting helps to control erosion and conserves moisture. Seepage is a problem in draws and at the base of knolls. Subsurface drains intercept seepage at the base of slopes. Grassed waterways, terraces, and water- and sediment-control basins help to prevent gullying.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as alfalfa, for hay and pasture. A cover of grasses and legumes helps to control erosion. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is a moderate limitation. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the slope, this soil is moderately limited as a site for dwellings. The shrink-swell potential also is a limitation on sites for dwellings without basements. Buildings should be designed so that they conform to natural slope of the land. Land shaping and installing retaining walls help to overcome the slope. Areas disturbed during construction should be revegetated as soon as possible.

This soil is severely limited as a site for local roads and streets because of low strength and frost action. Because of the slope, the roads and streets should be built on the contour. Also, land shaping is needed. Providing adequate side ditches and culverts and replacing or strengthening the base with better suited material help to prevent the damage caused by frost action and low strength.

This soil is moderately limited as a site for septic tank absorption fields because of the slope. Land shaping and installing the distribution lines across the slope help to insure that the absorption field functions properly.

The land capability classification is IIIe. The woodland ordination symbol is 5A.

PbD2—Parke silt loam, 12 to 18 percent slopes, eroded. This strongly sloping, deep, well drained soil is on the sides of ridges and knolls and along drainageways in the uplands. Slopes are generally 75 to 200 feet long. Areas are mostly elongated and narrow and are 10 to 40 acres in size.

In a typical profile, the surface layer is brown silt loam about 8 inches thick. The subsoil extends to a depth of about 80 inches. In sequence downward, it is brown, friable and firm silt loam and silty clay loam; brown and strong brown, friable loam; yellowish red, friable loam; and yellowish red, friable sandy clay loam. In some small areas the slope is less than 12 or more than 18 percent. In some areas on ridges and knolls, the subsoil is silt loam or silty clay loam more than 40 inches thick.

Included with this soil in mapping are small areas of the moderately steep, well drained Chetwynd soils on side slopes. These soils are more sandy than the Parke soil. They make up about 2 to 8 percent of the map unit.

The Parke soil has a high available water capacity and is moderately permeable. Runoff is very rapid. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled when moist. It is somewhat sticky when wet and becomes hard and cloddy when dry.

Most areas of this soil are used for hay and pasture. Some are used for cultivated crops. A few are wooded.

Because of the slope, this soil is poorly suited to corn and soybeans. A system of conservation tillage that leaves all or part of the crop residue on the surface minimizes crusting and increases the rate of water infiltration. Contour farming slows runoff. No-till planting helps to control erosion and conserves moisture. A cropping sequence that includes close-growing crops helps to control erosion. Grassed waterways help to prevent gullying.

This soil is well suited to grasses and legumes for hay and pasture. A wide variety of grasses and legumes, including orchardgrass and alfalfa, grow well. A cover of grasses and legumes helps to control erosion. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is the main management concern. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the slope, this soil is severely limited as a site for dwellings. Buildings should be designed so that they conform to the natural slope of the land. Land shaping and installing retaining walls help to overcome the slope. Areas disturbed during construction should be revegetated as soon as possible.

This soil is severely limited as a site for local roads and streets because of the slope, low strength, and frost action. Replacing the layers that have low strength with better suited material helps to prevent the damage caused by low strength and frost action. Constructing the roads and streets on the contour and land shaping help to overcome the slope.

This soil is severely limited as a site for septic tank absorption fields because of the slope. Land shaping and installing the distribution lines across the slope help to ensure that the absorption field functions properly.

The land capability classification is IVe. The woodland ordination symbol is 5A.

Pc—Patton silty clay loam. This nearly level, deep, poorly drained soil is in depressions and on broad flats on lake plains and low terraces. Some areas are ponded by runoff from the higher lying adjacent soils. Areas are irregularly shaped and are 40 to 600 acres in size.

In a typical profile, the surface layer is very dark gray silty clay loam about 8 inches thick. The subsurface layer also is very dark gray silty clay loam about 8 inches thick. The subsoil is dark grayish brown and grayish brown, mottled, firm silty clay loam about 23 inches thick. The substratum to a depth of about 60 inches is grayish brown, mottled silty clay loam. In the lower lying part of some areas, the subsoil and substratum are silty clay. In a few areas the substratum is stratified silt loam, loam, and fine sandy loam below a depth of 40 inches.

Included with this soil in mapping are small areas of the somewhat poorly drained Henshaw soils on low rises. These soils make up about 2 to 5 percent of the map unit.

The Patton soil has a high available water capacity and is moderately slowly permeable. The water table is often near or slightly above the surface in spring. Runoff is ponded or very slow. The organic matter content is high in the surface layer. This layer is friable and can be easily tilled under proper moisture conditions.

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

If drained, this soil is well suited to corn, soybeans, and small grain. The wetness is the main limitation. Winter wheat can be damaged by ponding in winter and early spring. A drainage system has been established in most areas. A subsurface drainage system can lower the high water table if adequate outlets are available. Land smoothing and shallow surface drains help to remove excess surface water. Returning crop residue to the soil and growing green manure crops improve tilth and increase the organic matter content.

This soil is well suited to grasses, such as orchardgrass, and some legumes, such as red clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of the wetness and frost heaving. Overgrazing or grazing when the soil is wet damages the sod, reduces plant density and forage yields, and causes surface compaction and poor tilth. Proper stocking rates, timely deferment of grazing, and restricted use during wet periods minimize surface compaction and help to keep the pasture in good condition.

This soil is fairly well suited to trees. The equipment limitation, seedling mortality, the windthrow hazard, and plant competition are management concerns. Prolonged seasonal wetness hinders harvesting, logging, and planting. Equipment should be used only during dry periods or when the ground is frozen. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced. Seedlings survive and grow fairly well if competing vegetation is controlled by cutting, spraying, or girdling. Some replanting of seedlings generally is needed.

Because of the ponding, this soil is generally unsuitable as a site for dwellings. It is severely limited as a site for local roads because of the ponding, low strength, and frost action. Providing an adequate drainage system along the roads and replacing or strengthening the base with better suited material help to overcome these limitations. The soil is generally unsuitable as a site for septic tank absorption fields because of the ponding and the moderately slow permeability.

The land capability classification is IIw. The woodland ordination symbol is 5W.

PdB2—Pekin silt loam, 2 to 6 percent slopes, eroded. This gently sloping, deep, moderately well drained soil is on ridgetops and on breaks between old alluvial terraces and bottom land. Slopes are 25 to 75 feet long. Areas are dominantly long and narrow and are 3 to 10 acres in size.

In a typical profile, the surface layer is brown silt loam about 10 inches thick. The subsoil is about 42 inches thick. In sequence downward, it is light yellowish brown, friable silt loam; pale brown, mottled, friable silt loam; a fragipan of light yellowish brown and yellowish brown, mottled, firm, brittle silt loam; and yellowish brown, mottled, friable silt loam. The substratum to a depth of about 60 inches is light brownish gray, mottled silt loam stratified with thin layers of silty clay loam. In some small areas the slope is less than 2 or more than 6 percent. On narrow, elongated breaks to bottom land, the soil is well drained.

Included with this soil in mapping are small areas of the somewhat poorly drained Bartle soils on small flats and along the top of breaks to the bottom land. Also included are some areas that are ponded during periods of heavy rainfall. Included soils make up about 5 to 15 percent of the map unit.

The Pekin soil has a moderate available water capacity. It is moderately permeable above the fragipan and very slowly permeable in the fragipan. The water table is at a depth of 2 to 6 feet during early spring. Runoff is rapid. The organic matter content is moderate. The fragipan restricts water movement and the growth of roots. The surface layer is friable and can be easily tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. Some are used for hay or pasture. A few are used as woodlots.

This soil is well suited to corn, soybeans, and small grain. The hazard of erosion is the main management concern. The very slowly permeable fragipan restricts the downward movement of water and the growth of roots. The soil is often wet and seepy in the spring but may be droughty in the summer. A system of conservation tillage that leaves all or part of the crop residue on the surface minimizes crusting and increases the rate of water infiltration. No-till planting helps to control erosion and conserves moisture. Contour farming slows runoff. A cropping sequence that includes close-growing crops helps to control erosion.

This soil is well suited to grasses, such as orchardgrass, and some legumes, such as red clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because the fragipan restricts the growth of roots. A cover of grasses and legumes helps to control erosion. Alfalfa stands are often damaged by frost heaving. Overgrazing and grazing when the soil is wet are the main management concerns. Overgrazing reduces plant density and plant hardiness and causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. No major hazards or limitations affect planting and harvesting.

Because of the wetness, this soil is moderately limited as a site for dwellings without basements and severely limited as a site for dwellings with basements. Drains around footings help to lower the water table. Disturbed areas should be revegetated as soon as possible after construction.

This soil is severely limited as a site for local roads and streets because of low strength and frost action. Strengthening or replacing the base with better suited material improves the ability of the roads to support vehicular traffic. A surface drainage system along the roads helps to prevent the damage caused by frost action.

This soil is severely limited as a site for septic tank absorption fields because of the wetness and the very slow permeability in the fragipan. Installing perimeter subsurface drains around the absorption field helps to lower the seasonal high water table. Filling or mounding the absorption field with suitable material improves the ability of the field to absorb the effluent.

The land capability classification is IIe. The woodland ordination symbol is 4A.

Pf—Peoga silt loam. This nearly level, deep, poorly drained soil is on lake plains and low terraces. Areas are irregularly shaped and are 10 to 200 acres in size.

In a typical profile, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsurface layer is light brownish gray, mottled silt loam about 7 inches thick. The subsoil is about 40 inches thick. The upper part is light brownish gray, mottled, friable silt loam; the next part is gray, mottled, firm silt loam; and the lower part is light brownish gray and yellowish brown, mottled, friable silt loam. The substratum to a depth of about 60 inches is yellowish brown, mottled, stratified silt loam and silty clay loam. In some places the subsoil is silty clay loam. In other places the substratum is loam and clay loam.

Included with this soil in mapping are small areas of the moderately well drained Pekin soils on narrow breaks to bottom land. Also included are a few small areas of the poorly drained and very poorly drained Bonnie soils. These soils are periodically flooded where a low terrace grades to bottom land. Included soils make up about 2 to 5 percent of the map unit.

The Peoga soil has a high available water capacity and is slowly permeable. The water table is at or near the surface in winter and early spring. Runoff is slow. The organic matter content is moderate. The surface layer is friable and can be easily worked at the proper moisture content, but it tends to puddle and crust after heavy rains.

Most areas of this soil are used for cultivated crops. A few are used for hay and pasture or are wooded.

If drained, this soil is fairly well suited to corn, soybeans, and small grain. The wetness is the main limitation. A drainage system has been established in most areas, but additional drainage measures are needed in many areas. A subsurface drainage system can lower the high water table if adequate outlets are available. Land smoothing and shallow surface drains help to remove excess surface water. A system of conservation tillage that leaves all or part of the crop residue on the surface prevents excessive crusting after heavy rainfall and improves the rate of water infiltration. Ridge tillage helps to prevent compaction in the rows. Returning crop residue to the soil and growing cover crops increase the organic matter content of the surface layer and help to maintain good tilth.

This soil is well suited to grasses, such as orchardgrass, and some legumes, such as red clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of the wetness and frost heaving. The suitability for legumes depends on the completeness of drainage. Overgrazing or grazing when the soil is wet damages the sod, reduces plant density and forage yields, and causes surface compaction and poor tilth. Proper stocking rates, timely grazing, and restricted use during wet periods minimize surface compaction and help to keep the pasture in good condition.

This soil is fairly well suited to trees. The equipment limitation, seedling mortality, the windthrow hazard, and plant competition are management concerns. Prolonged seasonal wetness hinders harvesting, logging, and planting. Equipment should be used only during dry periods or when the ground is frozen. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced. Seedlings grow well if competing vegetation is controlled by cutting, spraying, or girdling. Some replanting of seedlings generally is needed.

Because of the wetness, this soil is severely limited as a site for dwellings. Installing drains around footings and diverting surface water away from houses by proper grading and landscaping help to overcome the wetness.

This soil is severely limited as a site for local roads and streets because of the wetness, low strength, and frost action. Providing an adequate drainage system along the roads and replacing or strengthening the base with better suited material help to overcome these limitations.

This soil is severely limited as a site for septic tank absorption fields because of the slow permeability and the wetness. Filling or mounding the absorption field with suitable material improves the ability of the field to absorb the effluent. Installing perimeter drains around the absorption field helps to overcome the wetness.

The land capability classification is IIIw. The woodland ordination symbol is 5W.

Pg—Plankeshaw silt loam, frequently flooded. This nearly level, deep, well drained soil is on bottom land. It is flooded for very brief periods, mainly in spring and early summer. Because of very rapid runoff from the nearby upland soils, many sandstone fragments have been deposited on the surface. Most areas are 3 to 30 acres in size. They generally are narrow and elongated along small streams and are fan shaped where small, rapidly flowing streams enter the wider bottom land along the larger streams.

In a typical profile, the surface layer is brown silt loam about 6 inches thick. The subsoil is about 20 inches of dark yellowish brown, friable loam and channery loam. The substratum to a depth of about 60 inches is brown, mottled channery and very channery loam (fig. 10). In some small areas, about 20 percent of the surface is covered by sandstone fragments and the content of sandstone fragments is 20 to 40 percent in the subsoil. In some places the content of these fragments is less than 10 percent throughout the soil. In other places the soil is mostly sandy loam.

Figure 10.—Many sandstone fragments are in the subsoil and substratum of Piankeshaw silt loam, frequently flooded.

Included with this soil in mapping are small areas of the somewhat poorly drained Stendal soils in swales and meander channels on the bottom land. These soils have many sandstone fragments. Also included are a few small areas where sandstone bedrock is at a depth of 40 to 60 inches. Included soils make up about 10 to 15 percent of the map unit.

The Piankeshaw soil has a moderate available water capacity and is moderately permeable. The organic matter content is moderate in the surface layer. Runoff is slow. The surface layer is friable and can be easily tilled in all areas, except for small areas where the plow layer has many sandstone fragments.

Most areas of this soil are used for pasture or woodland. A few are used for cultivated crops.

This soil is well suited to corn and soybeans. The frequent flooding is a hazard. It is generally of short duration. Scouring is a hazard since runoff is very rapid from much of the surrounding upland area. Dikes and levees are generally not built to protect the soil from flooding since most of the bottom land is narrow and much of the runoff enters the bottom land from side tributaries. Applying a system of conservation tillage that leaves protective amounts of crop residue on the surface and growing winter cover crops increase the organic matter content and improve tilth.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as alfalfa and red clover, for hay and pasture. Scouring is a hazard. A permanent cover of grasses, shrubs, and trees helps to prevent scouring on streambanks. Proper stocking rates, pasture rotation, and timely grazing help to keep the pasture in good condition.

This soil is well suited to trees. The main management concern is plant competition. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the flooding, this soil is generally unsuitable as a site for dwellings and sanitary facilities and is severely limited as a site for local roads. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding.

The land capability classification is IIs. The woodland ordination symbol is 7A.

PkB2—Pike silt loam, 2 to 6 percent slopes, eroded. This gently sloping, deep, well drained soil is in the uplands. It is on ridgetops or knolls and on slopes along drainageways. Slopes are generally 100 to 300 feet long. The areas on narrow ridgetops and along drainageways are 2 to 5 acres in size. Those on knolls are irregularly shaped and are 5 to 60 acres in size.

In a typical profile, the surface layer is dark yellowish brown silt loam about 9 inches thick. The subsoil is about 57 inches thick. The upper part is brown, friable silty clay loam; the next part is dark yellowish brown and brown, friable and firm silt loam; and the lower part is reddish brown, firm sandy clay loam. The substratum to a depth of about 80 inches is reddish brown sandy loam. In some areas the depth to reddish brown sandy clay loam or sandy loam is 60 to 80 inches, and in other areas it is 30 to 40 inches. In some small areas the slope is less than 2 or more than 6 percent.

Included with this soil in mapping are small, narrow areas of the gently sloping, moderately well drained Ava soils on ridgetops. These soils make up about 2 to 5 percent of the map unit.

The Pike soil has a high available water capacity and is moderately permeable. Runoff is rapid. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content.

Most areas of this soil are used for cultivated crops. A few small areas are used for hay or pasture or are wooded.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard. A system of conservation tillage that leaves all or part of the crop residue on the surface increases the rate of water infiltration. No-till planting helps to control erosion and conserves moisture. A cropping sequence that includes close-growing crops helps to control erosion. Slopes that are long and uniform can be terraced. Seepage is a problem in draws and at the base of knolls. Subsurface drains intercept the seepage at the base of slopes.

This soil is well suited to grasses and legumes for hay and pasture. A wide variety of grasses and legumes, including orchardgrass and alfalfa, grow well. Proper stocking rates, pasture rotation, and timely grazing help to keep the pasture in good condition.

Some areas on narrow ridgetops between very steep draws are wooded. This soil is well suited to trees. Plant competition is the main management concern. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

This soil is suitable as a site for dwellings and septic tank absorption fields. It is severely limited as a site for local roads and streets because of frost action and low strength. Replacing or strengthening the base with better suited material and providing adequate side ditches and culverts help to prevent the damage caused by frost action and low strength.

The land capability classification is IIe. The woodland ordination symbol is 5A.

PkC2—Pike silt loam, 6 to 12 percent slopes, eroded. This moderately sloping, deep, well drained soil is in the uplands. It is on the sides of knolls and drainageways. Slopes are generally 100 to 300 feet long. Most areas along drainageways are narrow and elongated and are 2 to 10 acres in size. Those on knolls are irregularly shaped and are 5 to 30 acres in size.

In a typical profile, the surface layer is brown silt loam about 7 inches thick. The subsoil extends to a depth of about 80 inches. In sequence downward, it is dark yellowish brown, friable silt loam; brown, firm silty clay loam; brown, friable loam and sandy clay loam; and reddish brown and red, friable sandy clay loam. In places brown loam or clay loam is at a depth of 32 to 40 inches. In some small areas, particularly on narrow ridgetops, the slope is less than 6 percent. In other areas it is more than 12 percent. In places bedrock is at a depth of 40 to 60 inches.

Included with this soil in mapping are small areas of the somewhat poorly drained Newark soils on narrow bottom land along drainageways. Also included, on the sides of knolls, are a few small areas of the well drained Cincinnati soils, which have a fragipan. Included soils make up about 5 to 10 percent of the map unit.

The Pike soil has a high available water capacity and is moderately permeable. Runoff is rapid. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. A few are used for hay or pasture or are wooded.

This soil is fairly well suited to corn, soybeans, and small grain. The hazard of erosion is the main management concern. A system of conservation tillage that leaves all or part of the crop residue on the surface minimizes crusting and increases the rate of water infiltration. No-till planting helps to control erosion and conserves moisture. A cropping sequence that includes close-growing crops helps to control erosion. Contour farming slows runoff.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as alfalfa, for hay and pasture. A cover of grasses and legumes helps to control erosion. The major management concern is overgrazing. Proper stocking rates and pasture rotation help to keep the pasture in good condition.

This soil is well suited to trees. Seedlings survive and grow well if competing vegetation is controlled by proper site preparation or by cutting, spraying, or girdling.

Because of the slope, this soil is moderately limited as a site for dwellings. Buildings should be designed so that they conform to the natural slope of the land. The soil is severely limited as a site for local roads and streets because of low strength and frost action. Strengthening or replacing the base with better suited material and providing adequate side ditches and culverts help to prevent the damage caused by low strength and frost action. The soil is moderately limited as a site for septic tank absorption fields because of the slope. Installing the absorption field on the contour helps to overcome the slope.

The land capability classification is IIIe. The woodland ordination symbol is 5A.

PrB—Princeton fine sandy loam, 2 to 6 percent slopes. This gently sloping, deep, well drained soil is on knolls in the uplands. Slopes are undulating and are dominantly 50 to 150 feet long. Areas are irregularly shaped and are 3 to 50 acres in size.

In a typical profile, the surface layer is dark yellowish brown fine sandy loam about 11 inches thick. The subsoil is about 53 inches thick. The upper part is brown, friable fine sandy loam; the next part is dark brown and brown, friable fine sandy loam and very fine sandy loam; and the lower part is yellowish brown, very friable loamy fine sand. The substratum to a depth of about 70 inches is yellowish brown, stratified fine sandy loam, loamy fine sand, and silt. In some small areas the slope is less than 2 or more than 6 percent. On some knolls, the surface layer is loamy fine sand and the subsoil is mostly sandy loam. In places, the surface layer is silt loam and the subsoil is silt loam or silty clay loam.

Included with this soil in mapping are narrow areas of the somewhat poorly drained Ayrshire soils in drainageways. These soils make up about 2 to 5 percent of the map unit.

The Princeton soil has a high available water capacity and is moderately permeable. Runoff is medium. The organic matter content is moderate in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content.

Most areas of this soil are used for cultivated crops. A few small areas are used for hay or pasture or are wooded.

This soil is well suited to corn, soybeans, and small grain. Erosion is a hazard. A system of conservation tillage that leaves all or part of the crop residue on the surface increases the rate of water infiltration. No-till planting helps to control erosion and conserves moisture. Contour farming slows runoff. A cropping sequence that includes close-growing crops helps to control erosion. Seepage is a problem in draws and at the base of knolls. Subsurface drains intercept the seepage at the base of slopes.

This soil is well suited to grasses and legumes for hay and pasture. A wide variety of grasses and legumes, including orchardgrass and alfalfa, grow well. Proper stocking rates, pasture rotation, and timely grazing help to keep the pasture in good condition.

Some areas on narrow ridgetops between very steep draws are wooded. This soil is well suited to trees. Plant competition is the main management concern. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

This soil is suitable as a site for dwellings and septic tank absorption fields. It is moderately limited as a site for local roads and streets because of frost action. Providing adequate side ditches and culverts helps to prevent the damage caused by frost action.

The land capability classification is IIe. The woodland ordination symbol is 5A.

PrC—Princeton fine sandy loam, 6 to 12 percent slopes. This moderately sloping, deep, well drained soil is on knolls in the uplands. Slopes are undulating and dominantly are 50 to 150 feet long. Areas are irregularly shaped and are 3 to 10 acres in size.

In a typical profile, the surface layer is dark yellowish brown fine sandy loam about 9 inches thick. The subsoil is about 47 inches thick. In sequence downward, it is yellowish brown, friable fine sandy loam; strong brown, friable sandy loam; strong brown, friable sandy clay loam; strong brown, friable loam; and yellowish brown, friable silt loam. The substratum to a depth of about 70 inches is strong brown silt loam stratified with sandy loam and very fine sandy loam. In some small areas, the surface layer is loamy fine sand and the subsoil is mostly sandy loam. In some small areas the slope is less than 6 or more than 12 percent. In places, the surface layer is silt loam and the subsoil is silt loam or silty clay loam.

Included with this soil in mapping are narrow areas of the somewhat poorly drained Ayrshire soils in drainageways and a few small areas of the somewhat poorly drained Stendal soils along drainageways at the bottom of draws. Included soils make up about 5 to 10 percent of the map unit.

The Princeton soil has a high available water capacity and is moderately permeable. Runoff is medium. The organic matter content is moderate in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content.

Most areas of this soil are used for cultivated crops. A few small areas are used for hay or pasture or are wooded.

This soil is fairly well suited to corn, soybeans, and small grain. Erosion is a hazard. A system of conservation tillage that leaves all or part of the crop residue on the surface increases the rate of water infiltration. No-till planting helps to control erosion and conserves moisture. A cropping sequence that includes close-growing crops helps to control erosion. Seepage is a problem in draws and at the base of knolls. Subsurface drains intercept the seepage at the base of slopes.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as alfalfa, for hay and pasture. A cover of grasses and legumes helps to control erosion. Proper stocking rates, pasture rotation, and timely grazing help to keep the pasture in good condition.

This soil is well suited to trees. Plant competition is a moderate limitation. It can be controlled by cutting, spraying, or girdling.

Because of the slope, this soil is moderately limited as a site for dwellings. Buildings should be designed so that they conform to the natural slope of the land. Land shaping and installing retaining walls help to overcome the slope. Areas disturbed during construction should be revegetated as soon as possible.

This soil is moderately limited as a site for local roads and streets because of the slope and frost action. Constructing the roads and streets on the contour and land shaping help to overcome the slope. Providing adequate side ditches and culverts help to prevent the damage caused by frost action.

This soil is moderately limited as a site for septic tank absorption fields because of the slope. Land shaping and installing the distribution lines across the slope help to ensure that the absorption field functions properly.

The land capability classification is IIIe. The woodland ordination symbol is 5A.

RaA—Reesville silt loam, 0 to 2 percent slopes. This nearly level, deep, somewhat poorly drained soil is on flats in the uplands. Areas are irregularly shaped and are 5 to 30 acres in size.

In a typical profile, the surface layer is grayish brown silt loam about 9 inches thick. The subsoil is about 35 inches thick. The upper part is light brownish gray, mottled, friable silt loam; the next part is brownish yellow, light olive brown, and yellowish brown, mottled, firm silty clay loam; and the lower part is light olive brown, mottled, friable silty clay loam. The substratum to a depth of about 60 inches is light olive brown, mottled silt loam. In places the subsoil and substratum are strongly acid. In a few small areas along drainageways, the slope is 2 to 4 percent.

Included with this soil in mapping are small areas of a moderately well drained soil along drainageways or on low rises. This included soil is not grayish in the upper part of the subsoil. Also included are areas of the moderately well drained Ava soils on low knolls and breaks. Included soils make up about 5 to 10 percent of the map unit.

The Reesville soil has a very high available water capacity and is moderately permeable. A perched water table is at a depth of 1.0 to 2.5 feet in the winter and early spring. Runoff is slow. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. A few are used for hay or pasture.

This soil is well suited to corn, soybeans, and small grain. The wetness is a limitation. A drainage system has been established in most areas, but additional drainage measures are needed in many areas. A subsurface drainage system helps to overcome the wetness. Land smoothing helps to keep water from ponding in low spots. A conservation tillage system that leaves all or part of the crop residue on the surface increases the rate of water infiltration.

This soil is well suited to grasses, such as orchardgrass, and some legumes, such as alfalfa and red clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of the wetness and frost heaving. The suitability for legumes depends on the completeness of drainage. A subsurface drainage system helps to overcome the wetness. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, and timely deferment of grazing during wet periods help to keep the pasture in good condition.

A few small areas support native hardwoods. This soil is fairly well suited to trees. The equipment limitation and plant competition are the main management concerns. The use of planting and logging equipment is limited during wet periods. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the wetness, this soil is severely limited as a site for dwellings. Installing subsurface drains at the base of the footings and diverting surface water away from houses by proper grading and landscaping help to overcome the wetness.

This soil is severely limited as a site for local roads and streets because of low strength and frost action. Providing an adequate drainage system along the roads and replacing or strengthening the base with better suited material help to overcome the damage caused by low strength and frost action.

This soil is severely limited as a site for septic tank absorption fields because of the wetness and the moderate permeability. Installing perimeter drains around the absorption field helps to overcome the wetness. Filling or mounding the absorption field with suitable material improves the ability of the field to absorb the effluent.

The land capability classification is IIw. The woodland ordination symbol is 4W.

Rb—Rensselaer sandy loam. This nearly level, deep, very poorly drained soil is in depressional areas on low terraces. It is subject to ponding. Areas are irregularly shaped and are 100 to 500 acres in size.

In a typical profile, the surface layer is very dark gray sandy loam about 8 inches thick. The subsurface layer is very dark grayish brown sandy loam about 4 inches thick. The subsoil is dark gray, mottled, very friable and friable sandy loam, sandy clay loam, and fine sandy loam about 44 inches thick. The substratum to a depth of about 70 inches is grayish brown, stratified sand, fine sand, and loamy sand. In some small areas the subsoil is mostly sandy loam. In some drainageways and on the slightly lower parts of depressions, the surface layer is loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Ayrshire and Roby soils on slight rises. These soils make up about 2 to 5 percent of the map unit.

The Rensselaer soil has a high available water capacity and is moderately permeable. The water table is often near or slightly above the surface in the winter and early spring. Runoff is very slow or ponded. The organic matter content is high in the surface layer. This layer is friable and can be easily tilled throughout a wide range of moisture content.

Most areas of this soil are used for cultivated crops. A few are used for hay or pasture or are wooded.

This soil is well suited to corn, soybeans, and small grain. The wetness and the hazard of soil blowing are problems (fig. 11). A drainage system has been established in most areas, but additional drainage measures are needed in many areas. A subsurface drainage system helps to overcome the wetness. In some areas drainage ditches are needed to provide outlets for subsurface drains. Land smoothing and shallow surface drains help to remove ponded water. A system of conservation tillage that keeps the maximum amount of crop residue on the surface helps to control soil blowing. Growing cover crops increases the rate of water infiltration, helps to maintain good tilth, and helps to control soil blowing.

This soil is well suited to grasses, such as orchardgrass, and some legumes, such as red clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of the wetness and frost heaving. The suitability for legumes depends on the completeness of drainage. A subsurface drainage system helps to overcome the wetness. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, and timely grazing help to keep the pasture in good condition.

This soil is fairly well suited to trees. The equipment limitation, seedling mortality, the windthrow hazard, and plant competition are management concerns. Equipment should be used only during dry periods or when the ground is frozen. Because of seedling mortality, special planting stock and overstocking are needed. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced. Competing vegetation can be controlled by cutting, spraying, or girdling.

Because of the ponding, this soil is generally unsuitable as a site for dwellings and sanitary facilities. It is severely limited as a site for local roads because of the ponding, low strength, and frost action. Constructing the roads on raised, well compacted fill material and

Figure 11.—Soil blowing in an area of Rensselaer sandy loam and Roby sandy loam, 0 to 2 percent slopes.

Figure 12.—Ponding in a depressional area of Rensselaer loam.

providing adequate side ditches and culverts help to overcome these limitations.

The land capability classification is IIw. The woodland ordination symbol is 5W.

Rd—Rensselaer loam. This nearly level, deep, very poorly drained soil is in depressional areas on low terraces. It is subject to ponding (fig. 12). Areas are irregularly shaped and are 100 to 600 acres in size.

In a typical profile, the surface layer is very dark gray loam about 9 inches thick. The subsurface layer also is very dark gray loam. It is about 6 inches thick. The subsoil is dark gray, mottled, firm and friable sandy clay loam and clay loam about 35 inches thick. The substratum to a depth of about 70 inches is dark gray and light brownish gray, mottled clay loam and stratified fine sand, sand, sandy loam, and sandy clay loam. In some areas the subsoil has layers of sandy loam. In a few places the surface layer and subsoil are silt loam or silty clay loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Ayrshire soils. These soils are generally on slight rises. They make up about 2 to 5 percent of the map unit.

The Rensselaer soil has a high available water capacity and is moderately permeable. The water table is often near or slightly above the surface in winter and early spring. Runoff is very slow or ponded. The organic matter content is high in the surface layer. This layer is friable and can be easily tilled when the content of moisture is low.

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

This soil is well suited to corn, soybeans, and small grain. The wetness is the main limitation. A drainage system has been established in most areas, but additional drainage measures are needed in many areas.

A subsurface drainage system helps to overcome the wetness. In places drainage ditches are needed to provide outlets for subsurface drains. Land smoothing and shallow surface drains help to prevent ponding. Growing cover crops increases the rate of water infiltration and helps to maintain good tilth.

This soil is well suited to grasses, such as orchardgrass, and some legumes, such as red clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of the wetness and frost heaving. The suitability for legumes depends on the completeness of the drainage. A subsurface drainage system helps to overcome the wetness. In places drainage ditches are needed to provide outlets for subsurface drains. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, and timely deferment of grazing during wet periods help to keep the pasture in good condition.

This soil is fairly well suited to trees. The equipment limitation, seedling mortality, the windthrow hazard, and plant competition are management concerns. Equipment should be used only during dry periods or when the ground is frozen. Because of seedling mortality, special planting stock and overstocking are needed. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced. Competing vegetation can be controlled by cutting, spraying, or girdling.

Because of the ponding, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields. It is severely limited as a site for local roads because of the ponding, frost action, and low strength. Replacing the soil with coarser textured material, constructing the roads on raised, well compacted fill material, and providing adequate side ditches and culverts help to prevent the damage caused by low strength, ponding, and frost action.

The land capability classification is IIw. The woodland ordination symbol is 5W.

RmA—Roby sandy loam, 0 to 2 percent slopes. This nearly level, deep, somewhat poorly drained soil is on low terraces. Most areas are 3 to 20 acres in size. They generally are narrow and elongated and are adjacent to and between knolls and depressions.

In a typical profile, the surface layer is dark grayish brown sandy loam about 10 inches thick. The subsoil is about 42 inches thick. In sequence downward, it is pale brown, mottled, very friable sandy loam; light brownish gray, mottled, friable sandy loam; and light brownish gray and gray, mottled, very friable sandy loam that has dark brown bands and masses of sandy clay loam. The upper part of the substratum is grayish brown, mottled sandy loam. The lower part to a depth of about 80 inches is grayish brown, stratified sand, loamy sand, and sandy loam. In places the upper part of the subsoil is brown. In some small areas the slope is somewhat more than 2 percent. In places, the upper 24 to 36 inches is loamy sand and the subsoil is mainly clay loam and sandy clay loam.

Included with this soil in mapping are areas of the very poorly drained Rensselaer soils in swales and depressions. These soils make up about 2 to 5 percent of the map unit.

The Roby soil has a high available water capacity and is moderately permeable. The organic matter content is moderate in the surface layer. The water table is at a depth of 1 to 3 feet in the spring. Runoff is slow. The surface layer is very friable and can be easily tilled throughout a wide range of moisture content.

Most areas of this soil are used for cultivated crops. A few are used for hay or pasture or are wooded.

This soil is well suited to corn, soybeans, and small grain. Wetness and soil blowing are management concerns. A drainage system has been established in most areas. Additional drainage measures are needed in many areas. Subsurface drains are used, but outlets are difficult to locate in some areas. Special blinding material is needed to keep fine sand from filling the drains. Land smoothing and shallow surface drains help to remove excess surface water. A system of conservation tillage that keeps the maximum amount of crop residue on the surface helps to control soil blowing. Conservation tillage, cover crops, and green manure crops increase the organic matter content and help to maintain good tilth.

This soil is well suited to grasses, such as orchardgrass, and some legumes, such as red clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of the wetness and frost heaving. The suitability for legumes depends on the completeness of drainage. Some areas without a drainage system can be used for grasses and legumes, but a drainage system is usually beneficial. Overgrazing or grazing when the soil is wet results in surface compaction and poor tilth. Proper stocking rates, pasture rotation, and timely deferment of grazing during wet periods help to keep the pasture in good condition.

A few small areas support native hardwoods. This soil is well suited to trees. Plant competition is a management concern. It can be overcome by cutting, spraying, or girdling.

Because of the wetness, this soil is severely limited as a site for dwellings and septic tank absorption fields. Installing subsurface drains at the base of the footings and diverting surface water away from houses by proper grading and landscaping help to overcome the wetness. Perimeter drains are needed around the absorption fields. The soil is severely limited as a site for local roads and streets because of frost action. Providing an adequate drainage system and replacing or strengthening the base with better suited material help to prevent the damage caused by frost action.

The land capability classification is IIs. The woodland ordination symbol is 4A.

ScA—Shakamak silt loam, 1 to 3 percent slopes. This very gently sloping, deep, somewhat poorly drained and moderately well drained soil is on ridgetops and along drainageways. Most slopes are 100 to 300 feet long. Areas are 2 to 150 acres in size.

In a typical profile, the surface layer is brown silt loam about 10 inches thick. The subsoil extends to a depth of about 80 inches. In sequence downward, it is light yellowish brown and yellowish brown, friable silt loam; yellowish brown, mottled, firm silty clay loam; yellowish brown, mottled, very firm, brittle silt loam; a fragipan of yellowish brown, mottled, very firm, brittle silt loam; and yellowish brown, mottled, friable and firm loam and clay loam. In some small areas the soil does not have gray mottles within a depth of 24 inches. In wooded areas the surface layer is thin and is very dark grayish brown and dark brown. In places the substratum consists of sandstone and shale bedrock residuum. In a few small areas the soil is nearly level. In a few areas the slope is 3 to 6 percent.

Included with this soil in mapping are the well drained Cincinnati soils on steeper breaks and knolls and the poorly drained, nearly level Vigo soils on ridgetops and in small drainageways. Included soils make up about 5 to 10 percent of the map unit.

The Shakamak soil has a moderate available water capacity. It is very slowly permeable in the fragipan. A perched water table is at a depth of 1.5 to 2.0 feet in winter and early spring. Runoff is medium. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled throughout a fairly wide range in moisture content. The fragipan restricts water movement and root growth.

Most areas of this soil are used for cultivated crops. Some are used for hay and pasture. A few are wooded.

This soil is well suited to corn, soybeans, and small grain. The wetness and erosion are management concerns. The fragipan restricts root development. The water table is perched on the fragipan. Fieldwork is often delayed by seepage on slopes. Subsurface drains intercept the seepage and lower the water table. A system of conservation tillage that leaves all or part of the crop residue on the surface minimizes crusting and increases the rate of water infiltration. No-till planting and a cropping sequence that includes close-growing crops help to control erosion. Terraces, water- and sediment-control basins, and grassed waterways help to control erosion and help to prevent gullying in drainageways.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as alfalfa and red clover, for hay and pasture. Many grasses and legumes are suited, but deep-rooted legumes, such as alfalfa, are often damaged by frost heaving. A cover of grasses and legumes helps to control erosion. Subsurface drains intercept seepage and lower the water table. Overgrazing or grazing when the soil is wet causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. The main management concern is plant competition. Competing vegetation can be controlled by cutting, spraying, and girdling.

This soil is moderately limited as a site for dwellings without basements and severely limited as a site for dwellings with basements. The wetness and the shrink-swell potential are management concerns. Installing drains around footings and diverting surface water away from houses by proper landscaping and grading help to overcome the wetness. Strengthening foundations and basement walls helps to prevent the damage caused by shrinking and swelling.

Because of frost action and low strength, this soil is severely limited as a site for local roads and streets. Providing adequate side ditches and culverts along the roads and adding suitable base material help to prevent the damage caused by low strength and frost action.

This soil is severely limited as a site for septic tank absorption fields because of the very slow permeability in the fragipan and the wetness. Replacing the very slowly permeable material with more permeable material and installing perimeter interception drains around the absorption field help to overcome these limitations.

The land capability classification is IIw. The woodland ordination symbol is 4A.

So—Steff silt loam, rarely flooded. This nearly level, deep, moderately well drained soil is on bottom land. It is subject to rare flooding. The flooding is of brief duration and occurs mainly in winter and spring. Most areas are 5 to 25 acres in size. They are generally elongated and are parallel to streams.

In a typical profile, the surface layer is brown silt loam about 10 inches thick. The subsoil is light yellowish brown and pale brown, mottled, friable silt loam about 16 inches thick. The upper part of the substratum is light yellowish brown and yellowish brown, mottled loam and very fine sandy loam. The lower part to a depth of about 60 inches is light brownish gray and dark yellowish brown, mottled silt loam. In places the subsoil and substratum are medium acid. In some narrow areas at the edge of the unit, the slope is 2 to 4 percent.

Included with this soil in mapping are small areas of the moderately well drained Pekin soils on low terraces. These soils are not flooded. Also included are a few small areas of the somewhat poorly drained Stendal soils on the slightly lower parts of the bottom land. Included soils make up about 5 to 15 percent of the map unit.

The Steff soil has very high available water capacity and is moderately permeable. The water table is at a depth of 1.5 to 3.0 feet in winter and early spring. Runoff is slow. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for cultivated crops. A few are used for hay and pasture or are forested.

This soil is well suited to corn, soybeans, grain sorghum, and small grain. The flooding is the main management concern. In places building dikes or water-retention structures helps to prevent the damage caused by flooding. Growing winter cover crops increases the organic matter content and improves tilth. A permanent cover of grasses, shrubs, and trees helps to prevent scouring on streambanks. Subsurface drains are needed in seepy areas in drainageways and in some included areas of Stendal soils.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as alfalfa and red clover, for hay and pasture. The main management concern is overgrazing. Proper stocking rates, pasture rotation, and timely deferment of grazing during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. The main management concern is plant competition. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the flooding and the wetness, this soil is generally unsuitable as a site for dwellings and sanitary facilities. It is severely limited as a site for local roads because of low strength and frost action. Strengthening or replacing the base with better suited material helps to overcome the low strength. Installing a surface drainage system along the roads helps to remove excess surface water and thus helps to prevent the damage caused by frost action.

The land capability classification is I. The woodland ordination symbol is 8A.

Sr—Steff silt loam, frequently flooded. This nearly level, deep, moderately well drained soil is on bottom land. It is flooded for brief periods, mainly in winter and spring. Areas are generally narrow and elongated and are parallel to streams. Most are 10 to 40 acres in size.

In a typical profile, the surface layer is brown silt loam about 10 inches thick. The subsoil is friable silt loam about 17 inches thick. The upper part is yellowish brown, and the lower part is pale brown and mottled. The upper part of the substratum is light brownish gray and light gray, mottled silt loam. The lower part to a depth of about 60 inches is light yellowish brown, mottled, stratified silt loam, loam, and fine sandy loam. In some areas the soil is medium acid.

Included with this soil in mapping are small areas of the somewhat poorly drained Stendal soils on the slightly lower parts of the bottom land. Also included are a few narrow strips of the well drained Cuba soils along stream channels. Included soils make up about 3 to 7 percent of the map unit.

The Steff soil has a very high available water capacity and is moderately permeable. The water table is at a depth of 1.5 to 3.0 feet during the winter and early spring. Runoff is slow. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled.

Most areas of this soil are used for cultivated crops. Some are used for small grain or for hay and pasture.

This soil is well suited to corn, soybeans, and grain sorghum. The flooding is the main management concern. In some years replanting is needed because flooding has destroyed stands. Small grain and alfalfa are especially subject to flood damage. Dikes and levees help to control flooding along large streams, but they generally are not built along small streams where bottoms are narrow. Conservation tillage, green manure crops, and cover crops increase the organic matter content and help to maintain good tilth. A permanent cover of grasses, shrubs, and trees helps to prevent scouring on streambanks.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as red clover, for hay and pasture. Overgrazing is the main management concern. It results in reduced plant density, surface compaction, and poor tilth. Proper stocking rates, pasture rotation, and timely deferment of grazing during wet periods help to keep the pasture in good condition.

Some areas, particularly those on narrow bottoms that are adjacent to very steep soils, are used for woodland. This soil is well suited to trees. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the flooding and the wetness, this soil is generally unsuitable as a site for dwellings and sanitary facilities. It is severely limited as a site for local roads because of the flooding, low strength, and frost action. Strengthening or replacing the base with better suited material improves the ability of the roads to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding and frost action.

The land capability classification is IIw. The woodland ordination symbol is 8A.

St—Stendal silt loam, frequently flooded. This nearly level, deep, somewhat poorly drained soil is on bottom land. It is flooded for brief periods, mainly in winter and spring. Areas are generally elongated and irregularly shaped. They are 10 to 200 acres in size.

In a typical profile, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsoil is dark grayish brown and grayish brown, mottled, friable silt loam about 21 inches thick. The substratum to a depth of about 60 inches is light brownish gray, mottled silt loam and grayish brown, mottled silt loam that has thin strata of silty clay loam. In some small areas the soil is medium acid or slightly acid.

Included with this soil in mapping are small areas of the poorly drained and very poorly drained Bonnie soils and the moderately well drained Steff soils. Bonnie soils are in the lower nearly level or slightly depressional areas on bottom land. Steff soils are on slight rises next to stream channels. Included soils make up about 5 to 10 percent of the map unit.

The Stendal soil has a very high available water capacity and is moderately permeable. The water table is at a depth of 1 to 3 feet during the winter and early spring. Runoff is slow. The organic matter content is moderate in the surface layer. This layer is friable and can be easily tilled, but it tends to puddle and crust after heavy rains.

Most areas of this soil are used for cultivated crops. Some are used for small grain or for hay or pasture (fig. 13). Many narrow bottoms in draws are used for woodland or pasture.

If drained, this soil is well suited to corn, soybeans, and grain sorghum. The flooding is the main management concern. In some years replanting is needed because flooding has destroyed stands. Dikes and levees help to control flooding along large streams, but they generally are not built along small streams where bottoms are narrow. The wetness is a limitation. A drainage system is needed. Subsurface drains are commonly used. Land smoothing and shallow surface drains help to remove excess surface water. Conservation tillage, cover crops, and green manure crops increase the organic matter content and help to maintain good tilth.

Figure 13.—Hay in an area of Stendal silt loam, frequently flooded.

This soil is well suited to grasses, such as orchardgrass, and some legumes, such as red clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of the wetness and frost heaving. Some grasses and legumes can be grown in undrained areas, but a drainage system is generally beneficial. Overgrazing or grazing when the soil is wet results in reduced plant density, surface compaction, and poor tilth. Proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture in good condition. A permanent cover of grasses, shrubs, and trees helps to prevent scouring on streambanks.

This soil is fairly well suited to trees. Plant competition and the equipment limitation are the main management concerns. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling. Seasonal wetness may slightly delay harvesting or planting.

Because of the flooding and the wetness, this soil is generally unsuitable as a site for dwellings and sanitary facilities. It is severely limited as a site for local roads because of the flooding, low strength, and frost action. Strengthening or replacing the base with better suited material improves the ability of the roads to support vehicular traffic. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding and frost action.

The land capability classification is IIw. The woodland ordination symbol is 5W.

Ud—Udorthents, loamy. These nearly level to moderately sloping, deep, somewhat excessively drained soils are on flood plains. They are subject to flooding. They consist of mounds of loamy and silty soil material that remain after sand and gravel have been mined. Reaction is mildly alkaline or neutral. Areas are 10 to 100 acres in size. They are commonly adjacent to water-filled pits. Some areas are currently being mined.

No one profile is typical of these soils. In one of the more common profiles, however, the surface layer is dark grayish brown sandy loam about 6 inches thick. In sequence downward, the underlying material is brown, very compact sandy loam about 20 inches thick; stratified, brown, very compact silt loam and fine sandy loam about 15 inches thick; and brown silt loam about 19 inches thick. Some areas have more than 60 inches of sandy overburden. In places, the surface layer is gravelly and the underlying material has gravelly layers. Some layers of this soil have been heavily compacted by wheeled equipment and have platy structure.

Included with these soils in mapping are areas that are more sloping as a result of cuts that have removed soil material and a few areas that have not been disturbed by mining activities. Also included are some areas in the uplands where fill material has been removed and the soil is gravelly sandy loam. These areas are not flooded. Included soils make up about 5 to 15 percent of the map unit.

The Udorthents have a high available water capacity. They are slowly permeable in the compact, medium textured material and rapidly permeable or very rapidly permeable in the sandy material. Runoff is slow or medium. The organic matter content is low in the surface layer. This layer is friable and can be easily tilled. Because the upper part of the medium textured underlying material is very compact, plant growth is restricted.

Most areas of these soils support volunteer hardwoods, weeds, and grasses. Some are currently being used for stockpiling sand, gravel, and soil material. Some of the lower areas where the water table is at or near the surface are marshy and support cottonwood, willows, cattails, and marsh grasses.

Because of the compaction of the underlying material, these soils are poorly suited to corn, soybeans, and small grain, even after land shaping and smoothing. They are suited to grasses and legumes for cover, but seedlings are difficult to establish and maintain because of the compaction. The soils are suited to woodland. The most common trees are cottonwood, sycamore, red maple, and willow.

These soils are generally unsuitable as sites for dwellings, sanitary facilities, and local roads because of the frequent flooding.

No land capability classification or woodland ordination symbol is assigned.

UnE—Uniontown silt loam, 18 to 30 percent slopes. This moderately steep and steep, deep, well drained and moderately well drained soil is on terraces in draws and on breaks to bottom land. Slopes are 30 to 100 feet long. Most areas are 20 to 80 acres in size and are narrow and elongated.

In a typical profile, the surface layer is very dark grayish brown silt loam about 3 inches thick. The subsurface layer is brown silt loam about 3 inches thick. The subsoil is mottled, firm silty clay loam about 39 inches thick. The upper part is yellowish brown, and the lower part is olive yellow and brownish yellow. The substratum to a depth of about 60 inches is light brownish gray and strong brown, mottled silty clay loam and stratified silty clay loam and silt loam. In places the subsoil and substratum are silty clay.

Included with this soil in mapping are narrow, elongated areas of the moderately well drained, gently sloping Pekin soils on ridges between draws. Also included are narrow strips of Haymond soils along drainageways at the bottom of draws; some areas where the slope is 30 to 50 percent; some areas that are underlain by cavernous limestone and that have large sinkholes; and exposures of sandstone, shale, or limestone bedrock in the lower part of some draws.

Included areas make up about 10 to 15 percent of the map unit.

The Uniontown soil has a high available water capacity and is moderately permeable or moderately slowly permeable. The water table is at a depth of 2.5 to 6.0 feet during winter and spring. Runoff is very rapid. The organic matter content is moderate. The surface layer is friable and can be easily tilled.

Most areas are wooded. A few small areas are pastured. Because of the slope and the hazard of erosion, this soil is generally unsuited to corn, soybeans, and small grain. It is fairly well suited to grasses, such as orchardgrass, and legumes, such as alfalfa, for pasture. It is poorly suited to hay. The slope hinders the use of farm machinery. A cover of grasses and legumes helps to control erosion. Overgrazing is the main concern in managing the pastured areas. Proper stocking rates, pasture rotation, and timely deferment of grazing when the soil is wet help to keep the pasture in good condition.

This soil is fairly well suited to trees. A cover of woody vegetation helps to prevent excessive runoff and erosion. The hazard of erosion, the equipment limitation, and plant competition are management concerns. The slope limits the use of planting and logging equipment. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling. Diverting runoff away from logging roads that run up and down the hill helps to control erosion.

This soil is generally unsuitable as a site for dwellings and sanitary facilities because of the slope and the wetness. It is severely limited as a site for local roads because of the slope, low strength, and frost action. Cutting and filling are needed. Building the roads on the contour helps to overcome the slope. Replacing or covering the upper soil layers with suitable base material helps to prevent the damage caused by frost action and low strength.

The land capability classification is VIe. The woodland ordination symbol is 6R.

VgA—Vigo silt loam, 0 to 2 percent slopes. This nearly level, deep, poorly drained soil is on flats in the uplands. Areas are irregularly shaped and are 40 to 600 acres in size.

In a typical profile, the surface layer is grayish brown silt loam about 8 inches thick. The subsurface layer is light gray, mottled silt loam about 10 inches thick. The next 8 inches is mixed light brownish gray, mottled silty clay loam and light gray silt loam. The subsoil extends to a depth of about 80 inches. It is mottled. The upper part is light gray, firm silty clay loam, and the lower part is gray, strong brown, and yellowish brown silt loam. In some areas the subsoil is silty clay loam throughout. In a few areas the slope is 2 to 4 percent. In places the subsoil is yellowish brown, mottled silt loam.

Included with this soil in mapping are small areas of the somewhat poorly drained and moderately well drained Shakamak soils on low rises. These soils make up about 2 to 5 percent of the map unit.

The Vigo soil has a very high available water capacity and is very slowly permeable. The water table is at a depth of 0.5 foot to 2.5 feet during winter and early spring. Runoff is slow. The organic matter content is low. The surface layer is friable and can be easily tilled throughout a fairly wide range of moisture content, but it tends to puddle and crust after heavy rains.

Most areas of this soil are used for cultivated crops. A few are used for hay or pasture or are wooded.

This soil is well suited to corn, soybeans, and small grain. The wetness is a limitation. A drainage system has been established in most areas, but additional drainage measures are needed in many areas. A subsurface drainage system helps to overcome the wetness. Land smoothing and shallow surface drains help to prevent ponding in low spots. A system of conservation tillage that leaves all or part of the crop residue on the surface prevents excessive crusting and increases the rate of water infiltration. Cover crops and green manure crops increase the organic matter content and help to maintain good tilth. Ridge tillage helps to prevent compaction in the rows. Erosion is a problem in included areas that have a slope of 2 to 3 percent. Contour farming and terraces help to control erosion in these gently sloping areas.

This soil is well suited to grasses, such as orchardgrass, and some legumes, such as red clover, for hay and pasture. It is not well suited to alfalfa because of the wetness and frost heaving. The suitability for legumes depends on the completeness of drainage. A subsurface drainage system helps to overcome the wetness. Overgrazing or grazing when the soil is wet causes surface compaction and reduces plant density. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This soil is fairly well suited to trees. Plant competition, the equipment limitation, seedling mortality, and the windthrow hazard are management concerns. Prolonged seasonal wetness hinders harvesting, logging, and planting. Water-tolerant species should be favored in the stands. Equipment should be used only during dry periods or when the ground is frozen. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling. Some replanting of seedlings is generally needed.

Because of the wetness, this soil is severely limited as a site for dwellings. Installing drains around footings and diverting surface water away from houses by proper grading and landscaping help to overcome the wetness.

This soil is severely limited as a site for local roads and streets because of the wetness, low strength, and frost action. Providing an adequate drainage system along the roads and replacing or strengthening the base with better suited material help to overcome these limitations.

This soil is severely limited as a site for septic tank absorption fields because of the very slow permeability and the wetness. Filling or mounding the absorption field with suitable material improves the ability of the field to absorb the effluent. Installing perimeter interceptor drains around the absorption field helps to overcome the wetness.

The land capability classification is IIw. The woodland ordination symbol is 5W.

WcA—Waupecan silt loam, rarely flooded, 0 to 2 percent slopes. This nearly level, deep, well drained soil is on terraces. It is protected from most floods by the McGinnis Levee. Areas are somewhat elongated and are parallel to river sloughs. They are 40 to 250 acres in size.

In a typical profile, the surface layer is very dark grayish brown silt loam about 8 inches thick. The subsurface layer also is very dark grayish brown silt loam. It is about 3 inches thick. The subsoil is about 55 inches thick. The upper part is brown, friable silty clay loam. The next part is brown, firm clay loam. The lower part is brown and yellowish brown, firm clay loam and sandy clay loam and friable coarse sandy loam. The substratum to a depth of about 80 inches is yellowish brown gravelly loamy sand. In places the surface layer and the upper part of the subsoil are sandy loam. In a few narrow, elongated areas along sloughs or drainageways, the slope is more than 2 percent.

Included with this soil in mapping are a few small, narrow, elongated areas of Ayrshire soils in shallow swales and drainageways. These soils make up about 2 to 5 percent of the map unit.

The Waupecan soil has a high available water capacity and is moderately permeable. Runoff is slow. The organic matter content is high in the surface layer. This layer is friable and can be easily tilled throughout a fairly wide range of moisture content.

Nearly all areas are used for cultivated crops. This soil is well suited to corn, soybeans, and small grain. The rare flooding is a hazard. Crops can be damaged if floodwater overtops the levee. Applying a system of conservation tillage, returning crop residue to the soil, and growing cover crops maintain the organic matter content and improve tilth. No-till planting helps to conserve moisture.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as alfalfa, for hay and pasture. Proper stocking rates, pasture rotation, and timely grazing help to keep the pasture in good condition.

This soil is well suited to trees. Walnut trees grow well. Plant competition is a moderate limitation. Seedlings grow well, however, if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the flooding, this soil is generally unsuitable as a site for dwellings and is moderately limited as a site for sanitary facilities. Flooding is a hazard because floodwater could overtop the levee. The soil is moderately limited as a site for local roads and streets because of frost action and low strength. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by frost action and low strength.

The land capability classification is I. No woodland ordination symbol is assigned.

WeD2—Wellston silt loam, 12 to 18 percent slopes, eroded. This strongly sloping, deep, well drained soil is in the uplands. It is on knolls and on side slopes along drainageways. Slopes generally are 100 to 300 feet long. Areas are 3 to 30 acres in size.

In a typical profile, the surface layer is brown silt loam about 6 inches thick. The subsoil is about 27 inches thick. The upper part is yellowish brown, friable silt loam; the next part is strong brown, firm silt loam and silty clay loam; and the lower part is strong brown, firm channery clay loam. The substratum is strong brown channery loam about 11 inches thick. Sandstone bedrock is at a depth of about 44 inches. In places, the substratum is silty clay that has soft fragments of shale and the underlying bedrock is soft shale. In some wooded areas the soil is not eroded. In some small areas the slope is less than 12 or more than 18 percent. In some places the silt loam extends to a depth of about 54 inches. In other places the subsoil has a weak fragipan.

Included with this soil in mapping are small areas of the moderately well drained Ebal soils on knolls and the sides of draws and a few areas of the gently sloping, moderately well drained Zanesville soils on narrow ridgetops. Also included are a few gullied areas and areas where a few large sandstone fragments are on the surface and in the soil. Included soils make up about 5 to 15 percent of the map unit.

The Wellston soil has a high available water capacity and is moderately permeable. Runoff is very rapid. The organic matter content is moderate in the surface layer. If worked when wet, this soil is sticky and becomes hard and cloddy when dry.

Most areas of this soil are used for pasture or hay or are wooded. A few small areas are used for cultivated crops.

Because of the slope and the hazard of erosion, this soil is poorly suited to cultivated crops, such as corn and soybeans. A system of conservation tillage that leaves all or part of the crop residue on the surface minimizes crusting and increases the rate of water infiltration. No-till planting helps to control erosion and conserves moisture. A cropping sequence that includes close-growing crops helps to control erosion. Contour farming slows runoff. The large sandstone fragments near the surface in some areas restrict the use of tillage implements.

This soil is fairly well suited to grasses, such as orchardgrass, and legumes, such as alfalfa, for hay and pasture. A cover of grasses and legumes helps to control erosion. Overgrazing is the major management concern. It reduces plant density and plant hardiness and causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates and pasture rotation help to keep the pasture in good condition.

This soil is fairly well suited to trees. Erosion, the equipment limitation, and plant competition are management concerns. Because of the erosion hazard, logging roads, skid trails, and landings should be established on gentle grades and water should be removed by water bars, culverts, and drop structures. The slope restricts the use of some logging equipment. The use of planting and logging equipment is limited during wet periods. Seedlings survive and grow well if competing vegetation is controlled by proper site preparation or by cutting, spraying, or girdling.

Because of the slope, this soil is severely limited as a site for dwellings. Buildings should be designed so that they conform to the natural slope of the land. Land shaping and installing retaining walls help to overcome the slope. Areas disturbed during construction should be revegetated as soon as possible.

This soil is severely limited as a site for local roads and streets because of the slope and frost action. Constructing the roads and streets on the contour and land shaping help to overcome the slope. Cutting is limited by the depth to bedrock in some areas. Frost action can be controlled by replacing or covering the upper soil layers with suitable base material.

This soil is severely limited as a site for septic tank absorption fields because of the slope. Land shaping and installing the distribution lines across the slope help to ensure that the absorption field functions properly.

The land capability classification is IVe. The woodland ordination symbol is 4R.

WeD3—Wellston silt loam, 12 to 18 percent slopes, severely eroded. This strongly sloping, deep, well drained soil is in draws and on the sides of ridges and knolls in the uplands. Slopes are generally 200 to 400 feet long. Most areas are elongated and are 10 to 40 acres in size.

In a typical profile, the surface layer is yellowish brown silt loam about 3 inches thick. The subsoil is about 30 inches thick. It is yellowish brown and friable. The upper part is silt loam, and the lower part is silty clay loam. The substratum is brownish yellow channery silt loam about 11 inches thick. Sandstone and shale bedrock is at a depth of about 44 inches. In places, the substratum is silty clay that has soft fragments of shale and the underlying bedrock is soft shale. In some areas the soil is not so eroded and has most of the original surface layer. In other areas the silt loam extends to a depth of about 50 inches. In places the subsoil has a weak fragipan. In some small areas the slope is less than 12 or more than 18 percent.

Included with this soil in mapping are small areas of the moderately well drained Ebal soils in draws and on side slopes and small areas of the gently sloping, moderately well drained Zanesville soils on a few ridgetops. Also included are some small areas of extremely eroded, well drained Gilpin soils. Included soils make up about 5 to 15 percent of the map unit.

The Wellston soil has a high available water capacity and is moderately permeable. Runoff is very rapid. The organic matter content is low in the surface layer. If worked when wet, this soil is sticky and becomes hard and cloddy when dry.

Most areas are left idle or are pastured. Idle areas have become naturally vegetated with trees, shrubs, briers, and grasses. Some areas have been planted to pine. This soil is generally unsuited to cultivated crops because of the slope and the hazard of erosion.

This soil is suited to grasses, such as orchardgrass, and legumes, such as alfalfa, for hay and pasture. The slope and the hazard of erosion are the main management concerns. Erosion is a hazard when the pasture or hayland is reseeded. Overgrazing reduces plant density and plant hardiness and causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and timely deferment of grazing when the soil is wet help to keep the pasture in good condition.

This soil is fairly well suited to trees. Erosion, the equipment limitation, and plant competition are management concerns. Diverting runoff away from logging roads that run up and down the hill helps to control erosion. The slope restricts the use of some logging equipment. The use of planting and logging equipment is limited during wet periods. Competing vegetation can be controlled by proper site preparation or by cutting, spraying, or girdling.

Because of the slope, this soil is severely limited as a site for dwellings. Grading the area and designing buildings so that they conform to the natural slope of the land help to overcome this limitation. Graded areas should be revegetated as soon as possible during construction.

This soil is severely limited as a site for local roads and streets because of the slope and frost action. Building the roads and streets on the contour helps to overcome the slope. Cutting and filling may be necessary, but they are limited by the depth to bedrock in places. Strengthening or replacing the upper soil layers with suitable base material helps to prevent the damage caused by frost action.

This soil is severely limited as a site for septic tank absorption fields because of the slope. Installing the absorption field on the contour helps to overcome the slope.

The land capability classification is VIe. The woodland ordination symbol is 4R.

WgD2—Wellston silt loam, karst, 6 to 18 percent slopes, eroded. This moderately sloping and strongly sloping, deep, well drained soil is in areas on uplands that include many bowl-shaped sinkholes. The sinkholes are separated by narrow ridgetops and are generally 75 to 200 feet wide and 5 to 15 feet deep. Slopes are generally 50 to 100 feet long. Some areas are crossed by drainageways, but most are drained through the bottom of the sinkholes. Most areas are irregularly shaped and are 10 to 40 acres in size.

In a typical profile, the surface layer is brown silt loam about 7 inches thick. The subsoil is about 43 inches thick. It is strong brown. The upper part is friable silt loam, and the lower part is mottled, firm silty clay loam. The substratum to a depth of about 70 inches is reddish yellow, mottled silty clay loam and light yellowish brown, mottled silty clay. In some areas the sides of the sinkholes are severely eroded. In some small areas they are steep. In places limestone bedrock is below a depth of 40 inches.

Included with this soil in mapping are small areas on the sides of sinkholes where limestone bedrock is within a depth of 20 to 40 inches and a few small areas where the limestone bedrock crops out. Also included are small areas of the well drained Haymond soils at the bottom of some sinkholes and some small areas of nearly level soils on ridgetops and at the bottom of the sinkholes. Haymond soils are less clayey than the Wellston soil. Included areas make up about 10 to 15 percent of the map unit.

The Wellston soil has a high available water capacity and is moderately slowly permeable. Runoff is rapid or very rapid. The organic matter content is moderate in the surface layer. This layer is friable and can be fairly easily tilled.

Most areas of this soil are used for cultivated crops or for hay and pasture. A few are wooded.

Because of the slope and the hazard of erosion, this soil is poorly suited to cultivated crops and small grain. The slope and the hazard of erosion are the main management concerns. Ridgetops can be cultivated, but they are narrow and make up a small part of the map unit. Conservation practices are needed to control erosion, but the karst topography limits their effectiveness. No-till planting helps to control erosion and conserves moisture. A system of conservation tillage that leaves all or part of the crop residue on the surface minimizes crusting and increases the rate of water infiltration.

This soil is fairly well suited to grasses, such as orchardgrass, and legumes, such as alfalfa, for hay and pasture. Erosion is a hazard when the pasture or hayland is reseeded. Overgrazing reduces plant density and plant hardiness and causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

This soil is fairly well suited to trees. It is suited to black walnut. Erosion, the equipment limitation, and plant competition are the main management concerns. Properly managing the ground cover and using equipment only when the topsoil is dry and firm help to control erosion. Logging roads, skid trails, and landings commonly can be located on the ridgetops between sinkholes. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

This soil is moderately limited as a site for dwellings without basements because of the slope and as a site for dwellings with basements because of the depth to bedrock and the slope. The gently sloping areas on ridgetops are the best building sites. Grading the site and designing the dwellings so that they conform to the natural slope of the land help to overcome the slope. Graded areas should be revegetated as soon as possible during construction. Topsoil should be stockpiled and spread over areas where vegetation is difficult to establish. Excavation of bedrock is needed on sites for dwellings with basements.

This soil is severely limited as a site for local roads and streets because of frost action and the slope. The roads generally are built on the less sloping ridgetops. Cutting and filling may be necessary. Replacing or strengthening the upper soil layer with better suited base material helps to prevent the damage caused by frost action.

This soil is moderately limited as a site for septic tank absorption fields because of the slope and the moderately slow permeability. Because of the slope, the absorption field should be installed on ridgetops or on the contour on side slopes. Runoff collects in sinkholes and may contaminate underground water supplies. Replacing the moderately slowly permeable material with more permeable material improves the ability of the field to absorb the effluent.

The land capability classification is IVe. The woodland ordination symbol is 4R.

Wm—Wilhite silty clay, frequently flooded. This nearly level, deep, very poorly drained soil is in sloughs on bottom land. It is subject to ponding. Areas are generally narrow and elongated. They are 20 to 100 acres in size.

In a typical profile, the surface layer is dark grayish brown silty clay about 10 inches thick. The subsoil is dark gray, mottled, firm silty clay and clay loam about 22 inches thick. The substratum to a depth of about 60 inches is dark gray, mottled silty clay loam and silt loam. In some sloughs the subsoil is silty clay. In places the substratum has layers of sand below a depth of 40 inches.

Included with this soil in mapping are small areas of the somewhat poorly drained Newark soils on the sides of sloughs and in drainageways. Also included are areas where the sides of the sloughs have a slope of 2 to 6 percent. Included soils make up about 2 to 5 percent of the map unit.

The Wilhite soil has a high available water capacity and is very slowly permeable. The water table is near or slightly above the surface in the winter and early spring. Runoff is very slow. The organic matter content is moderate in the surface layer. This layer becomes hard and cloddy if worked when wet.

Most areas of this soil are used for cultivated crops. Some are used for woodland. In some of the wetter sloughs, the vegetation is mostly shrubs.

This soil is poorly suited to corn, soybeans, and small grain. Some areas are drained by surface drains, but additional drainage measures commonly are needed. A subsurface drainage system helps to overcome the wetness. Because of the very slow permeability, subsurface drains should be closely spaced. Some areas can be protected from flooding by levees. Returning crop residue to the soil, growing winter cover crops, and minimizing tillage improve tilth.

This soil is fairly well suited to grasses, such as orchardgrass, and some legumes, such as red clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because of the flooding, frost heaving, and the wetness. Some grasses and legumes can be grown in undrained areas, but a drainage system is generally beneficial. Grazing when the soil is wet causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition. Scouring often occurs when livestock damage the vegetative cover on streambanks.

The soil is fairly well suited to trees. The equipment limitation, seedling mortality, the windthrow hazard, and plant competition are management concerns. The seasonal wetness restricts root growth. Also, it may delay planting and harvesting. Equipment should be used only during dry periods or when the ground is frozen. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced. Seedlings survive and grow fairly well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the flooding and the ponding, this soil is generally unsuitable as a site for dwellings and sanitary facilities. It is severely limited as a site for local roads because of the flooding, the shrink-swell potential, and low strength. Replacing the upper part of the soil with better suited material helps to prevent the damage caused by shrinking and swelling and by low strength. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding and by shrinking and swelling.

The land capability classification is IVw. The woodland ordination symbol is 5W.

Wt—Wirt very fine sandy loam, frequently flooded. This nearly level, deep, well drained soil is along sloughs and drainageways on broad bottom land. It is flooded for brief periods, mainly in winter and spring. Areas are elongated. Most are 5 to 30 acres in size.

In a typical profile, the surface layer is brown very fine sandy loam about 10 inches thick. The subsoil is dark yellowish brown, very friable fine sandy loam about 17 inches thick. The upper part of the substratum is yellowish brown fine sandy loam and loam. The lower part to a depth of about 60 inches is brown fine sandy loam. In some places the substratum is loamy sand or sand below a depth of 24 inches. In other places the soil is moderately well drained. In some areas it is mostly loamy fine sand. In other areas it is mostly silt loam below a depth of 20 inches.

Included with this soil in mapping are narrow areas of the somewhat poorly drained Newark soils in swales. Also included are some areas on the highest part of the bottom land that are only rarely flooded. Included soils make up about 3 to 8 percent of the map unit.

The Wirt soil has a high available water capacity and is moderately permeable. Runoff is slow. The organic matter content is moderate in the surface layer. This layer is very friable and can be easily tilled throughout a wide range of moisture content.

Nearly all areas are used for cultivated crops. This soil is suited to corn and soybeans. The flooding is a hazard. It can be controlled by dikes and levees. During years when rainfall is below average or poorly distributed, crops can be damaged by drought. Winter cover crops and a system of conservation tillage that leaves protective amounts of crop residue on the surface increase the organic matter content and improve tilth. A permanent cover of grasses, shrubs, or trees helps to prevent scouring on streambanks.

This soil is well suited to grasses, such as orchardgrass, and legumes, such as alfalfa and red clover, for hay and pasture. Stands are sometimes damaged by flooding. Proper stocking rates, pasture rotation, and timely deferment of grazing during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. The main management concern is plant competition. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the flooding, this soil is generally unsuitable as a site for dwellings and sanitary facilities and is severely limited as a site for local roads. Constructing the roads on raised, well compacted fill material and providing adequate side ditches and culverts help to prevent the damage caused by flooding.

The land capability classification is IIw. The woodland ordination symbol is 7A.

ZaA—Zanesville silt loam, 1 to 3 percent slopes. This very gently sloping, deep, moderately well drained soil is on ridgetops in the uplands. Slopes generally are 150 to 300 feet long. Areas are irregularly shaped and are 3 to 20 acres in size.

In a typical profile, the surface layer is brown silt loam about 8 inches thick. The subsoil is about 52 inches thick. In sequence downward, it is yellowish brown, friable silt loam; yellowish brown and strong brown, mottled, friable silty clay loam; a fragipan of strong brown and yellowish brown, mottled, very firm, brittle silty clay loam and silt loam; and yellowish brown, mottled, friable silt loam. The substratum to a depth of about 80 inches is yellowish brown channery loam. In some small areas the slope is less than 1 or more than 3 percent.

Included with this soil in mapping are areas of a nearly level, somewhat poorly drained soil on ridgetops. This included soil has grayish mottles beneath the plow layer. It makes up about 2 to 5 percent of the map unit.

The Zanesville soil has a moderate available water capacity and is moderately slowly permeable or slowly permeable. A perched water table is at a depth of 2 to 3 feet in the winter and early spring. Runoff is medium. The organic matter content is moderate. The fragipan restricts water movement and root growth. The surface layer is friable and can be easily tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for hay and pasture. Some are used for cultivated crops. A few are wooded.

This soil is well suited to corn, soybeans, and small grain. The wetness is the main management concern. Erosion is a hazard on the more sloping parts of the landscape. The fragipan restricts the downward movement of water and the growth of plant roots. A subsurface drainage system helps to overcome the wetness. The soil is often wet and seepy in the spring but may be somewhat droughty in the summer. A system of conservation tillage that leaves all or part of the crop residue on the surface minimizes crusting and increases the rate of water infiltration.

This soil is well suited to grasses, such as orchardgrass, and some legumes, such as red clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because the fragipan restricts the growth of roots. The main management concerns are overgrazing and grazing when the soil is too wet. Overgrazing reduces plant density and plant hardiness. It also causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees. The seasonal wetness may hinder logging and planting. The fragipan limits the effective rooting depth. Seedlings survive and grow well if competing vegetation is controlled by cutting, spraying, or girdling.

Because of the wetness, this soil is moderately limited as a site for dwellings without basements and is severely limited as a site for dwellings with basements. Drains around footings help to lower the water table. Diverting surface water away from houses by proper grading and landscaping also helps to overcome the wetness.

This soil is severely limited as a site for local roads and streets because of low strength and frost action. Strengthening or replacing the base with better suited material improves the ability of the roads to support vehicular traffic. A system of surface drains along the roads helps to prevent the damage caused by frost action.

This soil is severely limited as a site for septic tank absorption fields because of the restricted permeability and the wetness. Installing subsurface interceptor drains around the perimeter of the absorption field helps to overcome the wetness. Replacing the moderately slowly permeable or slowly permeable material with more permeable material improves the ability of the field to absorb the effluent.

The land capability classification is IIw. The woodland ordination symbol is 7A.

ZaB2—Zanesville silt loam, 2 to 6 percent slopes, eroded. This gently sloping, deep, well drained or moderately well drained soil is on ridgetops in the uplands. Slopes are generally 100 to 250 feet long. Most areas are narrow and elongated and are 5 to 50 acres in size.

In a typical profile, the surface layer is brown silt loam about 9 inches thick. The subsoil is about 48 inches thick. In sequence downward, it is yellowish brown, friable silt loam; yellowish brown, mottled, friable silty clay loam; strong brown, mottled, firm, brittle silty clay loam; a fragipan of yellowish brown, mottled, firm, brittle silt loam; and yellowish brown, mottled, firm silt loam. The substratum to a depth of about 80 inches is brownish yellow, mottled silt loam and shaly silty clay loam. In wooded areas the soil is not eroded and has a very dark grayish brown or dark brown surface layer. In some places the silt loam or silty clay loam subsoil extends to a depth of 80 inches or more. In other places the depth to the fragipan is more than 30 inches. In some small areas the slope is less than 2 or more than 6 percent.

Included with this soil in mapping are small areas of a nearly level, somewhat poorly drained soil on the top of ridges. This included soil has grayish mottles at a depth of 12 to 18 inches. Also included are a few small areas of the moderately well drained Ebal soils in benchlike positions and a few areas of soils that do not have a fragipan. Ebal soils are more clayey in the subsoil and substratum than the Zanesville soil. Included soils make up about 5 to 10 percent of the map unit.

The Zanesville soil has a moderate available water capacity and is moderately slowly permeable or slowly permeable. A perched water table is at a depth of 2 to 3 feet in the winter and early spring. Runoff is rapid. The organic matter content is moderate. The fragipan restricts water movement and root growth. The surface layer is friable and can be easily tilled throughout a fairly wide range of moisture content.

Most areas of this soil are used for hay and pasture. Some are used for cultivated crops. A few are used as woodlots.

This soil is well suited to corn, soybeans, and small grain. The hazard of erosion is the main management concern. The fragipan restricts the downward movement of water and the growth of roots. The soil is often wet and seepy in the spring but may be somewhat droughty in the summer. A system of conservation tillage that leaves all or part of the crop residue on the surface minimizes crusting and increases the rate of water infiltration. No-till planting helps to control erosion and conserves moisture. Contour farming slows runoff. A cropping sequence that includes close-growing crops helps to control erosion. Subsurface drains in draws help to drain seepy areas.

This soil is well suited to grasses, such as orchardgrass, and some legumes, such as red clover, for hay and pasture. It is poorly suited to deep-rooted legumes, such as alfalfa, because the fragipan restricts the growth of roots. A cover of grasses and legumes helps to control erosion. Alfalfa stands are often damaged by frost heaving. Overgrazing and grazing when the soil is wet are the main management concerns. Overgrazing reduces plant density and plant hardiness and causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture in good condition.

This soil is well suited to trees (fig. 14). Plant competition is the main management concern. It can be overcome by proper site preparation and by cutting, spraying, or girdling.

Because of the wetness, this soil is moderately limited as a site for dwellings without basements and is severely limited as a site for dwellings with basements. Drains around footings help to lower the water table. Surface water can be diverted away from houses by proper grading and landscaping. Disturbed areas should be revegetated as soon as possible after construction.

This soil is severely limited as a site for local roads and streets because of low strength and frost action. Strengthening or replacing the base with better suited material improves the ability of the roads to support vehicular traffic. A system of surface drains along the roads removes excess water and helps to prevent the damage caused by frost action.

This soil is severely limited as a site for septic tank absorption fields because of the restricted permeability and the wetness. Replacing the moderately slowly permeable or slowly permeable material with more permeable material improves the ability of the field to absorb the effluent. Subsurface interceptor drains around the perimeter of the absorption field help to lower the seasonal high water table.

The land capability classification is IIe. The woodland ordination symbol is 7A.

ZaC2—Zanesville silt loam, 6 to 12 percent slopes, eroded. This moderately sloping, deep, well drained or moderately well drained soil is in the uplands. Slopes are generally 100 to 300 feet long. Those on breaks and side slopes along drainageways are concave. Those on knolls and ridges are convex. Areas are generally narrow and elongated and are 5 to 50 acres in size.

In a typical profile, the surface layer is brown silt loam about 8 inches thick. The subsoil is about 46 inches thick. In sequence downward, it is yellowish brown, friable silty clay loam; brown, mottled, very firm, brittle silty clay loam; a fragipan of brown, mottled, very firm, brittle silt loam; and yellowish brown, mottled, friable silt loam. The substratum to a depth of about 60 inches is strong brown loam. In some places the lower part of the subsoil and the substratum are mostly silty clay or shaly silty clay. In other places, the soil is severely eroded and the surface layer consists mostly of yellowish brown subsoil material. In some small areas on the top of ridges, the slope is less than 6 percent. In some small areas on the sides of ridges, it is more than 12 percent.

Included with this soil in mapping are small areas of the well drained Gilpin and Wellston and moderately well drained Ebal soils on the sides of ridges. Gilpin and Wellston soils are more permeable than the Zanesville soil. Also, Gilpin soils have more sandstone fragments in the subsoil. Ebal soils are more clayey than the Zanesville soil. Also included are a few gullied areas. Included soils make up about 5 to 10 percent of the map unit.

The Zanesville soil has a moderate available water capacity and is moderately slowly permeable or slowly permeable. A perched water table is at a depth of 2 to 3 feet in the winter and early spring. Runoff is rapid. The fragipan restricts water movement and the growth of roots. The organic matter content is moderate the surface layer. This layer is friable and can be easily worked only at the proper moisture content.

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

Figure 14.—Christmas trees in an area of Zanesville silt loam, 2 to 6 percent slopes, eroded.

This soil is fairly well suited to corn and soybeans. The hazard of erosion is the main management concern. The fragipan restricts water infiltration and root penetration. A system of conservation tillage that leaves part or all of the crop residue on the surface minimizes crusting and increases the rate of water infiltration. No-till planting helps to control erosion and conserves moisture. A cropping system that includes close-growing crops helps to control erosion. Contour farming slows runoff. Subsurface drains intercept seepage on slopes. During years when rainfall is below average or poorly distributed, the soil becomes somewhat droughty and crop yields are likely to be reduced.

This soil is well suited to grasses, such as orchardgrass, and some legumes, such as red clover, for hay and pasture. A cover of grasses and legumes helps to control erosion. Stands of alfalfa and other deep-rooted crops are often damaged by frost heaving. The fragipan restricts root penetration and water infiltration. Overgrazing is the major management concern. It reduces plant density and causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates and pasture rotation help to keep the pasture in good condition.

This soil is well suited to trees. Seedlings survive and grow well if competing vegetation is controlled by proper site preparation or by cutting, spraying, or girdling.

Because of the slope and the wetness, this soil is moderately limited as a site for dwellings without basements. It is severely limited as a site for dwellings with basements because of the wetness. Drains around footings help to overcome the wetness. Buildings should be designed so that they conform to the natural slope of the land.

This soil is severely limited as a site for local roads and streets because of low strength and frost action. Strengthening or replacing the base with better suited material improves the ability of the soil to support vehicular traffic. Providing adequate surface drains and culverts helps to prevent the damage caused by frost action.

This soil is severely limited as a site for septic tank absorption fields because of the restricted permeability and the wetness. Replacing the moderately slowly permeable or slowly permeable material with suitable filtering material improves the ability of the field to absorb the effluent. Installing subsurface interceptor drains around the perimeter of the absorption field helps to lower the water table.

The land capability classification is IIIe. The woodland ordination symbol is 7A.

ZaC3—Zanesville silt loam, 6 to 12 percent slopes, severely eroded. This moderately sloping, deep, well drained or moderately well drained soil is in the uplands. Slopes are dominantly 100 to 300 feet long. Those on breaks and side slopes along drainageways are concave. Those on knolls and ridges are convex. Areas are generally narrow and elongated. Most are 3 to 20 acres in size.

In a typical profile, the surface layer is yellowish brown silt loam about 4 inches thick. The subsoil is about 52 inches thick. In sequence downward, it is yellowish brown, friable and firm silty clay loam; yellowish brown, mottled, firm, brittle silty clay loam; a fragipan of yellowish brown, very firm, brittle silt loam; and light yellowish brown, mottled, friable silt loam. The substratum to a depth of about 80 inches is strong brown silty clay loam and channery silty clay loam. In places the lower part of the subsoil and the substratum are mostly silty clay or shaly silty clay. In some wooded areas the soil is not eroded. In some small areas the slope is less than 6 or more than 12 percent.

Included with this soil in mapping are small areas of the well drained Gilpin and Wellston and moderately well drained Ebal soils on the sides of ridges. Gilpin and Wellston soils are more permeable than the Zanesville soil. Also, Gilpin soils have more sandstone fragments in the subsoil. Ebal soils are more clayey than the Zanesville soil. Also included are a few gullied areas. Included soils make up about 5 to 10 percent of the map unit.

The Zanesville soil has a moderate available water capacity and is moderately slowly permeable or slowly permeable. A perched water table is at a depth of 2 to 3 feet in the winter and early spring. Runoff is rapid. The fragipan restricts water movement and the growth of roots. The organic matter content is low in the surface layer. This layer is friable when moist but becomes sticky when wet. If it is worked when wet, it becomes hard and cloddy as it dries. Seepage is a problem on side slopes in the spring.

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

This soil is poorly suited to corn and soybeans. The hazard of erosion is the main management concern. The fragipan restricts water infiltration and root penetration. A system of conservation tillage that leaves part or all of the crop residue on the surface minimizes crusting and increases the rate of water infiltration. A cropping sequence that is dominated by close-growing crops helps to control erosion. No-till planting helps to control erosion and conserves moisture. Contour farming slows runoff. Subsurface drains intercept seepage on side slopes. During years when rainfall is below average or poorly distributed, the soil becomes somewhat droughty and crop yields are likely to be reduced.

This soil is fairly well suited to grasses, such as orchardgrass, and some legumes, such as red clover, for hay and pasture. A cover of grasses and legumes helps to control erosion. Stands of alfalfa and other deep-rooted crops are often damaged by frost heaving. The fragipan restricts root penetration and water infiltration. Overgrazing is the major management concern. It reduces plant density and causes surface compaction, excessive runoff, and poor tilth. Proper stocking rates and pasture rotation help to keep the pasture in good condition.

This soil is fairly well suited to trees. Seedlings survive and grow well if competing vegetation is controlled by proper site preparation or by cutting, spraying, or girdling. Because of seedling mortality, special planting stock and overstocking are needed. Because of the windthrow hazard, harvest methods should not isolate the remaining trees or leave them widely spaced.

Because of the slope and the wetness, this soil is moderately limited as a site for dwellings without basements. It is severely limited as a site for dwellings with basements because of the wetness. Drains around footings help to overcome the wetness. Buildings should be designed so that they conform to the natural slope of the land.

This soil is severely limited as a site for local roads and streets because of low strength and frost action. Strengthening or replacing the base with better suited material improves the ability of the roads to support vehicular traffic. Providing adequate side ditches and culverts helps to prevent the damage caused by frost action.

This soil is severely limited as a site for septic tank absorption fields because of the restricted permeability and the wetness. Replacing the moderately slowly permeable or slowly permeable material with suitable filtering material improves the ability of the field to absorb the effluent. Installing subsurface interceptor drains around the perimeter of the absorption field helps to lower the water table.

The land capability classification is IVe. The woodland ordination symbol is 6D.

Zp—Zipp silty clay. This nearly level, deep, very poorly drained soil is on broad lake plains. It is subject to ponding by runoff from the higher lying adjacent soils. Areas are irregularly shaped and are 40 to 500 acres in size.

In a typical profile, the surface layer is dark grayish brown silty clay about 7 inches thick. The subsoil is dark gray and gray, mottled, very firm clay about 40 inches thick. The substratum to a depth of about 60 inches is dark gray, mottled clay. In some places the substratum is stratified silt loam and silty clay loam below a depth of 50 inches. In other places the surface layer is black silty clay loam. In some small areas the soil is silty clay loam throughout.

This soil has a moderate available water capacity and is slowly permeable or very slowly permeable. The water table is often near or slightly above the surface in winter and early spring. Runoff is very slow or ponded. The organic matter content is moderate in the surface layer. If plowed when too wet or too dry, this layer becomes cloddy and difficult to work.

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

If drained, this soil is fairly well suited to corn, soybeans, and small grain. The wetness and the ponding are limitations. They can damage winter small grain crops. A drainage system has been established in most areas, but additional drainage measures are needed in many areas. In some years replanting is needed because ponding has destroyed stands. In places drainage outlets are difficult to locate. Because of the slow or very slow permeability, subsurface drains should be closely spaced. Land smoothing and shallow surface drains help to prevent ponding and remove excess surface water in low spots. Returning crop residue to the soil, applying a system of conservation tillage, and growing green manure crops and cover crops improve tilth and increase the organic matter content.

This soil is well suited to grasses, such as orchardgrass, and some legumes, such as red clover, for hay and pasture. It is poorly suited to alfalfa because of the wetness and frost heaving. Overgrazing or grazing when the soil is too wet damages the sod, reduces forage yields and plant density, and causes surface compaction and poor tilth.

This soil is fairly well suited to trees. The equipment limitation, the windthrow hazard, seedling mortality, and plant competition are the main management concerns. The seasonal wetness oftens delays planting and logging. Equipment should be used only during dry periods or when the ground is frozen. Because of the windthrow hazard, harvesting methods should not isolate the remaining trees or leave them widely spaced. Because of seedling mortality, special planting stock and overstocking are needed. Competing vegetation can be controlled by proper site preparation and by cutting, spraying, or girdling.

Because of the ponding and the shrink-swell potential, this soil is generally unsuitable as a site for dwellings. It is severely limited as a site for local roads because of the ponding, low strength, and the shrink-swell potential. Replacing the layers that have a high shrink-swell potential with better suited material helps to prevent the damage caused by low strength and by shrinking and swelling. Constructing the roads on raised, well compacted fill material and providing adequate surface drains and culverts help to prevent the damage caused by ponding. The soil is generally unsuitable as a site for septic tank absorption fields because of the ponding and the slow or very slow permeability.

The land capability classification is IIIw. The woodland ordination symbol is 5W.

Prime Farmland

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

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban and built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal inputs of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Soil Conservation Service.

About 180,000 acres in Greene County, or more than 51 percent of the total acreage, meets the soil requirements for prime farmland. Scattered areas of this land are throughout the county, but most are in the western and central parts. Nearly all of the prime farmland is used for crops, mainly corn and soybeans.

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

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table and all soils that are frequently flooded during the growing season qualify for prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures.

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

Phillip K. Bousman, conservation agronomist, Soil Conservation Service, helped prepare this section.

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.

More than 218,800 acres in the county was used for crops and pasture in 1967 (*5*). Of this total, 69,184 acres was used for permanent pasture; 88,532 acres for row crops, mainly corn and soybeans; 11,188 acres for closely grown crops, mainly wheat and oats; and 15,667 acres for rotation hay and pasture. The rest was idle cropland or was used for conservation purposes. Since 1967, an estimated 12,000 acres of pasture and 21,000 acres of woodland have been converted to cropland. In 1982, a total of 148,384 acres in the county was used for crops and pasture (*12*). Of this total, 21,256 acres was used for permanent pasture and 121,314 acres was used for row crops, mainly corn and soybeans. A total of 5,814 acres was used for other crops or was idle cropland.

The potential of the soils in Greene County for increased food production is fair. About 19,000 acres of potentially good cropland is currently used as woodland and about 23,000 acres as pasture. Most of this potential cropland is on rolling hills that are easily eroded. If cultivated crops are grown, erosion-control measures are needed. In addition to the reserve productive capacity represented by this land, food production could also be increased considerably by extending the latest crop production technology to all of the cropland in the county. This soil survey can greatly aid in the application of such technology.

The paragraphs that follow describe the major management concerns in the areas of the county used for crops and pasture. These concerns are wetness, water erosion, soil blowing, fertility, and tilth.

Wetness is the major management concern on about 24 percent of the cropland and pasture in the county. Unless drained, some soils are so wet that they generally cannot be used for the crops commonly grown in the county. These are the poorly drained or very poorly drained Patton, Peoga, Booker, and Montgomery soils on lake plains and low terraces. These soils receive runoff from the adjacent uplands. Measures that improve drainage ditches generally are needed. Unless drained, somewhat poorly drained soils are so wet that crops are damaged during most years. Examples are Bartle, Newark, and Stendal soils.

Parke, Pike, and Wellston soils are characterized by good natural drainage most of the year. Small areas of wetter soils along drainageways and in swales are included with these well drained soils in mapping. They also are included with the moderately well drained Cincinnati, Zanesville, Ava, and Pekin soils, especially those that have a slope of 2 to 4 percent. A drainage system is needed in some of these wetter areas.

The design of both surface and subsurface drainage systems varies with the kind of soil. A combination of surface and subsurface drains is needed in most areas of the poorly drained soils used for intensive row cropping. Examples are Peoga, Vigo, and Patton soils. Subsurface drains should be more closely spaced in slowly permeable or very slowly permeable soils than in the more rapidly permeable soils. Internal drainage is so slow in Booker, Montgomery, and Zipp soils that the effectiveness of subsurface drains is restricted. Also, finding adequate outlets for these drains is difficult.

Water erosion is the major problem on about 49 percent of the cropland and pasture in the county. It is a serious hazard on soils that have a slope of more than 2 percent. If plowed each spring and planted to corn year after year, Ava soils in areas where the slope is 3 percent and is 300 feet long will lose 12 tons of soil per year. These soils become unproductive if they lose more than 4 tons of soil each year.

Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the original surface layer is lost and part of the subsoil is mixed with the plow layer. The original surface layer is soft and can be easily tilled. It contains the plant nutrients, organic matter, and bacteria that help the plants to grow well. Loss of the surface layer is especially damaging on soils that have a clayey subsoil, such as Markland soils, and on soils that have a fragipan, such as Ava, Cincinnati, and Zanesville soils. The fragipan limits root growth. Second, eroding sediment can fill open drainage channels and streams. Because of this sedimentation, the cost of maintaining these open drainageways increases. The sediment also contains chemicals that can pollute creeks and rivers.

Terraces and water- and sediment-control basins reduce the susceptibility to erosion by controlling runoff. They keep water from running across a field and control the water within the field. The terraces break long slopes into shorter, less erosive ones. Although these measures are effective, they are expensive. A less costly solution is a protective vegetative cover.

A protective cover of grasses or crop residue helps to control erosion by reducing the runoff rate and increasing the rate of water infiltration. A cropping sequence that includes grasses or hay significantly reduces soil loss. Orchardgrass, timothy, and bromegrass are commonly grown with alfalfa on the well drained soils in the higher lying areas. Very poorly drained and poorly drained soils are well suited to reed canarygrass. Leaving crop residue on the surface until spring also protects the soil.

Conservation tillage leaves a protective cover of crop residue on the surface. The amount of residue covered up by tillage implements varies greatly, depending on the kind of residue, the speed and depth of tillage, and other factors. A chisel plow generally covers more crop residue than a tandem disk. No-till or slot tillage is the best method of maintaining a protective cover of crop residue (fig. 15). In areas where no-till is applied, the seed is planted in slots in the ground and all of the crop residue is left on the surface. Weeds are controlled by herbicides.

Grassed waterways are needed in many areas of Greene County. They are especially needed on the more sloping soils, such as Cincinnati, Zanesville, Wellston, and Parke soils.

Further information about the design of erosion-control measures is available at the local office of the Soil Conservation Service.

Soil blowing is a hazard on the sandy Bloomfield soils. Also, soils that are plowed in the fall are very susceptible to soil blowing the following spring. Soils may be damaged in a few hours if winds are strong and the soils are dry and bare of vegetation or surface mulch. Maintaining a vegetative cover or surface mulch and keeping the surface rough through proper tillage methods minimize soil blowing. Conservation tillage and windbreaks of suitable shrubs also are effective in controlling soil blowing.

Fertility is naturally low in most of the soils on uplands in the county. The slightly acid or neutral Haymond, Newark, Wirt, Nolan, and Armiesburg soils on flood plains are naturally higher in content of plant nutrients than most of the soils on uplands and terraces.

On most of the soils in the uplands and some of the soils on terraces, such as Pekin, Bartle, and Peoga soils, applications of ground limestone are needed to raise the pH level sufficiently for legumes to grow well. Available phosphorus and potash levels are naturally low in most of these soils. On all soils additions of lime and fertilizer should be based on the results of soil tests, on the needs of the crop, and on the expected level of yields. All crops respond well to lime and fertilizer if the proper kinds and amounts are applied. The Cooperative Extension Service can help in determining the kinds and amounts to be applied.

Tilth is an important factor affecting plant growth and the infiltration of water into the soil. Soils with good tilth are granular and porous.

Many of the soils used for crops in the county have a surface layer of silt loam that is light in color and low or moderate in content of organic matter. Generally, the

Figure 15.—No-till corn on Pike silt loam, 2 to 6 percent slopes, eroded.

structure of these soils is moderate or weak. A surface crust forms during periods of heavy rainfall. The crust is hard and impervious to water. As a result, it reduces the rate of water infiltration and increases the runoff rate. Proper management of crop residue through methods of reduced tillage improve soil structure and minimize crusting.

Fall plowing is not a good means of improving the tilth of light colored silt loams because a crust forms during winter and spring. Many of these soils are nearly as dense and hard at planting time as they were before they were plowed in the fall. Also, about 49 percent of the cropland consists of sloping soils that are subject to erosion if they are plowed in the fall.

Tilth is a problem in such soils as Booker clay, Montgomery silty clay loam, and Zipp silty clay, which often stay wet until late in spring. If plowed when wet, these soils tend to be very cloddy when dry. Because of the cloddiness, preparing a good seedbed is difficult. Fall plowing generally improves the tilth of these soils.

Field crops suited to the soils and climate of the county include many that are not commonly grown. Corn and soybeans are the main row crops. Wheat and oats are the most common close-grown crops. Rye and barley could be grown, and grass and legume seed could be produced from alfalfa, bluegrass, tall fescue, lespedeza, orchardgrass, red clover, sudangrass, and timothy.

Specialty crops are of limited commercial importance in the county. Tobacco is grown in small patches on about 75 farms (fig. 16). Only a small acreage is used for small fruits. Deep, well drained soils that warm up early in spring are especially well suited to many specialty crops. These include Princeton and Pike soils and the Parke soils that have a slope of less than 12 percent. Crops can generally be planted and harvested earlier on these soils than on the other soils in the county. Irrigation is needed on the Princeton soils.

Most of the well drained soils are suitable for orchards and nursery crops. Soils in low positions on the landscape where frost is frequent and air drainage is poor generally are poorly suited to early vegetables, small fruits, and orchards.

Figure 16.—Tobacco in an area of Piankeshaw silt loam, frequently flooded. This area is protected from flooding.

The latest information about growing specialty crops can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. 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 6 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 (*9*). 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 and 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.

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 7. 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

Michael D. Warner, forester, Soil Conservation Service, helped prepare this section.

Table 8 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. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic feet per acre per year, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; and *F*, a high content of rock fragments in the soil. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

In table 8, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, fire lanes, and log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures 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.

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 under normal conditions the kind of equipment or season of use is not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

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. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The first species listed under *common trees* for a soil is the indicator species for that soil. It is the dominant species on the soil and the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 9 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 9 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Recreation

The soils of the survey area are rated in table 10 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 10, 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 10 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 13 and interpretations for dwellings without basements and for local roads and streets in table 12.

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

James D. McCall, biologist, Soil Conservation Service, helped prepare this section.

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 11, 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, bluegrass, 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 goldenrod, beggarweed, ragweed, pokeweed, sheep sorrel, dock, crabgrass, and dandelion.

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, poplar, beech, black walnut, wild cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, dewberry, elderberry, and mayapple. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, pondweed, spikerush, wild millet, wildrice, buttonbush, algae, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, river sloughs, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, dove, groundhog, coyote, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and whitetail deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, rails, kingfishers, muskrat, mink, and beaver.

Edge habitat consists of areas where major land uses or cover types adjoin. A good example is the border between dense woodland and a field of no-till corn. Although not rated in the table, edge habitat is of primary importance to animals from the smallest songbirds to whitetail deer. Most of the animals that inhabit openland or woodland also frequent edge habitat, and desirable edge areas are consistently used by 10 times as many wildlife as are the centers of large areas of woodland or cropland.

Engineering

Max L. Evans, state conservation engineer, Soil Conservation Service, helped prepare 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 12 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 13 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 13 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 (*13*). 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 13 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 13 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 14 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 14, 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 15 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 soil blowing 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 soil blowing, 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.

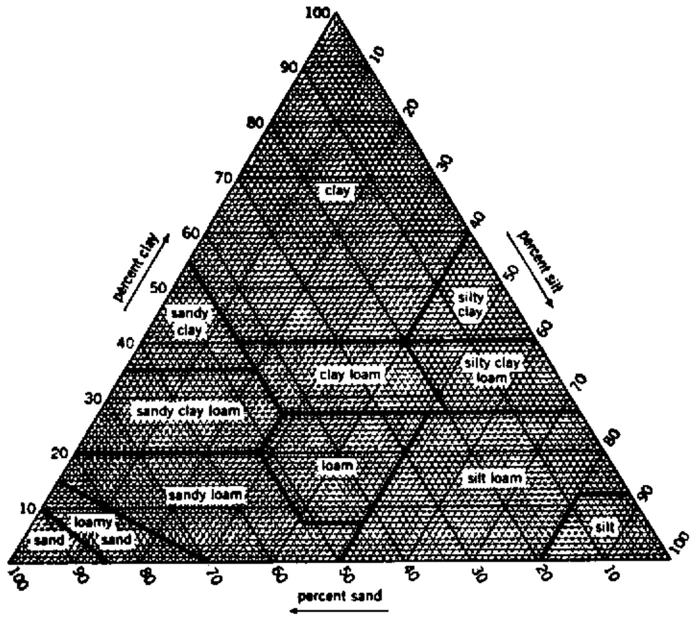


Figure 17.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Engineering Index Properties

Table 16 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 (fig. 17). "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 17 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.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.

5. Loamy soils that are less than 20 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.

6. Loamy soils that are 20 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to soil blowing.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 17, 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 18 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.

The four hydrologic soil groups are:

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

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

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

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a 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.

If a soil is assigned to two hydrologic groups in table 18, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 18 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs, on the average, once or less in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in 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 18 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 18.

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. 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.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

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 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 (*10*). 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 19 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 Alfisol.

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 Udalf (*Ud*, meaning humid, plus *alf*, from Alfisol).

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 Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalf*, the suborder of the Alfisols that has a udic 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 Hapludalfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-silty, mixed, mesic Typic Hapludalfs.

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* (*8*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*10*). 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."

Alford Series

The Alford series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in loess. Slopes range from 2 to 12 percent.

These soils have a lower base saturation than is definitive for the Alford series. This difference, however, does not affect the usefulness or behavior of the soils.

Alford soils are similar to Parke and Pike soils and are commonly near Ava, Cincinnati, Pike, and Princeton soils. Parke and Pike soils have more sand in the lower part of the solum than the Alford soils. They are in landscape positions similar to those of the Alford soils.

Ava, Cincinnati, and Princeton soils are on ridges or knolls and on breaks along drainageways. Ava soils are moderately well drained. Ava and Cincinnati soils have a fragipan. Princeton soils have more sand throughout the solum than the Alford soils.

A typical pedon of Alford silt loam, 2 to 6 percent slopes, eroded, in a pasture; 760 feet east and 100 feet north of the southwest corner of sec. 1, T. 8 N., R. 6 W.

Ap—0 to 6 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; mixed with about 5 percent small masses of brown (7.5YR 4/4) silt loam; weak fine granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

BE—6 to 10 inches; brown (7.5YR 4/4) silt loam; weak thick platy structure parting to weak fine subangular blocky; friable; many roots; neutral; clear wavy boundary.

Bt1—10 to 18 inches; strong brown (7.5YR 5/6) silty clay loam; moderate fine subangular blocky structure; friable; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of most peds; strongly acid; gradual wavy boundary.

Bt2—18 to 26 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt3—26 to 34 inches; strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; firm; thin continuous dark brown (7.5YR 4/4) clay films on faces of most peds; pale brown (10YR 6/3) silt coatings on vertical faces of some peds; very strongly acid; clear wavy boundary.

Bt4—34 to 44 inches; strong brown (7.5YR 5/6) silt loam; weak medium subangular blocky structure; friable; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; pale brown (10YR 6/3) silt coatings on vertical faces of some peds; very strongly acid; gradual wavy boundary.

Bt5—44 to 53 inches; strong brown (7.5YR 5/6) silt loam; weak coarse subangular blocky structure; friable; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; light gray (10YR 7/2) silt coatings on vertical faces of some peds; very strongly acid; gradual wavy boundary.

Bt6—53 to 61 inches; strong brown (7.5YR 5/6) silt loam; weak very coarse subangular blocky structure; friable; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of most peds; light gray (10YR 7/2) vertical silt flows between peds; very strongly acid; clear wavy boundary.

2C—61 to 80 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; very pale brown (10YR 7/3) silt flows in vertical cracks; strongly acid.

The solum is more than 60 inches thick. The Ap horizon has chroma of 3 or 4. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam or silty clay loam. Some pedons have a 2Bt horizon. This horizon is silt loam.

Alvin Series

The Alvin series consists of deep, well drained, moderately permeable or moderately rapidly permeable soils on terraces and uplands. These soils formed in wind-deposited sandy material. Slopes range from 2 to 12 percent.

Alvin soils are similar to Bloomfield and Princeton soils and are commonly near Ayrshire, Bloomfield, Princeton, and Roby soils. Bloomfield soils have more sand and less clay in the control section than the Alvin soils. They are on knolls and side slopes. Princeton soils have more clay and less sand in the control section than the Alvin soils. They are on knolls. Ayrshire and Roby soils are somewhat poorly drained and are on the lower lying flats.

A typical pedon of Alvin loamy sand, in a cultivated area of Alvin-Bloomfield complex, 6 to 12 percent slopes; 550 feet east and 350 feet north of the center of sec. 20, T. 6 N., R. 6 W.

Ap—0 to 8 inches; dark brown (10YR 4/3) loamy sand, light yellowish brown (10YR 6/4) dry; weak fine granular structure; very friable; strongly acid; abrupt smooth boundary.

E—8 to 12 inches; dark yellowish brown (10YR 4/4) loamy sand; weak fine granular structure; very friable; few fillings of dark brown (10YR 4/3) loamy fine sand in wormholes and root channels; medium acid; abrupt smooth boundary.

Bt1—12 to 19 inches; strong brown (7.5YR 5/6) sandy loam; weak medium subangular blocky structure; very friable; thin continuous dark brown (7.5YR 4/4) clay films on faces of most peds; medium acid; gradual wavy boundary.

Bt2—19 to 27 inches; strong brown (7.5YR 5/6) sandy loam; weak coarse subangular blocky structure; very friable; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of most peds; slightly acid; gradual wavy boundary.

Bt3—27 to 38 inches; strong brown (7.5YR 5/6) loamy sand; weak coarse subangular blocky structure; very friable; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of most peds; slightly acid; clear wavy boundary.

Bt4—38 to 48 inches; yellowish brown (10YR 5/6) sand; weak coarse subangular blocky structure; very friable; discontinuous bands of dark brown (7.5YR 4/4) sandy loam about 1/4 inch thick; neutral; gradual wavy boundary.

Bt5—48 to 64 inches; brown (7.5YR 4/4) sand; weak coarse subangular blocky structure; very friable; discontinuous bands of dark brown (7.5YR 4/4) sandy loam totaling about 3 inches in thickness; neutral; clear wavy boundary.

C—64 to 80 inches; light yellowish brown (10YR 6/4) sand; single grain; loose; mildly alkaline.

The solum is 48 to 70 inches thick. The Ap horizon has chroma of 3 or 4. It is strongly acid or medium acid. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is medium acid or slightly acid in the upper part and slightly acid or neutral in the lower part. The upper part of this horizon is dominantly sandy loam, but in some pedons it has thin subhorizons of loam or sandy clay loam. The lower part is sand or loamy sand that in many pedons has bands of sandy loam.

Ambraw Series

The Ambraw series consists of deep, poorly drained, moderately permeable or moderately slowly permeable soils on flood plains. These soils formed in loamy sediments. Slopes are 0 to 1 percent.

Ambraw soils are similar to Rensselaer soils and are commonly adjacent to Ayrshire and Waupecan soils. All of the similar and adjacent soils are in the higher positions on the landscape. Rensselaer soils have more sand in the substratum than the Ambraw soils. Ayrshire soils are somewhat poorly drained and do not have a mollic epipedon. Waupecan soils are well drained.

A typical pedon of Ambraw sandy clay loam, rarely flooded, in a cultivated field; 400 feet north and 160 feet east of the southwest corner of sec. 20, T. 6 N., R. 6 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) sandy clay loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; about 3 percent gravel; neutral; abrupt smooth boundary.

A—8 to 14 inches; very dark grayish brown (10YR 3/2) sandy clay loam, gray (10YR 5/1) dry; few fine distinct light olive brown (2.5Y 5/4) mottles; weak medium subangular blocky structure; friable; about 3 percent gravel; medium acid; abrupt wavy boundary.

Bg1—14 to 22 inches; dark grayish brown (10YR 4/2) sandy clay loam; common fine distinct light olive brown (2.5Y 5/4) mottles; weak medium subangular blocky structure; friable; fillings of very dark grayish brown (10YR 3/2) loam in crawfish holes and wormholes; about 3 percent gravel; strongly acid; gradual wavy boundary.

Bg2—22 to 30 inches; dark grayish brown (10YR 4/2) sandy clay loam; few fine distinct strong brown (7.5YR 5/8) and common fine distinct light olive brown (2.5Y 5/6) mottles; weak medium subangular blocky structure; friable; thin discontinuous gray (10YR 5/1) films on faces of peds; fillings of dark grayish brown (10YR 4/2) loam in crawfish holes; about 3 percent gravel; strongly acid; gradual wavy boundary.

Bg3—30 to 38 inches; gray (10YR 5/1) sandy clay loam; many medium distinct light olive brown (2.5Y 5/6) mottles; moderate medium subangular blocky structure; firm; thin discontinuous gray (N 5/0) films on faces of peds; fillings of dark gray (N 4/0) loam in crawfish holes about 10 to 20 inches apart; about 5 percent gravel; medium acid; gradual wavy boundary.

Bg4—38 to 45 inches; gray (10YR 5/1) sandy clay loam; many medium distinct yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; firm; thin discontinuous gray (N 5/0) films on faces of peds; dark gray (10YR 4/1) fillings in crawfish holes about 10 to 20 inches apart; about 3 percent gravel; medium acid; gradual wavy boundary.

Bg5—45 to 51 inches; gray (10YR 5/1) sandy clay loam; common medium distinct brownish yellow (10YR 6/6) and many medium distinct light olive brown (2.5Y 5/6) mottles; weak very coarse subangular structure; friable; discontinuous black (10YR 2/1) iron and manganese oxide accumulations; dark gray (10YR 4/1) fillings in crawfish holes about 10 to 20 inches apart; about 3 percent gravel; medium acid; gradual wavy boundary.

Cg—51 to 60 inches; gray (10YR 5/1) stratified clay loam and sandy clay loam; many medium distinct light olive brown (2.5Y 5/6) and common fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; dark gray (N 4/0) fillings in crawfish holes about 12 to 24 inches apart; about 1 percent gravel; medium acid.

The solum is 40 to 55 inches thick. The A horizon has chroma of 1 or 2. It is 12 to 16 inches thick. The B horizon has value of 4 or 5 and chroma of 1 or 2. It is loam, sandy clay loam, or clay loam. The C horizon is stratified sandy clay loam, clay loam, or loam.

Armiesburg Series

The Armiesburg series consists of deep, well drained, moderately permeable soils on bottom land. These soils formed in silty and loamy alluvium washed from loess-mantled uplands. Slopes are 0 to 1 percent.

Armiesburg soils are similar to Haymond and Nolin soils and are commonly adjacent to those soils and to Newark soils. All of the similar and adjacent soils are on bottom land. They have less clay in the solum than the Armiesburg soils and do not have a mollic epipedon. Newark soils are somewhat poorly drained.

A typical pedon of Armiesburg silt loam, occasionally flooded, in a cultivated field; 2,800 feet south and 1,100 feet east of the northwest corner of sec. 22, T. 6 N., R. 6 W.

Ap—0 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; neutral; abrupt wavy boundary.

A—11 to 16 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate medium subangular blocky structure; firm; continuous very dark gray (10YR 3/1) organic coatings on faces of peds; neutral; clear wavy boundary.

Bw1—16 to 23 inches; dark yellowish brown (10YR 4/4) silt loam; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; continuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; clear wavy boundary.

Bw2—23 to 34 inches; dark brown (10YR 4/3) silty clay loam; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; continuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; slightly acid; gradual wavy boundary.

Bw3—34 to 40 inches; dark brown (10YR 4/3) clay loam; weak medium subangular blocky structure; firm; continuous very dark grayish brown (10YR 3/2) organic coatings on faces of peds; medium acid; gradual wavy boundary.

C—40 to 60 inches; yellowish brown (10YR 5/4) loam; common medium faint yellowish brown (10YR 5/8) mottles; massive; friable; few black (10YR 2/1) iron and manganese oxide accumulations; neutral.

The Ap horizon has chroma of 2 or 3. It is silt loam or silty clay loam. The C horizon is loam, silt loam, silty clay loam, or clay loam.

Ava Series

The Ava series consists of deep, moderately well drained, very slowly permeable soils on uplands. These soils formed in loess and in the underlying erosional sediments over glacial till. Slopes range from 2 to 6 percent.

Ava soils are similar to Pekin soils and are adjacent to Alford, Cincinnati, Fairpoint, Pike, Reesville, and Vigo soils. Pekin soils are on ridgetops and breaks from terraces to bottom land. They have less sand and gravel in the lower part than the Ava soils. The well drained Alford and Pike soils are on ridges and knolls. They do not a have fragipan. The well drained Cincinnati soils are on knolls, in draws, and on breaks. Fairpoint, Reesville, and Vigo soils do not have a fragipan. The well drained Fairpoint soils have a higher content of coarse fragments than the Ava soils. They are in positions on the landscape similar to those of the Ava soils. The somewhat poorly drained Reesville soils are on flats. The poorly drained Vigo soils are on flats between draws. They have more silt and less sand in the lower part of the solum than the Ava soils.

A typical pedon of Ava silt loam, 2 to 6 percent slopes, eroded, in a cultivated field; 1,950 feet north and 2,125 feet east of the southwest corner of sec. 17, T. 8 N., R. 5 W.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam, very pale brown (10YR 7/3) dry; weak fine granular structure; friable; common fine roots; few masses of yellowish brown (10YR 5/6) silt loam; slightly acid; abrupt smooth boundary.

Bt1—7 to 17 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; firm; few fine roots; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; medium acid; clear wavy boundary.

Bt2—17 to 23 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt3—23 to 29 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct pale brown (10YR 6/3) and light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm few fine roots; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; very strongly acid; clear wavy boundary.

Btx1—29 to 40 inches; yellowish brown (10YR 5/6) silt loam; common medium distinct grayish brown (10YR 5/2) mottles; moderate very coarse prismatic structure; very firm; brittle; thin continuous grayish brown (10YR 5/2) clay films and flows on faces of prisms; light gray (10YR 7/2) silt coatings and fillings in cracks between prisms; very strongly acid; clear wavy boundary.

2Btx2—40 to 53 inches; yellowish brown (10YR 5/4) silt loam; common fine distinct grayish brown (10YR 5/2) mottles; weak very coarse prismatic structure; very firm; brittle; thin continuous grayish brown (10YR 5/2) clay films and flows on faces of prisms; light gray (10YR 7/2) silt coatings and fillings in cracks between prisms of light gray (10YR 7/2) silt; about 1 percent gravel; very strongly acid; gradual wavy boundary.

2Bt1—53 to 63 inches; yellowish brown (10YR 5/4) loam; few fine distinct strong brown (7.5YR 5/6) and grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; firm; thin discontinuous pale brown (10YR 6/3) clay films on faces of peds; light gray (10YR 7/2) silt coatings on faces of peds; about 2 percent gravel; strongly acid; clear wavy boundary.

2Bt2—63 to 80 inches; strong brown (7.5YR 5/6) loam; common medium distinct grayish brown (10YR 5/2) and reddish brown (5YR 4/3) mottles; weak very coarse subangular blocky structure; firm; thin discontinuous pale brown (10YR 6/3) clay films on faces of peds; light gray (10YR 7/2) silt coatings on faces of peds; about 2 percent gravel; strongly acid.

The solum is 60 to more than 90 inches thick. The silty loess mantle is 36 to 45 inches thick. The fragipan is at a depth of 20 to 30 inches.

Some of the less eroded pedons have an E horizon. The Bt horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 6. It has distinct mottles with chroma of 1 or 2. It is silt loam or silty clay loam. The Btx and 2Btx horizons have hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 8. They have distinct mottles with chroma of 1 or 2. They are silty clay loam, silt loam, or loam. The 2Bt horizon is loam or clay loam.

Ayrshire Series

The Ayrshire series consists of deep, somewhat poorly drained, moderately permeable soils on low terraces. These soils formed in stratified, loamy and sandy water-laid sediments. Slopes range from 0 to 2 percent.

Ayrshire soils are similar to Roby soils and are commonly near Alvin, Princeton, Rensselaer, Roby, and Waupecan soils. Roby and Alvin soils have more sand in the solum than the Ayrshire soils. Roby soils are on flats. The well drained Alvin soils are on ridges and knolls. The well drained Princeton soils are on knolls. The very poorly drained Rensselaer soils are in depressions. They have a mollic epipedon. The well drained Waupecan soils are slightly higher on the landscape than the Ayrshire soils. Also, they have less sand in the solum.

A typical pedon of Ayrshire sandy loam, in a cultivated field; 350 feet east and 1,200 feet south of the northwest corner of sec. 20, T. 6 N., R. 6 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) sandy loam, light gray (10YR 7/2) dry; weak fine granular structure; very friable; about 2 percent gravel; slightly acid; abrupt smooth boundary.

E—10 to 16 inches; pale brown (10YR 6/3) sandy loam; common fine faint light brownish gray (10YR 6/2) and common fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; very friable; common dark grayish brown (10YR 4/2) fillings in wormholes; about 2 percent gravel; neutral; clear wavy boundary.

Bt1—16 to 22 inches; pale brown (10YR 6/3) fine sandy loam; many medium faint light brownish gray (10YR 6/2) and many medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; many discontinuous distinct light brownish gray (10YR 6/2) clay films on faces of peds; about 10 percent small masses of dark grayish brown (10YR 4/2) sandy loam; about 2 percent gravel; neutral; gradual wavy boundary.

Bt2—22 to 29 inches; light brownish gray (10YR 6/2) sandy clay loam; many medium faint pale brown (10YR 6/3) and many medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; many continuous distinct grayish brown (10YR 5/2) clay films on faces of peds; common streaks of clean sand between faces of peds; about 2 percent gravel; slightly acid; gradual wavy boundary.

Bt3—29 to 43 inches; yellowish brown (10YR 5/6) sandy clay loam; many medium distinct pale brown (10YR 6/3) and common fine prominent yellowish red (5YR 5/8) mottles; moderate coarse subangular blocky structure; firm; many continuous distinct grayish brown (10YR 5/2) clay films on faces of peds; common pale brown (10YR 6/3) sandy loam streaks between vertical faces of peds; about 2 percent gravel; neutral; gradual wavy boundary.

Bt4—43 to 54 inches; grayish brown (10YR 5/2) sandy loam; many medium distinct gray (10YR 5/1) and strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; friable; many discontinuous distinct gray (10YR 5/1) clay films on faces of peds; about 4 percent gravel; neutral; gradual wavy boundary.

C—54 to 70 inches; grayish brown (2.5Y 5/2) coarse sandy loam stratified with thin layers of sandy clay loam, coarse sand, and loamy sand; common medium distinct strong brown (7.5YR 5/6) mottles; massive; friable; about 5 percent gravel; neutral.

The solum is 45 to 60 inches thick. The Ap horizon has value of 4 or 5 and chroma of 2 or 3. It is sandy loam or fine sandy loam. The Bt horizon has value of 5 or 6 and chroma of 2 to 6. It is slightly acid or neutral. It is mainly sandy loam or sandy clay loam, but in some pedons it has subhorizons of clay loam. The C horizon is dominantly sand or stratified coarse sand, loamy sand, sandy loam, and coarse sandy loam. The content of gravel in this horizon ranges from 2 to 15 percent.

Bartle Series

The Bartle series consists of deep, somewhat poorly drained, very slowly permeable soils on old alluvial terraces. These soils formed in acid lacustrine or alluvial sediments. Slopes range from 0 to 2 percent.

Bartle soils are similar to Reesville soils and are commonly adjacent to Uniontown and Pekin soils. Reesville and Uniontown do not have a fragipan. Reesville soils have more clay in the control section than the Bartle soils. They are on uplands. Uniontown soils are well drained and are in draws and on steep breaks. They have more clay in the subsoil than the Bartle soils. The gently sloping Pekin soils are on ridges and breaks. They have a subsoil that is browner than that of the Bartle soils.

A typical pedon of Bartle silt loam, in a pasture; 860 feet east and 1,320 feet south of the northwest corner of sec. 23, T. 8 N., R. 3 W.

Ap—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; many roots; neutral; abrupt smooth boundary.

E—4 to 8 inches; light brownish gray (10YR 6/2) silt loam; common fine distinct yellowish brown (10YR 5/4) mottles; weak fine subangular blocky structure; friable; few fillings of gray (10YR 5/1) silt loam in root channels and wormholes; slightly acid; clear wavy boundary.

Bt—8 to 17 inches; pale brown (10YR 6/3) silt loam; common fine distinct light gray (10YR 7/2) and common fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; common roots; thin discontinuous light brownish gray (10YR 6/2) clay films on faces of peds; few light brownish gray (10YR 6/2) tongues of silt loam; few black (10YR 2/1) soft iron and manganese oxide accumulations; slightly acid; clear wavy boundary.

Btg—17 to 27 inches; light brownish gray (10YR 6/2) silt loam; moderate medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; thin discontinuous light brownish gray (10YR 6/2) clay films on faces of peds; thick light brownish gray (10YR 6/2) silt flows between prisms; black (10YR 2/1) soft iron and manganese oxide accumulations; strongly acid; clear irregular boundary.

Btgx1—27 to 34 inches; light brownish gray (10YR 6/2) silt loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure; firm; brittle; thick continuous light brownish gray (10YR 6/2) silt flows and clay flows between prisms; few black (10YR 2/1) iron and manganese oxide accumulations; strongly acid; gradual irregular boundary.

Btgx2—34 to 43 inches; light brownish gray (10YR 6/2) silt loam; common medium distinct yellowish brown (10YR 5/8) mottles; weak very coarse prismatic structure parting to medium thick platy; firm; brittle; thick light brownish gray (10YR 6/2) silt flows and clay flows between prisms; few black (10YR 2/1) soft iron and manganese oxide accumulations; strongly acid; gradual irregular boundary.

Btgx3—43 to 52 inches; light brownish gray (10YR 6/2) silty clay loam; many medium distinct yellowish brown (10YR 5/8) mottles; weak very coarse prismatic structure; firm; brittle; thick light brownish gray (10YR 6/2) silt flows and clay flows between prisms; few black (10YR 2/1) soft iron and manganese oxide accumulations; strongly acid; gradual irregular boundary.

Cg—52 to 60 inches; gray (10YR 6/1) stratified silty clay loam and silt loam; many medium distinct yellowish brown (10YR 5/8) mottles; massive; firm; strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The E horizon has value of 5 or 6 and chroma of 2 or 3. It is neutral to strongly acid. The Bt and Btg horizons have hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 to 4. They are silt loam or silty clay loam. The Btgx horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 4. The C horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 to 4. It is stratified silt loam, silty clay loam, loam, or clay loam.

Berks Series

The Berks series consists of moderately deep, well drained, moderately permeable or moderately rapidly permeable soils on uplands. These soils formed in material weathered from interbedded sandstone and shale. Slopes range from 30 to 70 percent.

Berks soils are commonly adjacent to Ebal, Gilpin, Piankeshaw, Stendal, Wellston, and Zanesville soils. The moderately well drained Ebal soils are on ridges and in benchlike areas. Their solum is thicker than that of the Berks soils and contains fewer sandstone fragments and more clay loam. Gilpin soils are in draws and on breaks. Their solum has fewer coarse fragments than that of the Berks soils. The well drained Piankeshaw and somewhat poorly drained Stendal soils are along drainageways in draws. They are deep over bedrock. Wellston and Zanesville soils have a solum that is thicker than that of the Berks soils. Also, they have fewer sandstone fragments. They are on knolls, on ridgetops, and in draws.

A typical pedon of Berks channery silt loam, in a wooded area of Berks-Ebal complex, 15 to 60 percent slopes; 2,200 feet west and 2,200 feet south of the northeast corner of sec. 12, T. 6 N., R. 4 W.

Oe—0.5 inch to 0; partially decomposed leaf litter.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) channery silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many roots; about 15 percent sandstone fragments; slightly acid; clear wavy boundary.

Bw1—3 to 12 inches; brown (10YR 5/3) channery silt loam; weak fine subangular blocky structure; friable; many roots; root channels and wormholes filled with very dark grayish brown (10YR 3/2) silt loam; about 18 percent sandstone fragments; strongly acid; clear wavy boundary.

Bw2—12 to 23 inches; yellowish brown (10YR 5/4) very channery loam; moderate medium subangular blocky structure; friable; many roots; about 40 percent sandstone fragments; strongly acid; clear wavy boundary.

R—23 inches; interbedded fractured sandstone and shale bedrock; about 10 percent yellowish brown

(10YR 5/4) sandy loam in the cracks in the upper part; massive; strongly acid.

The solum is 20 to 36 inches thick. The depth to bedrock is 20 to 40 inches. The content of coarse fragments in the B horizon is 35 to 60 percent.

The A horizon has value and chroma of 2 or 3. It is channery silt loam or loam. The Bw horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 3 to 6. It is channery silt loam, channery loam, or very channery loam. In the cracks between sandstone fragments in the upper part of the R horizon, the content of loam or sandy loam ranges from 10 to 20 percent.

Bloomfield Series

The Bloomfield series consists of deep, well drained or somewhat excessively drained, moderately rapidly permeable or rapidly permeable soils on terraces and uplands. These soils formed in wind-deposited sandy material. Slopes range from 2 to 60 percent.

Bloomfield soils are similar to Alvin soils and are commonly near Alvin, Princeton, and Roby soils. Alvin soils have more clay in the subsoil than the Bloomfield soils. They are in landscape positions similar to those of the Bloomfield soils. Princeton soils are well drained and are on knolls. They have more clay and less sand throughout the solum than the Bloomfield soils. Roby soils are somewhat poorly drained and are on flats.

A typical pedon of Bloomfield sand, in a cultivated area of Alvin-Bloomfield complex, 6 to 12 percent slopes; 400 feet east and 400 feet north of the center of sec. 20, T. 6 N., R. 6 W.

Ap—0 to 9 inches; brown (10YR 4/3) sand, pale brown (10YR 6/3) dry; weak fine granular structure; very friable; strongly acid; abrupt wavy boundary.

E1—9 to 20 inches; yellowish brown (10YR 5/6) sand; single grain; loose; numerous small masses of dark yellowish brown (10YR 4/4) loamy fine sand in root channels and wormholes; medium acid; clear wavy boundary.

E2—20 to 32 inches; yellowish brown (10YR 5/6) loamy sand; weak fine subangular blocky structure; very friable; few thin discontinuous lamellae of dark brown (7.5YR 4/4) sandy loam in the lower part; slightly acid; gradual wavy boundary.

E&Bt—32 to 48 inches; yellowish brown (10YR 5/6) sand (E); weak medium subangular blocky structure; very friable; about 4 inches of discontinuous dark brown (7.5YR 4/4) loamy sand bands and masses 1.0 to 2.5 inches thick (Bt); weak medium subangular blocky structure in the thicker bands and the larger masses; dark brown (7.5YR 4/4) clay bridges between sand grains; slightly acid; gradual wavy boundary.

Bt—48 to 60 inches; dark brown (7.5YR 4/4) loamy sand; weak fine subangular blocky structure; very friable; dark brown (7.5YR 4/4) clay bridges between sand grains; about 2 inches of yellowish brown (10YR 5/4) sand masses and streaks; slightly acid; gradual wavy boundary.

C—60 to 80 inches; yellowish brown (10YR 5/4) sand; single grain; loose; slight effervescence; mildly alkaline.

The Ap and E horizons are sand or loamy sand. The E horizon has value of 4 or 5 and chroma of 3 to 6. Some pedons have a BE horizon. This horizon is loamy sand. The E&Bt and Bt horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. The Bt horizon is loamy fine sand or loamy sand. It has bands of sandy loam in some pedons.

Bonnie Series

The Bonnie series consists of deep, poorly drained and very poorly drained, moderately slowly permeable soils on bottom land. These soils formed in acid, silty alluvium. Slopes are 0 to 1 percent.

Bonnie soils are similar to Wilhite soils and are commonly near Peoga, Stendal, and Steff soils. All of the similar and adjacent soils are on bottom land, except for Peoga soils, which are on terraces. Wilhite soils have more clay in the control section than the Bonnie soils. Peoga soils have more clay in the subsoil than the Bonnie soils. Stendal soils are somewhat poorly drained, and Steff soils are moderately well drained.

A typical pedon of Bonnie silt loam, frequently flooded, in a cultivated field; 600 feet west and 100 feet north of the southeast corner of sec. 30, T. 8 N., R. 6 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; few roots; medium acid; abrupt smooth boundary.

Cg1—8 to 20 inches; light brownish gray (10YR 6/2) silt loam; common fine distinct strong brown (7.5YR 5/6) and dark yellowish brown (10YR 3/4) mottles; weak very coarse prismatic structure; friable; few roots; light gray (10YR 7/2) silt fillings in cracks and crawfish holes; very strongly acid; clear wavy boundary.

Cg2—20 to 39 inches; light brownish gray (10YR 6/2) silt loam; common fine distinct dark yellowish brown (10YR 3/4) mottles; weak very coarse prismatic structure; friable; few roots; few light gray (10YR 7/2) silt flows in crawfish holes and silt fillings in cracks; common very dark brown (10YR 2/2) iron and manganese oxide accumulations; very strongly acid; gradual wavy boundary.

Cg3—39 to 50 inches; light brownish gray (10YR 6/2) silt loam; common fine distinct strong brown (7.5YR 5/6) mottles; massive; friable; light gray (10YR 7/2) silt fillings in crawfish holes and cracks; common very dark brown (10YR 2/2) iron and manganese oxide concretions and accumulations; strongly acid; gradual wavy boundary.

Cg4—50 to 60 inches; light brownish gray (10YR 6/2) silt loam; common fine distinct strong brown (7.5YR 5/6) mottles; massive; friable; flows and tongues of light gray (10YR 7/2) silt; common very dark brown (10YR 2/2) iron and manganese oxide accumulations; medium acid.

The Ap horizon has value of 4 or 5. The C horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 1 or 2. The part of the C horizon within a depth of 40 inches is strongly acid or very strongly acid. The part below a depth of 40 inches is strongly acid or medium acid. It has strata of loam or silty clay loam in some pedons.

Booker Series

The Booker series consists of deep, very poorly drained, very slowly permeable soils on lake plains. These soils formed in very fine textured sediments. Slopes are 0 to 1 percent.

Booker soils are similar to Montgomery soils and are commonly adjacent to McGary, Montgomery, and Zipp soils. All of the adjacent soils are on lake plains. They have less montmorillonitic clay than the Booker soils. McGary soils are somewhat poorly drained. McGary and Zipp soils do not have a mollic epipedon.

A typical pedon of Booker mucky clay, in a cultivated field; 1,000 feet west and 2,500 feet north of the southeast corner of sec. 6, T. 6 N., R. 6 W.

Ap—0 to 7 inches; black (10YR 2/1) mucky clay, dark gray (10YR 4/1) dry; weak fine granular structure; friable; slightly acid; abrupt smooth boundary.

A—7 to 12 inches; black (10YR 2/1) mucky clay, dark gray (10YR 4/1) dry; moderate thick platy structure; firm; slightly acid; clear wavy boundary.

Bg1—12 to 20 inches; very dark gray (10YR 3/1) clay; few fine distinct reddish brown (5YR 5/4) mottles; moderate medium prismatic structure parting to strong medium angular blocky; very firm and very sticky; black (10YR 2/1) slickensides and pressure faces; vertical cracks filled with black (10YR 2/1) mucky clay extend through the horizon; neutral; clear wavy boundary.

Bg2—20 to 29 inches; dark gray (N 4/0) clay; few fine distinct yellowish red (5YR 5/6) mottles; weak medium prismatic structure parting to strong medium angular blocky; very firm and very sticky; very dark gray (10YR 3/1) slickensides and pressure faces; thin vertical cracks filled with very dark gray (10YR 3/1) clay extend through the horizon; neutral; gradual wavy boundary.

Bg3—29 to 39 inches; gray (N 5/0) clay; few fine distinct yellowish red (5YR 5/6) mottles; weak medium prismatic structure parting to moderate fine angular blocky; very firm and very sticky; thin vertical cracks filled with black (5YR 2/1) material; very dark gray (10YR 3/1) slickensides and pressure faces; neutral; gradual wavy boundary.

Bg4—39 to 45 inches; dark gray (N 4/0) clay; common fine distinct light brownish gray (10YR 6/2) and few fine distinct yellowish red (5YR 5/6) mottles; weak medium prismatic structure parting to moderate fine angular blocky; very firm and very sticky; thin vertical cracks filled with black (10YR 2/1) material; very dark gray (10YR 3/1) slickensides and pressure faces; neutral; gradual wavy boundary.

Bg5—45 to 55 inches; dark gray (N 4/0) clay; common fine distinct light brownish gray (2.5Y 6/2) and few fine distinct yellowish red (5YR 4/6) mottles; weak medium prismatic structure parting to moderate fine angular blocky; firm and sticky; neutral; gradual wavy boundary.

Cg—55 to 60 inches; olive gray (5Y 5/2) clay; common coarse distinct strong brown (7.5YR 5/6) mottles; massive; firm and sticky; neutral.

The solum ranges from 45 to 60 inches in thickness. The mollic epipedon is about 12 to 20 inches thick. The A horizon has hue of 10YR or N, value of 2 or 3, and chroma of 0 or 1. It is clay, mucky clay, or mucky silty clay. The Bg horizon has hue of 10YR or N, value of 3 to 5, and chroma of 0 or 1. It is silty clay or clay.

Chetwynd Series

The Chetwynd series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in loamy outwash. Slopes range from 18 to 60 percent.

These soils have a higher base saturation than is definitive for the Chetwynd series. This difference, however, does not alter the usefulness or behavior of the soils.

Chetwynd soils are similar to Hickory soils and are commonly near Hickory, Parke, Pike, and Stendal soils. Hickory soils have less sand and more silt in the solum than the Chetwynd soils. Parke and Pike soils have more silt and less sand in the upper part of the solum than the Chetwynd soils. They are on knolls or ridgetops. The somewhat poorly drained Stendal soils are along drainageways in draws. They have less sand in the solum than the Chetwynd soils.

A typical pedon of Chetwynd silt loam, 25 to 60 percent slopes, in a wooded area; 600 feet east and 1,400 feet north of the southwest corner of sec. 29, T. 8 N., R. 7 W.

Oe—0.5 inch to 0; partially decomposed leaf litter.

A—0 to 3 inches; dark brown (10YR 3/3) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; many roots; medium acid; abrupt smooth boundary.

E—3 to 5 inches; brown (10YR 4/3) silt loam; weak thick platy structure parting to moderate fine granular; friable; many roots; very strongly acid; clear smooth boundary.

Bt1—5 to 14 inches; brown (7.5YR 5/4) loam; weak fine subangular blocky structure; friable; common roots; wormholes and root channels filled with brown (10YR 4/3) silt loam; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of some peds; about 2 percent fine gravel; very strongly acid; clear wavy boundary.

Bt2—14 to 25 inches; brown (7.5YR 4/4) loam; weak medium subangular blocky structure; friable; common roots; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of most peds; about 2 percent fine gravel; very strongly acid; gradual wavy boundary.

Bt3—25 to 33 inches; strong brown (7.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable; few roots; thin continuous dark brown (7.5YR 4/4) clay films on faces of most peds; about 3 percent gravel; very strongly acid; gradual wavy boundary.

Bt4—33 to 44 inches; strong brown (7.5YR 5/6) sandy loam; weak coarse subangular blocky structure; friable; few roots; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of most peds; about 3 percent gravel; very strongly acid; gradual wavy boundary.

Bt5—44 to 56 inches; yellowish red (5YR 5/6) sandy loam; weak coarse subangular blocky structure; friable; few roots; thin discontinuous reddish brown (5YR 4/4) clay films on faces of most peds; about 4 percent gravel; very strongly acid; gradual wavy boundary.

Bt6—56 to 72 inches; reddish brown (5YR 5/4) sandy loam; weak coarse subangular blocky structure; friable; thin discontinuous reddish brown (5YR 4/4) clay films on faces of most peds; about 5 percent masses and streaks of light yellowish brown (10YR 6/4) sand; about 5 percent gravel; very strongly acid; gradual wavy boundary.

Bt7—72 to 80 inches; strong brown (7.5YR 5/6) sandy loam; weak very coarse subangular blocky structure; friable; about 10 percent masses and streaks of light yellowish brown (10YR 6/4) sand; about 5 percent fine masses of reddish brown (5YR 4/4) sandy loam; about 5 percent gravel; very strongly acid.

The A and E horizons are silt loam or loam. The A horizon has value of 3 or 4 and chroma of 2 or 3. The E horizon has value of 4 or 5 and chroma of 3 or 4. The Bt horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8. It is strongly acid or very strongly acid. The upper part of this horizon is sandy clay loam or loam, and the lower part is sandy loam that in some pedons has strata of sandy clay loam. The C horizon is sand or gravelly sand.

Cincinnati Series

The Cincinnati series consists of deep, well drained soils on uplands. These soils formed in loess and in the underlying glacial till. Permeability is moderate in the upper part of the profile and slow or moderately slow in the lower part. Slopes range from 6 to 18 percent.

Cincinnati soils are similar to Zanesville soils and are commonly adjacent to Alford, Ava, Fairpoint, Stendal, and Vigo soils. Zanesville soils have more sandstone fragments in the solum than the Cincinnati soils and are underlain by sandstone bedrock. Alford, Fairpoint, Stendal, and Vigo soils do not have a fragipan. Alford soils are on ridges and knolls. Fairpoint soils are on knolls. They have a higher content of coarse fragments than the Cincinnati soils. The somewhat poorly drained Stendal soils are at the bottom of draws. They contain slightly less clay than the Cincinnati soils. The poorly drained Vigo soils are on flats. They have more silt in the lower part of the solum than the Cincinnati soils. The moderately well drained Ava soils are on ridgetops and knolls.

A typical pedon of Cincinnati silt loam, 6 to 12 percent slopes, eroded, in a cultivated field; 300 feet west and 2,500 feet south of the northeast corner of sec. 3, T. 8 N., R. 7 W.

Ap—0 to 8 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; friable; common roots; mixed with few masses of yellowish brown (10YR 5/6) silt loam by plowing; neutral; abrupt smooth boundary.

Bt1—8 to 13 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable; few roots; thin continuous yellowish brown (10YR 5/4) clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt2—13 to 18 inches; yellowish brown (10YR 5/4) silt loam; many fine distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; thin continuous dark brown (7.5YR 4/4) clay films; very strongly acid; clear wavy boundary.

Bt3—18 to 22 inches; yellowish brown (10YR 5/6) silty clay loam; many medium distinct strong brown (7.5YR 5/8) and pale brown (10YR 6/3) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; thick continuous light brownish gray (10YR 6/2) clay films on faces of peds and clay flows between prisms; light gray (10YR 6/1) silt flows between prisms; very strongly acid; clear irregular boundary.

Btx1—22 to 31 inches; yellowish brown (10YR 5/6) silt loam; common medium distinct light brownish gray (10YR 6/2) mottles; moderate coarse prismatic structure parting to moderate thick platy; firm; brittle; thin continuous grayish brown (10YR 5/2) clay films on faces of peds and clay flows between prisms; light gray (10YR 7/1) silt flows between prisms; common black (10YR 2/1) iron and manganese oxide accumulations; few fine pebbles; very strongly acid; clear irregular boundary.

2Btx2—31 to 46 inches; yellowish brown (10YR 5/6) silt loam; common medium distinct light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure; very firm; brittle; thin continuous grayish brown (10YR 5/2) clay flows on prisms; light gray (10YR 7/2) silt flows between prisms; about 2 percent pebbles; very strongly acid; clear irregular boundary.

2Bt1—46 to 54 inches; yellowish brown (10YR 5/6) loam; common medium distinct light brownish gray (10YR 6/2) mottles; weak coarse prismatic structure; firm; thin continuous brown (10YR 5/3) clay films on faces of prisms; about 3 percent pebbles; very strongly acid; clear wavy boundary.

2Bt2—54 to 65 inches; yellowish brown (10YR 5/4) loam; common medium distinct light brownish gray (10YR 6/2) and few medium distinct strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure; firm; thin discontinuous brown (10YR 5/3) clay films on faces of prisms; very strongly acid; gradual wavy boundary.

2Bt3—65 to 80 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct light brownish gray (10YR 6/2) mottles; weak coarse prismatic structure; firm; thin discontinuous brown (10YR 5/3) clay films on faces of prisms; about 5 percent pebbles; very strongly acid.

The silty loess mantle is 18 to 40 inches thick. The fragipan is at a depth of 18 to 30 inches.

The Ap horizon has value of 4 or 5 and chroma of 2 to 6. Most pedons that are not eroded have an E horizon. The Bt, Btx, and 2Btx horizons have hue of 10YR or 7.5YR and value and chroma of 4 to 6. They are silty clay loam or silt loam. The 2Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam, loam, or clay loam.

Cuba Series

The Cuba series consists of deep, well drained, moderately permeable soils on bottom land. These soils formed in acid, silty alluvium washed from loess-mantled uplands. Slopes are 0 to 1 percent.

These soils have less clay in the subsoil than is definitive for the Cuba series. This difference, however, does not alter the usefulness or behavior of the soils.

Cuba soils are similar to Haymond, Piankeshaw, and Steff soils and are adjacent to those soils and to Stendal soils. All of the similar and adjacent soils are on bottom land. Haymond and Piankeshaw soils are less acid than the Cuba soils. Also, Piankeshaw soils have more sandstone fragments in the solum. Steff soils are moderately well drained, and Stendal soils are somewhat poorly drained.

A typical pedon of Cuba silt loam, frequently flooded, in a cultivated field; 925 feet north and 550 feet west of the southeast corner of sec. 16, T. 8 N., R. 3 W.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak medium granular structure; friable; slightly acid; abrupt smooth boundary.

Bw1—9 to 16 inches; brown (10YR 5/3) silt loam; weak fine subangular blocky structure; friable; discontinuous dark yellowish brown (10YR 4/4) organic coatings on faces of peds; few fillings of brown (10YR 4/3) silt loam in root channels and wormholes; strongly acid; gradual wavy boundary.

Bw2—16 to 25 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; friable; discontinuous dark yellowish brown (10YR 3/4) organic coatings on faces of peds; strongly acid; gradual wavy boundary.

C1—25 to 42 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; strongly acid; gradual wavy boundary.

C2—42 to 48 inches; dark yellowish brown (10YR 4/4) silt loam; massive; friable; strongly acid; gradual wavy boundary.

C3—48 to 60 inches; light yellowish brown (10YR 6/4) silt loam; massive; friable; about 20 percent masses of dark brown (10YR 3/3) silt loam; strongly acid.

The control section is medium acid or strongly acid in the upper part and strongly acid or very strongly acid in the lower part. The Ap horizon has value of 4 or 5 and chroma of 3 or 4. The B horizon has value of 4 or 5 and chroma of 3 to 6. The C horizon has value of 4 to 6 and chroma of 3 or 4. It is silt loam or loam in the upper part and silt loam, loam, or sandy loam in the lower part.

Ebal Series

The Ebal series consists of deep, moderately well drained, very slowly permeable soils on uplands. These soils formed in loess and in material weathered from interbedded shale and thin layers of sandstone. Slopes range from 12 to 25 percent.

Ebal soils are commonly adjacent to Berks, Gilpin, Hagerstown, Haymond, and Wellston soils. Berks and Gilpin soils are in draws and on breaks. They are shallower to bedrock than the Ebal soils. Also, the solum of Berks soils has a higher content of sand and coarse fragments and a lower content of clay, and the solum of Gilpin soils has a lower content of clay and a higher content of coarse fragments. Hagerstown soils are underlain by limestone. They are on the sides of ridges and in draws. The nearly level Haymond soils are along drainageways in draws. They have less clay than the Ebal soils. Wellston soils are on side slopes and ridgetops. They have less clay and more sand and coarse fragments in the lower part of the solum than the Ebal soils.

A typical pedon of Ebal silt loam, in a pastured area of Ebal-Wellston silt loams, 10 to 18 percent slopes, eroded; 1,750 feet north and 1,250 feet west of the southeast corner of sec. 28, T. 6 N., R. 3 W.

Ap—0 to 6 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; friable; slightly acid; abrupt smooth boundary.

Bt1—6 to 11 inches; strong brown (7.5YR 5/6) silty clay loam; weak fine subangular blocky structure; friable; thin discontinuous brown (7.5YR 5/4) clay films on faces of peds; about 5 percent small masses of dark yellowish brown (10YR 4/4) silt loam filling root channels and wormholes; strongly acid; clear wavy boundary.

Bt2—11 to 19 inches; yellowish brown (10YR 5/6) silty clay loam; common fine distinct yellowish red (5YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; thin continuous strong brown (7.5YR 4/6) clay films on faces of peds; about 2 percent sandstone fragments; very strongly acid; clear wavy boundary.

2Bt3—19 to 27 inches; yellowish brown (10YR 5/6) silty clay; common medium faint brownish yellow (10YR 6/8) and common fine distinct yellowish red (5YR 5/6) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; thin continuous light gray (10YR 7/2) clay films on faces of peds; about 2 percent sandstone fragments; very strongly acid; gradual wavy boundary.

2Bt4—27 to 33 inches; brownish yellow (10YR 6/6) silty clay; few fine distinct yellowish red (5YR 5/6) and light gray (2.5Y 7/2) mottles; weak coarse prismatic structure; very firm; thin continuous light gray (10YR 7/2) pressure faces and clay films; few black (10YR 2/1) iron and manganese oxide accumulations; very strongly acid; gradual wavy boundary.

2C1—33 to 39 inches; yellowish brown (10YR 5/6) silty clay; few fine distinct pale brown (10YR 6/3) and strong brown (7.5YR 5/6) mottles; massive; very firm; few black (10YR 2/1) iron and manganese oxide accumulations; very strongly acid; gradual wavy boundary.

2C2—39 to 46 inches; brownish yellow (10YR 6/6) silty clay; common fine distinct strong brown (7.5YR 5/8) and few fine distinct light gray (10YR 7/2) mottles; massive; very firm; common black (10YR 2/1) iron and manganese oxide accumulations; very strongly acid; gradual wavy boundary.

2C3—46 to 54 inches; brownish yellow (10YR 6/6) silty clay; common fine distinct strong brown (7.5YR 5/8) and light gray (2.5Y 7/2) mottles; massive; very firm; common black (10YR 2/1) iron and manganese oxide accumulations; few soft shale fragments; medium acid; gradual wavy boundary.

2Cr—54 to 60 inches; brownish yellow (10YR 6/6) soft silty clay shale; many fine distinct strong brown (7.5YR 5/8) and common fine distinct light gray (2.5Y 7/2) mottles; few black (10YR 2/1) iron and manganese oxide accumulations; slightly acid.

The solum is 30 to 60 inches thick. The depth to soft shale bedrock is 50 to 80 inches. The A horizon has value of 3 or 4 and chroma of 2 to 4. Some pedons have a BE horizon. The Bt horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 3 to 6. It is channery silt loam, silt loam, silty clay loam, or channery silty clay loam. The content of coarse fragments in this horizon ranges from 2 to 15 percent. The 2Bt horizon is silty clay or channery silty clay.

Elston Series

The Elston series consists of deep, well drained, moderately rapidly permeable soils on terraces. These soils formed in loamy outwash and in the underlying sandy outwash. Slopes range from 0 to 2 percent.

Elston soils are commonly near Haymond, Rensselaer, and Waupecan soils. Haymond soils are less sandy than the Elston soils. They are on bottom land. Rensselaer and Waupecan soils have more clay in the solum than the Elston soils. Rensselaer soils are very poorly drained and are in depressions on terraces. Waupecan soils are in positions on the landscape similar to those of the Elston soils.

A typical profile of Elston loam, 0 to 2 percent slopes, in a cultivated field; 1,220 feet south and 550 feet west of the northeast corner of sec. 30, T. 6 N., R. 6 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

A—8 to 16 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; neutral; abrupt wavy boundary.

Bt1—16 to 22 inches; dark brown (7.5YR 4/2) loam; weak medium subangular blocky structure parting to moderate medium granular; friable; thin continuous very dark grayish brown (10YR 3/2) organic and clay coatings on faces of peds; friable; about 2 percent gravel; neutral; clear wavy boundary.

Bt2—22 to 30 inches; brown (7.5YR 4/4) loam; weak medium subangular blocky structure; friable; thin continuous dark brown (10YR 3/3) organic coatings and clay films on faces of peds; about 4 percent fine gravel; slightly acid; gradual wavy boundary.

Bt3—30 to 39 inches; brown (7.5YR 4/4) sandy loam; weak coarse subangular blocky structure; very friable; thin discontinuous dark brown (7.5YR 3/2) clay films on faces of peds; about 6 percent fine gravel; slightly acid; gradual wavy boundary.

Bt4—39 to 48 inches; dark brown (7.5YR 4/4) loamy sand; weak coarse subangular blocky structure; very friable; dark brown (7.5YR 3/2) clay coatings on sand grains and clay bridges between sand grains; about 10 percent fine gravel; slightly acid; clear wavy boundary.

Bt5—48 to 53 inches; dark brown (7.5YR 3/4) gravelly sandy loam; weak coarse subangular blocky structure; very friable; dark brown (7.5YR 3/4) clay films on sand grains and clay bridges between sand grains; about 15 percent fine gravel; neutral; abrupt wavy boundary.

C—53 to 60 inches; brown (7.5YR 5/4) gravelly coarse sand; single grain; loose; about 18 percent fine gravel; slight effervescence; moderately alkaline.

The solum is 50 to 65 inches thick. The Ap and A horizons have chroma of 2 or 3. They are loam or sandy loam. The Bt horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 to 4. It is sandy loam or loam in the upper part and sandy loam, gravelly sandy loam, loamy sand, or gravelly loamy sand in the lower part. This horizon is slightly acid or neutral. The C horizon is sand or gravelly coarse sand.

Evansville Series

The Evansville series consists of deep, poorly drained, moderately permeable soils on lake plains and low terraces. These soils formed in stratified, medium textured and moderately fine textured sediments. Slopes are 0 to 1 percent.

The B horizon of these soils is more acid than is definitive for the Evansville series. This difference, however, does not alter the usefulness or behavior of the soils.

Evansville soils are similar to Peoga and Vigo soils and are commonly adjacent to Peoga, Pekin, and Zipp soils. Peoga and Vigo soils have more clay in the subsoil than the Evansville soils. Also, Vigo soils have a thicker E horizon. They are on upland flats. Peoga soils are in landscape positions similar to those of the Evansville soils. Pekin soils are moderately well drained and are on terraces. They have a fragipan. Zipp soils have more clay in the solum than the Evansville soils. They are on lake plains.

A typical pedon of Evansville silt loam, rarely flooded, in a cultivated field; 120 feet west and 140 feet north of the southeast corner of sec. 6, T. 8 N., R. 6 W.

Ap—0 to 11 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; slightly acid; abrupt smooth boundary.

Bg1—11 to 22 inches; gray (10YR 6/1) silty clay loam; many medium distinct light olive brown (2.5Y 5/6) and few fine distinct yellowish red (5YR 4/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; firm; wormholes and root channels filled with dark grayish brown (10YR 4/2) silt loam; tongues of gray (10YR 5/1) silt krotovinas 6 to 12 inches apart; very strongly acid; clear wavy boundary.

Bg2—22 to 36 inches; gray (10YR 6/1) silty clay loam; many medium distinct yellowish brown (10YR 5/6) and common fine distinct strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few discontinuous gray (10YR 5/1) clay films on faces of peds; tongues of gray (10YR 5/1) silt krotovinas 6 to 12 inches apart; very strongly acid; clear wavy boundary.

Bg3—36 to 44 inches; gray (10YR 6/1) silty clay loam; many medium distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) mottles; moderate coarse prismatic structure parting to weak medium subangular blocky; firm; discontinuous gray (10YR 5/1) clay films on faces of peds; tongues of gray (10YR 5/1) silt krotovinas 6 to 12 inches apart; strongly acid; gradual wavy boundary.

Bg4—44 to 50 inches; gray (10YR 6/1) silty clay loam; common medium distinct strong brown (7.5YR 5/6) and pale brown (10YR 6/3) mottles; weak very coarse prismatic structure; firm; tongues of gray (10YR 5/1) and dark gray (10YR 4/1) silt krotovinas 6 to 12 inches apart; strongly acid; gradual wavy boundary.

Cg—50 to 60 inches; light brownish gray (10YR 6/2) silty clay loam; common coarse distinct strong brown (7.5YR 5/6) and few medium distinct brownish yellow (10YR 6/6) mottles; massive; firm; few thin strata of silt loam; many black (10YR 2/1) iron and manganese oxide accumulations; tongues of gray (10YR 5/1) and dark gray (10YR 4/1) silt krotovinas 12 to 18 inches apart; medium acid.

The solum is 40 to 50 inches thick. The Ap horizon has value of 4 or 5. The Bg horizon is medium acid to very strongly acid. The Bg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. The lower part of this horizon is silty clay loam or silt loam. The C horizon also is silty clay loam or silt loam.

Fairpoint Series

The Fairpoint series consists of deep, well drained, moderately slowly permeable soils on uplands. These soils formed in spoil in surface-mined areas. Slopes range from 2 to 90 percent.

Fairpoint soils are commonly near Ava, Cincinnati, Shakamak, and Vigo soils. All of the adjacent soils are in undisturbed areas. They have an argillic horizon and do not have sandstone and shale fragments in the solum. Ava, Cincinnati, and Shakamak soils have a fragipan. They are on knolls or along drainageways. Vigo soils are poorly drained and are on flats between draws.

A typical pedon of Fairpoint very shaly loam, 35 to 90 percent slopes, in a wooded area; 60 feet south and 900 feet east of the northwest corner of sec. 13, T. 7 N., R. 7 W.

A—0 to 3 inches; dark grayish brown (10YR 4/2) very shaly loam, grayish brown (10YR 5/2) dry; weak coarse granular structure; friable; many fine roots; about 40 percent fine fragments of dark gray (10YR 4/1) soft weathered shale; about 10 percent sandstone fragments; few coal fragments and till pebbles; neutral; clear wavy boundary.

C1—3 to 15 inches; brown (10YR 5/3) extremely shaly loam; massive; friable; common fine roots; about 50 percent dark gray (10YR 4/1) shale fragments; about 15 percent sandstone fragments; few coal fragments and till pebbles; neutral; gradual irregular boundary.

C2—15 to 60 inches; brown (10YR 5/3) extremely shaly loam; massive; friable; few large roots; about 50 percent dark gray (10YR 4/1) shale fragments; about 15 percent sandstone fragments; few coal fragments and till pebbles; neutral.

The soils are medium acid to neutral throughout. The content of rock fragments ranges from 20 to 80 percent in the control section. These fragments commonly range from 1 to 6 inches in size, but some are large stones. Most of the rock fragments are shale, but some are sandstone and till pebbles. The fragments cover about 10 to 40 percent of the surface in vegetated areas and 20 to 80 percent of the surface in bare areas.

The A horizon is dominantly 1 to 4 inches of shaly silty clay loam, shaly silt loam, shaly clay loam, or very shaly loam. In some reclaimed areas, the A horizon and the upper part of the C horizon are silt loam, loam, silty clay loam, or clay loam. The A horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 6. The C horizon has hue of 10YR, 7.5YR, or 2.5Y or is neutral in hue. It has value of 3 to 6 and chroma of 0 to 8. It is the shaly to extremely shaly analogs of silt loam to clay loam.

Gilpin Series

The Gilpin series consists of moderately deep, well drained, moderately permeable soils on uplands. These soils formed in sandstone and shale residuum. Slopes range from 18 to 60 percent.

Gilpin soils are commonly near Berks, Ebal, Stendal, Wellston, and Zanesville soils. Berks soils have more sandstone fragments in the solum than the Gilpin soils. They are in draws and on breaks. Ebal soils have more clay in the lower part of the solum than the Gilpin soils. They are in draws and on side slopes. Stendal soils are somewhat poorly drained and are on bottom land. They have fewer coarse fragments than the Gilpin soils. Wellston soils have more silt than the Gilpin soils and do not have sandstone fragments in the upper part of the solum. They are in draws and on the sides of ridges. Zanesville soils have fewer sandstone fragments in the solum than the Gilpin soils and have a fragipan. They are on ridgetops and side slopes.

A typical pedon of Gilpin silt loam, in a wooded area of Gilpin-Berks complex, 30 to 60 percent slopes; 1,300 feet west and 2,700 feet north of the southeast corner of sec. 8, T. 7 N., R. 4 W.

Oe—0.5 inch to 0; partially decomposed leaf litter.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam; moderate fine granular structure; friable; about 10 percent sandstone fragments; neutral; clear wavy boundary.

E—4 to 8 inches; brown (10YR 5/3) silt loam; weak fine subangular blocky structure; friable; fillings of very dark grayish brown (10YR 3/2) silt loam in root channels; about 10 percent sandstone fragments; medium acid; clear wavy boundary.

Bt1—8 to 14 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; thin discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; about 10 percent sandstone fragments; strongly acid; clear wavy boundary.

Bt2—14 to 18 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; about 10 percent sandstone fragments; strongly acid; gradual wavy boundary.

Bt3—18 to 22 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; friable; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; about 10 percent sandstone fragments; very strongly acid; gradual wavy boundary.

Bt4—22 to 29 inches; strong brown (7.5YR 5/6) channery loam; weak coarse subangular blocky structure; friable; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; about

20 percent sandstone fragments; very strongly acid; gradual wavy boundary.

C—29 to 34 inches; strong brown (7.5YR 5/6) extremely channery loam; massive; friable; about 60 percent sandstone fragments; very strongly acid; abrupt smooth boundary.

R—34 inches; fractured sandstone bedrock; about 5 percent pale brown (10YR 6/3) sandy loam in cracks in the upper part; massive; strongly acid.

The solum is 20 to 36 inches thick. The depth to bedrock is 20 to 40 inches. The content of coarse fragments in the B horizon ranges from 15 to 30 percent.

The A horizon has chroma of 2 or 3. It is silt loam, loam, or channery loam. The B horizon has hue of 10YR or 7.5YR and chroma of 4 to 8. It is silt loam, loam, clay loam, channery silt loam, channery loam, very channery loam, or channery silty clay loam.

The Gilpin soils in the map units Ebal-Gilpin silt loams, 12 to 18 percent slopes, Gilpin-Ebal silt loams, 18 to 30 percent slopes, and Gilpin-Wellston silt loams, 18 to 25 percent slopes, are deeper to bedrock than is definitive for the Gilpin series. This difference, however, does not alter the usefulness or behavior of the soils.

Hagerstown Series

The Hagerstown series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in loess and in the underlying limestone residuum. Slopes range from 18 to 25 percent.

Hagerstown soils are similar to Wellston soils and are commonly adjacent to Ebal, Gilpin, Haymond, and Wellston soils. All of the adjacent soils are on ridges or in draws on uplands, except for Haymond soils, which are in draws on narrow bottom land. Ebal soils are underlain by soft shale. They are moderately well drained. Gilpin soils have sandstone fragments in the solum and are underlain by sandstone and shale bedrock. Haymond soils have less clay and more sand than the Hagerstown soils. Wellston soils are underlain by sandstone and shale bedrock.

A typical pedon of Hagerstown silt loam, 18 to 25 percent slopes, eroded, in an idle field; 2,100 feet east and 2,100 feet south of the northwest corner of sec. 12, T. 8 N., R. 3 W.

Ap—0 to 6 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak medium granular structure; friable; medium acid; abrupt smooth boundary.

Bt1—6 to 14 inches; brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure; friable; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; about 5 percent small masses of brown (10YR 4/3) silt loam; strongly acid; gradual wavy boundary.

Bt2—14 to 19 inches; yellowish red (5YR 4/8) silty clay loam; moderate fine subangular blocky structure; firm; thin continuous reddish brown (5YR 4/4) clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt3—19 to 26 inches; yellowish red (5YR 4/6) silty clay loam; moderate medium angular blocky structure; firm; thin continuous reddish brown (5YR 4/4) clay films on faces of peds; about 3 percent chert fragments; very strongly acid; gradual wavy boundary.

2Bt4—26 to 36 inches; yellowish red (5YR 4/6) silty clay; moderate medium angular blocky structure; firm; thin continuous reddish brown (5YR 4/4) clay films on faces of peds; about 13 percent chert fragments; very strongly acid; gradual wavy boundary.

2Bt5—36 to 44 inches; yellowish red (5YR 4/8) silty clay; moderate fine angular blocky structure; firm; thin continuous reddish brown (5YR 4/4) clay films on faces of peds; about 3 percent chert fragments; very strongly acid; gradual wavy boundary.

2Bt6—44 to 52 inches; yellowish red (5YR 4/8) silty clay; weak coarse subangular blocky structure; firm; thin discontinuous reddish brown (5YR 4/4) clay films on faces of peds; about 3 percent chert and sandstone fragments; common black (5YR 2/1) iron and manganese oxide accumulations; about 5 percent streaks of light brown (7.5YR 6/4) silty clay loam between peds; strongly acid; gradual wavy boundary.

2C—52 to 58 inches; red (2.5YR 4/6) clay; massive; very firm; about 15 percent chert, limestone, and sandstone fragments; medium acid.

2R—58 inches; limestone bedrock.

The depth to limestone bedrock ranges from 40 to 60 inches. The thickness of the loess mantle ranges from 20 to 40 inches.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. The Bt and 2Bt horizons have hue of 7.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8. The 2Bt and 2C horizons are silty clay or clay. The content of chert fragments in the 2Bt horizon ranges from 0 to 10 percent.

Haymond Series

The Haymond series consists of deep, well drained, moderately permeable soils on bottom land. These soils formed in silty alluvium. Slopes are 0 to 1 percent.

Haymond soils are similar to Armiesburg, Cuba, Nolin, and Piankeshaw soils and are commonly adjacent to Ebal, Hagerstown, Newark, Nolin, and Wirt soils. Armiesburg, Ebal, Hagerstown, and Nolin soils have more clay in the solum than the Haymond soils. The moderately well drained Ebal and well drained

Hagerstown soils are in draws and on ridges in the uplands. Cuba soils have more clay in the control section than the Haymond soils and are more acid. Piankeshaw soils have a higher content of coarse fragments in the solum than the Haymond soils. Newark and Wirt soils are in positions on the landscape similar to those of the Haymond soils. Newark soils are somewhat poorly drained. Wirt soils have more sand throughout than the Haymond soils.

A typical pedon of Haymond silt loam, rarely flooded, in a cultivated field; 1,350 feet west and 25 feet north of the southeast corner of sec. 21, T. 6 N., R. 6 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

Bw1—9 to 21 inches; brown (10YR 5/3) silt loam; weak fine subangular blocky structure; friable; wormholes filled with dark grayish brown (10YR 4/2) silt loam; thin discontinuous dark grayish brown (10YR 4/2) organic coatings on faces of peds; neutral; gradual wavy boundary.

Bw2—21 to 30 inches; brown (10YR 5/3) silt loam; weak medium subangular blocky structure; friable; thin discontinuous dark grayish brown (10YR 4/2) organic coatings on faces of peds; neutral; gradual wavy boundary.

Bw3—30 to 40 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; thin discontinuous dark yellowish brown (10YR 4/4) organic coatings on faces of peds; few small masses of brown (10YR 5/3) silt loam; neutral; gradual wavy boundary.

C1—40 to 49 inches; yellowish brown (10YR 5/4) silt loam; massive; friable; neutral; gradual wavy boundary.

C2—49 to 60 inches; yellowish brown (10YR 5/4) fine sandy loam; massive; friable; slight effervescence; dominantly neutral but mildly alkaline in a few spots.

The solum is 40 to 60 inches thick. The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The Bw and C horizons have value of 4 or 5 and chroma of 3 or 4. The C horizon is silt loam, loam, or fine sandy loam.

Henshaw Series

The Henshaw series consists of deep, somewhat poorly drained, moderately slowly permeable soils on low terraces. These soils formed in moderately fine textured sediments. Slopes range from 1 to 3 percent.

Henshaw soils are similar to McGary soils and are commonly adjacent to McGary and Patton soils. McGary soils have more clay in the subsoil than the Henshaw soils. They are in landscape positions similar to those of the Henshaw soils. Patton soils are poorly drained and are in depressions. They have a mollic epipedon.

A typical pedon of Henshaw silt loam, 1 to 3 percent slopes, in a cultivated field; 125 feet west and 1,400 feet south of northeast corner sec. 18, T. 6 N., R. 6 W.

Ap—0 to 11 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak medium granular structure; friable; neutral; abrupt smooth boundary.

Bt1—11 to 18 inches; light olive brown (2.5Y 5/4) silty clay loam; common fine distinct light brownish gray (2.5Y 6/2) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; thin continuous olive brown (2.5Y 4/4) clay films on faces of peds; dark grayish brown (10YR 4/2) silt loam fillings in wormholes; neutral; abrupt smooth boundary.

Bt2—18 to 29 inches; light yellowish brown (2.5Y 6/4) silty clay loam; common fine distinct light brownish gray (2.5Y 6/2) and common fine distinct olive yellow (2.5Y 6/6) mottles; weak medium prismatic structure parting to moderate medium angular blocky; firm; thin continuous dark grayish brown (2.5Y 4/2) clay films on faces of peds; neutral; gradual wavy boundary.

Bt3—29 to 43 inches; light olive brown (2.5Y 5/4) silty clay loam; common fine distinct olive yellow (2.5Y 6/6) and light brownish gray (2.5Y 6/2) mottles; weak coarse prismatic structure parting to weak medium subangular blocky; firm; thin discontinuous grayish brown (2.5Y 5/2) clay films on faces of peds; slight effervescence; few small white (10YR 8/1) masses of calcium carbonate; mildly alkaline; gradual wavy boundary.

BCg—43 to 54 inches; light brownish gray (2.5Y 6/2) silt loam; many medium distinct olive yellow (2.5Y 6/6) mottles; weak very coarse prismatic structure parting to weak very coarse subangular blocky; firm; thin discontinuous grayish brown (2.5Y 5/2) clay films on vertical faces of peds; strong effervescence; few small white (10YR 8/1) concretions of calcium carbonate; moderately alkaline; gradual irregular boundary.

Cg—54 to 60 inches; light brownish gray (10YR 6/2) silty clay loam; many medium distinct olive yellow (2.5Y 6/6) mottles; massive; friable; strong effervescence; few small white (10YR 8/1) masses of calcium carbonate; moderately alkaline.

The solum is 42 to 60 inches thick. The Ap horizon has value of 4 or 5 and chroma of 2 or 3. Pedons in areas where plowing has been shallow have an E horizon. The upper part of the Bt horizon has hue of 2.5Y or 10YR, value of 5 or 6, and chroma of 3 to 6. It is silty clay loam or silt loam. The BCg and Cg horizons have hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 to 6. They are silty clay loam or silt loam.

Hickory Series

The Hickory series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in loamy glacial till that in some areas has a thin mantle of loess. Slopes range from 12 to 60 percent.

Hickory soils are similar to Chetwynd and Uniontown soils and are commonly adjacent to Ava, Chetwynd, Cincinnati, Gilpin, and Stendal soils. Chetwynd soils are in draws and on breaks. They have more sand and less silt in the subsoil than the Hickory soils. Uniontown soils are in draws and on terrace breaks. They have less sand and more silt and clay in the subsoil than the Hickory soils. Ava and Cincinnati soils are on knolls and ridgetops. They have more silt in the upper part of the solum than the Hickory soils and have a fragipan. Ava soils are moderately well drained. Gilpin soils have sandstone fragments in the solum and are underlain by sandstone and shale bedrock. They are in the higher landscape positions. The somewhat poorly drained Stendal soils are along drainageways at the bottom of draws.

A typical pedon of Hickory silt loam, 18 to 25 percent slopes, in a wooded area; 250 feet north and 900 feet east of the southwest corner of sec. 6, T. 8 N., R. 7 W.

Oe—0.5 inch to 0; partially decomposed leaf litter.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; neutral; abrupt smooth boundary.

E—2 to 6 inches; dark grayish brown (10YR 4/2) silt loam; weak medium granular structure; friable; neutral; clear wavy boundary.

BE—6 to 9 inches; yellowish brown (10YR 5/6) silt loam; weak fine subangular blocky structure; friable; wormholes and root channels filled with dark grayish brown (10YR 4/2) silt loam; about 2 percent gravel; strongly acid; clear wavy boundary.

Bt1—9 to 16 inches; yellowish brown (10YR 5/6) clay loam; moderate fine subangular blocky structure; firm; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; discontinuous pale brown (10YR 6/3) silt coatings on faces of peds; about 3 percent fine gravel; very strongly acid; clear wavy boundary.

Bt2—16 to 28 inches; yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; firm; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; about 3 percent gravel; very strongly acid; gradual wavy boundary.

Bt3—28 to 42 inches; yellowish brown (10YR 5/6) clay loam; moderate coarse subangular blocky structure; firm; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; pale brown (10YR 6/3) loam coatings on faces of peds; about 4 percent gravel; very strongly acid; gradual wavy boundary.

Bt4—42 to 56 inches; strong brown (7.5YR 5/6) clay loam; weak coarse subangular blocky structure; friable; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; few pale brown (10YR 6/3) loam coatings on faces of peds; about 4 percent gravel; few black (10YR 2/1) iron and manganese oxide accumulations; strongly acid; gradual wavy boundary.

BC—56 to 66 inches; yellowish brown (10YR 5/6) sandy clay loam; common fine distinct strong brown (7.5YR 5/8) mottles; weak very coarse subangular blocky structure; friable; few pale brown (10YR 6/3) loam coatings on faces of peds; few black (10YR 2/1) iron and manganese oxide accumulations; about 5 percent gravel; medium acid; gradual wavy boundary.

C—66 to 80 inches; yellowish brown (10YR 5/6) sandy clay loam; common fine distinct strong brown (7.5YR 5/8) mottles; massive; friable; few pale brown (10YR 6/3) loam coatings on faces of peds; few black (10YR 2/1) iron and manganese oxide accumulations; about 6 percent gravel; medium acid.

The solum is 40 to 72 inches thick. In wooded areas the A horizon has value of 2 or 3 and is silt loam or loam. In areas that have been cleared and cultivated, it has value of 4 or 5 and chroma of 2 to 4. The E horizon has value of 4 to 6 and chroma of 2 or 3. In some areas it has been mixed into the Ap horizon by plowing. The E and BE horizons are silt loam or loam. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. The lower part of this horizon is clay loam, loam, or sandy clay loam. The C horizon has chroma of 3 to 6.

Markland Series

The Markland series consists of deep, moderately well drained and well drained soils on terraces. These soils formed mainly in calcareous, fine textured sediments. They are slowly permeable. Slopes range from 2 to 6 percent.

Markland soils are adjacent to McGary and Montgomery soils. McGary soils are in the slightly lower positions on the landscape and are somewhat poorly drained. Montgomery soils are in depressions and are very poorly drained. They have a mollic epipedon.

A typical pedon of Markland silty clay loam, 2 to 6 percent slopes, eroded, in a cultivated field; 500 feet north and 100 feet east of the southwest corner of sec. 7, T. 6 N., R. 6 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silty clay loam, pale brown (10YR 6/3) dry; weak medium granular structure; friable; about 7 percent masses of olive brown (2.5Y 4/4) silty clay; neutral; abrupt smooth boundary.

Bt1—9 to 16 inches; olive brown (2.5Y 4/4) silty clay; common fine distinct light olive brown (2.5Y 5/6) mottles; moderate fine angular blocky structure; firm; thin continuous distinct brown (10YR 4/3) clay films on faces of peds; neutral; clear wavy boundary.

Bt2—16 to 23 inches; olive brown (2.5Y 4/4) silty clay; many fine distinct light olive brown (2.5Y 5/6) mottles; moderate medium angular blocky structure; firm; thin discontinuous distinct dark grayish brown (2.5Y 4/2) clay films on faces of peds; mildly alkaline; clear wavy boundary.

C1—23 to 36 inches; light olive brown (2.5Y 5/4) silty clay; many fine faint light olive brown (2.5Y 5/6) mottles; moderate medium platy structure; very firm; thin discontinuous grayish brown (2.5Y 5/2) coatings on faces of peds; many discontinuous light gray (10YR 7/1) soft masses of lime; strong effervescence; moderately alkaline; clear wavy boundary.

C2—36 to 60 inches; light olive brown (2.5Y 5/4) silt loam stratified with thin layers of silty clay loam; few medium distinct light brownish gray (2.5Y 6/2) and common medium distinct olive yellow (2.5Y 6/6) mottles; massive; firm; few light gray (10YR 7/1) soft masses of lime; strong effervescence; moderately alkaline.

The thickness of solum and the depth to carbonates range from 20 to 40 inches. The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The Bt horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 3 to 6. It is dominantly silty clay, but in some pedons the upper part is silty clay loam. The C horizon is silt loam, silty clay, or silty clay loam.

McGary Series

The McGary series consists of deep, somewhat poorly drained, slowly permeable or very slowly permeable soils on low terraces and lake plains. These soils formed in fine textured or moderately fine textured sediments. Slopes range from 0 to 2 percent.

McGary soils are similar to Henshaw soils and are commonly near Booker, Henshaw, Markland, and Montgomery soils. Booker and Montgomery soils have a mollic epipedon. They are very poorly drained and are in the lower positions on the landscape. Booker soils contain more clay throughout than the McGary soils. Henshaw soils have less clay throughout than the McGary soils. They are somewhat poorly drained and are in landscape positions similar to those of the McGary soils. Markland soils are moderately well drained or well drained and are on slight rises and side slopes.

A typical pedon of McGary silt loam, 0 to 2 percent slopes, in a cultivated field; 2,050 feet east and 700 feet north of the southwest corner of sec. 24, T. 6 N., R. 7 W.

Ap—0 to 11 inches; gray (10YR 5/1) silt loam; moderate fine and medium granular structure; friable; neutral; abrupt smooth boundary.

Bt—11 to 15 inches; brown (10YR 5/3) silty clay; common fine faint gray (10YR 6/1) mottles; moderate medium subangular and angular blocky structure; firm; few thin continuous grayish brown (10YR 5/2) clay films on faces of peds; medium acid; clear smooth boundary.

Btg1—15 to 22 inches; grayish brown (10YR 5/2) silty clay; common fine faint yellowish brown (10YR 5/4) mottles; weak fine and medium prismatic structure parting to moderate and strong medium angular blocky; firm; many thin continuous gray (10YR 5/1) clay films on faces of peds; few fine black (10YR 2/1) accumulations of iron and manganese oxides; neutral; clear smooth boundary.

Btg2—22 to 27 inches; grayish brown (10YR 5/2) silty clay; common fine faint yellowish brown (10YR 5/4) mottles; moderate medium prismatic structure parting to moderate and strong medium angular blocky; firm; thin continuous gray (10YR 5/1) clay films on faces of peds; tongues of gray (10YR 5/1) silty clay 1 to 2 inches thick and 6 to 10 inches apart; mildly alkaline; gradual irregular boundary.

Btg3—27 to 39 inches; gray (10YR 5/1) silty clay; common fine distinct light yellowish brown (10YR 6/4) mottles; moderate fine and medium prismatic structure parting to moderate medium angular blocky; firm; thin discontinuous gray (10YR 6/1) clay films on faces of peds; mildly alkaline; clear irregular boundary.

Cg—39 to 60 inches; gray (10YR 6/1) stratified silty clay loam and clay; common fine distinct yellowish brown (10YR 5/6) mottles; moderate thick platy structure; firm; tongues of material from the B horizon; strong effervescence; moderately alkaline.

The solum is 24 to 40 inches thick. The depth to carbonates ranges from 20 to 40 inches. The Ap horizon has value of 4 or 5 and chroma of 1 or 2. Some pedons have a BE horizon. The Bt and C horizons have hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 to 3. The Bt horizon is silty clay loam or silty clay. The C horizon is mainly silty clay loam and clay. In some pedons, however, it has thin strata of silt loam.

Montgomery Series

The Montgomery series consists of deep, very poorly drained, slowly permeable soils on lake plains. These soils formed in clayey and silty sediments. Slopes are 0 to 1 percent.

Montgomery soils are similar to Booker and Patton soils and are commonly near Booker, Markland, McGary, Patton, and Zipp soils. Booker, Patton, and Zipp soils are on lake plains. Booker soils contain more montmorillonitic clay than the Montgomery soils, and Patton soils contain less clay. Zipp soils do not have a mollic epipedon. Markland soils are well drained or moderately well drained and are on breaks to depressions. McGary soils are somewhat poorly drained and are on low rises. They do not have a mollic epipedon.

A typical pedon of Montgomery silty clay loam, in a cultivated field; 380 feet north and 2,500 feet west of the southeast corner of sec. 26, T. 6 N., R. 7 W.

Ap—0 to 11 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; friable; slightly acid; abrupt smooth boundary.

A—11 to 15 inches; black (10YR 2/1) silty clay, dark gray (10YR 4/1) dry; moderate medium angular blocky structure; firm; neutral; clear wavy boundary.

Bg1—15 to 24 inches; dark gray (10YR 4/1) silty clay; common fine distinct brown (10YR 5/3) mottles; weak coarse prismatic structure parting to moderate coarse angular blocky; firm; thin continuous dark gray (10YR 4/1) clay films or pressure faces on peds; common fine soft black (10YR 2/1) accumulations of iron and manganese oxides; diffuse tubular tongues of dark gray (10YR 4/1) silty clay 1 to 2 inches in diameter and 8 to 12 inches apart; neutral in the upper part, mildly alkaline in the lower part; gradual irregular boundary.

Bg2—24 to 29 inches; grayish brown (2.5Y 5/2) silty clay; common fine distinct yellowish brown (10YR 5/4) mottles; weak coarse prismatic structure parting to moderate medium and coarse angular blocky; firm; thin continuous gray (10YR 5/1) clay films or pressure faces on peds; common soft black (10YR 2/1) accumulations of iron and manganese oxides; distinct tubular tongues of gray (10YR 5/1) silty clay 1 to 2 inches in diameter and 8 to 12 inches apart; slight effervescence; mildly alkaline; gradual smooth boundary.

Bg3—29 to 38 inches; gray (10YR 6/1) silty clay loam; many fine distinct yellowish brown (10YR 5/4) mottles; weak coarse prismatic structure parting to weak coarse angular blocky; firm; thin discontinuous gray (10YR 5/1) clay films or pressure faces on peds; common soft black (10YR 2/1) accumulations of iron and manganese oxides; distinct tubular tongues of gray (10YR 5/1) silty clay 1 to 2 inches in diameter and 8 to 12 inches apart; strong effervescence; moderately alkaline; gradual smooth boundary.

Cg1—38 to 48 inches; gray (10YR 6/1) silty clay loam; many medium distinct yellowish brown (10YR 5/4) mottles; weak coarse prismatic structure parting to weak coarse angular blocky; firm; distinct tubular tongues of gray (10YR 5/1) silty clay 1 to 2 inches in diameter and 8 to 12 inches apart; strong effervescence; moderately alkaline; gradual smooth boundary.

Cg2—48 to 60 inches; gray (10YR 5/1) silty clay loam; many medium distinct yellowish brown (10YR 5/8) mottles; weak medium and coarse angular blocky structure; firm; distinct tubular tongues of gray (10YR 5/1) and dark gray (10YR 4/1) silty clay 1 to 2 inches in diameter and 8 to 12 inches apart; strong effervescence; moderately alkaline.

The solum is 30 to 45 inches thick. It is neutral to moderately alkaline. The mollic epipedon is 12 to 17 inches thick.

The A horizon has value of 2 or 3. It is silty clay loam or silty clay. The Bg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. The Cg horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. In some pedons it has thin strata of silt loam or silty clay.

Muskego Series

The Muskego series consists of deep, very poorly drained, slowly permeable soils in depressional areas on low terraces. These soils formed in partially decomposed organic material over coprogenous earth. Slopes are 0 to 1 percent.

Muskego soils are commonly near Rensselaer soils, which formed in sandy and loamy outwash in the depressions.

A typical pedon of Muskego muck, in a cultivated field; 850 feet east and 750 feet south of the center of sec. 12, T. 6 N., R. 6 W.

Oa1—0 to 8 inches; black (10YR 2/1) sapric material, black (N 2/0) rubbed and pressed; about 5 percent fiber, less than 2 percent rubbed; moderate fine granular structure; very friable; many roots; neutral; abrupt smooth boundary.

Oa2—8 to 12 inches; black (10YR 2/1) sapric material, black (N 2/0) rubbed and pressed; about 5 percent fiber, less than 2 percent rubbed; weak fine subangular blocky structure; very friable; common roots; neutral; clear wavy boundary.

Oa3—12 to 16 inches; black (10YR 2/1) sapric material, black (N 2/0) rubbed and pressed; about 5 percent fiber, less than 2 percent rubbed; moderate medium platy structure parting to moderate medium subangular blocky; very friable; common roots; neutral; clear wavy boundary.

Oa4—16 to 19 inches; black (5YR 2/1) sapric material, dark reddish brown (5YR 2/2) rubbed and pressed; about 20 percent fiber, less than 10 percent rubbed; moderate thick platy structure; friable; common roots; neutral; abrupt wavy boundary.

C1—19 to 23 inches; very dark gray (5Y 3/1) coprogenous earth; moderate thick platy structure;

very friable; about 20 percent fiber in thin layers, less than 5 percent rubbed; common white (10YR 8/1) shell fragments; slight effervescence; mildly alkaline; gradual wavy boundary.

C2—23 to 34 inches; dark olive gray (5Y 3/2) coprogenous earth; weak thick platy structure; very friable; about 30 percent fiber in thin layers, less than 5 percent rubbed; few white (10YR 8/1) shell fragments; strong effervescence; mildly alkaline; gradual wavy boundary.

C3—34 to 60 inches; dark olive gray (5Y 3/2) coprogenous earth; massive; very friable; few white (10YR 8/1) shell fragments; strong effervescence; mildly alkaline.

The thickness of the organic material ranges from 16 to 24 inches. The fiber content of the organic material ranges from 0 to 25 percent, 0 to 10 percent rubbed. The coprogenous earth has hue of 2.5Y or 5Y, value of 2 or 3, and chroma of 1 or 2. The content of shell fragments ranges from 0 to about 5 percent.

Newark Series

The Newark series consists of deep, somewhat poorly drained, moderately permeable soils on bottom land. These soils formed in silty and loamy alluvium washed from loess-mantled uplands. Slopes are 0 to 1 percent.

Newark soils are similar to Stendal soils and are commonly adjacent to Armiesburg, Haymond, Nolin, Parke, Pike, Wirt, and Wilhite soils. All of the similar and adjacent soils are on bottom land, except for Parke and Pike soils, which are on ridges and knolls in the uplands. Stendal soils have less clay in the solum than the Newark soils and are more acid. Armiesburg, Haymond, Nolin, Parke, Pike, and Wirt soils are well drained. Wirt soils have more sand throughout than the Newark soils. Wilhite soils are very poorly drained. They have more clay throughout than the Newark soils.

A typical pedon of Newark loam, frequently flooded, in a cultivated field; 2,000 feet south and 100 feet east of the northwest corner of sec. 15, T. 6 N., R. 6 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) loam, light brownish gray (10YR 6/2) dry; moderate fine granular structure; friable; neutral; abrupt smooth boundary.

Bg1—10 to 18 inches; grayish brown (10YR 5/2) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; continuous dark grayish brown (10YR 4/2) coatings on faces of peds; dark grayish brown (10YR 4/2) fillings in wormholes; neutral; gradual wavy boundary.

Bg2—18 to 26 inches; grayish brown (10YR 5/2) silt loam; common fine distinct light gray (2.5Y 7/2) and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; continuous dark grayish brown (10YR 4/2) coatings on faces of peds; fillings of dark grayish brown (10YR 4/2) silt loam in root channels; neutral; gradual wavy boundary.

Bg3—26 to 32 inches; light brownish gray (10YR 6/2) silt loam; many medium distinct yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; friable; discontinuous dark grayish brown (10YR 4/2) coatings on vertical faces of peds; few black (10YR 2/1) iron and manganese oxide accumulations; neutral; gradual wavy boundary.

Cg1—32 to 50 inches; light brownish gray (2.5Y 6/2) stratified fine sandy loam and loam; many medium distinct yellowish brown (10YR 5/8) mottles; massive; very friable; few black (10YR 2/1) iron and manganese oxide accumulations; neutral; gradual wavy boundary.

Cg2—50 to 60 inches; grayish brown (2.5Y 5/2) stratified fine sandy loam, loam, and silt loam; many medium distinct yellowish brown (10YR 5/6) mottles; massive; very friable; slight effervescence; mildly alkaline.

The solum ranges from 24 to 40 inches in thickness. The Ap horizon has chroma of 2 or 3. The B horizon has hue of 10YR, value of 5 or 6, and chroma of 2 or 3. The C horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 or 3. It is silt loam or stratified silt loam, loam, and fine sandy loam in the upper part and grades to sandy loam and loamy sand below a depth of 50 inches in some pedons.

Nolin Series

The Nolin series consists of deep, well drained, moderately permeable soils on bottom land. These soils formed in silty alluvium washed from loess-covered uplands. Slopes are 0 to 1 percent.

Nolin soils are similar to Armiesburg and Haymond soils and are commonly adjacent to those soils and to Newark, Wilhite, and Wirt soils. All of the adjacent soils are on bottom land. Armiesburg soils have more clay throughout than the Nolin soils and have a mollic epipedon. Haymond soils have less clay throughout than the Nolin soils. The somewhat poorly drained Newark soils have more sand and less clay in the control section than the Nolin soils. The very poorly drained Wilhite soils have more clay throughout than the Nolin soils, and Wirt soils have more sand.

A typical pedon of Nolin silt loam, occasionally flooded, in a cultivated field; 25 feet west and 600 feet north of the center of sec. 22, T. 6 N., R. 6 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; neutral; abrupt smooth boundary.

Bw1—8 to 16 inches; dark brown (10YR 4/3) silt loam; moderate fine subangular blocky structure; firm; continuous dark grayish brown (10YR 4/2) organic coatings on peds; neutral; gradual wavy boundary.

Bw2—16 to 25 inches; dark brown (10YR 4/3) silt loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm; continuous dark grayish brown (10YR 4/2) organic coatings on peds; neutral; clear wavy boundary.

Bw3—25 to 37 inches; yellowish brown (10YR 5/4) silt loam; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; continuous dark grayish brown (10YR 4/2) organic coatings on peds; neutral; gradual wavy boundary.

Bw4—37 to 48 inches; yellowish brown (10YR 5/4) silt loam; weak coarse prismatic structure parting to weak coarse subangular blocky; friable; discontinuous brown (10YR 4/3) coatings on peds; neutral; gradual wavy boundary.

C—48 to 60 inches; yellowish brown (10YR 5/4) silt loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; massive; friable; neutral.

The solum is 40 to 54 inches thick. The Ap horizon has chroma of 2 or 3. The Bw and C horizons have value of 4 or 5 and chroma of 3 or 4. The Bw horizon is silt loam or silty clay loam. The C horizon is silt loam, loam, or fine sandy loam.

Parke Series

The Parke series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in loess and in the underlying glacial outwash. Slopes range from 6 to 18 percent.

Parke soils are similar to Alford and Pike soils and are commonly adjacent to Chetwynd, Pike, and Newark soils. Alford and Pike soils are in landscape positions similar to those of the Parke soils. They have more silt and less sand in the lower part of the subsoil than the Parke soils. Chetwynd soils are in draws and on breaks to bottom land. They have less silt and clay and more sand in the subsoil than the Parke soils. Newark soils are somewhat poorly drained and are on bottom land. They have less clay in the subsoil than the Parke soils.

A typical pedon of Parke silt loam, 12 to 18 percent slopes, eroded, in a pasture; 200 feet west and 2,300 feet north of the southeast corner of sec. 12, T. 6 N., R. 6 W.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many fine roots; about 10 percent small masses of yellowish brown (10YR 5/4) silt loam; slightly acid; abrupt smooth boundary.

BE—8 to 13 inches; brown (7.5YR 5/4) silt loam; weak medium subangular blocky structure; friable; common fine roots; few wormholes and root channels filled with brown (10YR 4/3) silt loam; slightly acid; clear wavy boundary.

Bt1—13 to 22 inches; brown (7.5YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt2—22 to 31 inches; brown (7.5YR 4/4) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; gradual wavy boundary.

2Bt3—31 to 37 inches; brown (7.5YR 4/4) loam; weak coarse prismatic structure parting to moderate coarse subangular blocky; friable; about 2 percent gravel; thin discontinuous reddish brown (5YR 4/4) clay films on faces of peds; strongly acid; gradual wavy boundary.

2Bt4—37 to 46 inches; strong brown (7.5YR 5/6) loam; weak coarse subangular blocky structure; friable; thin discontinuous reddish brown (5YR 4/4) clay films on faces of peds; about 3 percent gravel; strongly acid; gradual wavy boundary.

2Bt5—46 to 53 inches; yellowish red (5YR 5/6) loam; weak very coarse subangular blocky structure; friable; thin discontinuous reddish brown (5YR 4/4) clay films on faces of peds; about 3 percent gravel; strongly acid; gradual wavy boundary.

2Bt6—53 to 69 inches; yellowish red (5YR 5/6) sandy clay loam; weak very coarse subangular blocky structure; friable; thin discontinuous reddish brown (5YR 4/4) clay films on faces of peds; about 5 percent gravel; strongly acid; gradual wavy boundary.

2Bt7—69 to 80 inches; yellowish red (5YR 5/6) sandy clay loam; weak very coarse subangular blocky structure; friable; thin discontinuous reddish brown (5YR 4/4) clay films on faces of peds; about 5 percent gravel; streaks of light yellowish brown (10YR 6/4) sandy loam; strongly acid.

The mantle of loess is 20 to 40 inches thick. The Ap horizon has value of 4 or 5 and chroma of 3 or 4. The less eroded pedons have an E horizon, which is silt loam. The Bt and 2Bt horizons are strongly acid or very strongly acid. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is silt loam, clay loam, or silty clay loam. The 2Bt horizon has value of 4 or 5 and chroma of 4 to 6. It has hue of 10YR or 7.5YR in the upper part. It is sandy loam, loam, or sandy clay loam. Some pedons have a C horizon at a depth of 5 to more than 10 feet. This horizon is loose, stratified sand and gravel.

Patton Series

The Patton series consists of deep, poorly drained, moderately slowly permeable soils on lake plains and low terraces. These soils formed in moderately fine textured sediments. Slopes are 0 to 1 percent.

These soils have more clay in the B horizon than is definitive for the Patton series. This difference, however, does not affect the usefulness or behavior of the soils.

Patton soils are similar to Montgomery soils and are commonly adjacent to Henshaw and Montgomery soils. Montgomery soils have more clay in the solum than the Patton soils. Henshaw soils are somewhat poorly drained and are on low rises on lake plains and terraces. They do not have a mollic epipedon.

A typical pedon of Patton silty clay loam, in a cultivated field; 2,800 feet west and 1,100 feet south of the northeast corner of sec. 18, T. 6 N., R. 6 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; moderate fine granular structure; friable; neutral; abrupt smooth boundary.

A—8 to 16 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; weak fine subangular blocky structure; firm; neutral; clear wavy boundary.

Bg1—16 to 24 inches; dark grayish brown (2.5Y 4/2) silty clay loam; few fine distinct light olive brown (2.5Y 5/6) mottles; moderate medium subangular blocky structure; firm; thin very dark gray (10YR 3/1) organic fillings in vertical cracks and krotovinas; neutral; clear wavy boundary.

Bg2—24 to 30 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine distinct light olive brown (2.5Y 5/6) mottles; weak medium prismatic structure parting to moderate fine subangular blocky; firm; thin very dark gray (10YR 3/1) organic fillings in vertical cracks and krotovinas; neutral; gradual wavy boundary.

Bg3—30 to 39 inches; grayish brown (2.5Y 5/2) silty clay loam; many fine distinct brownish yellow (10YR 6/8) mottles; weak coarse prismatic structure parting to moderate fine subangular blocky; firm; discontinuous gray (5Y 6/1) organic coatings; few dark gray (10YR 4/1) silty clay loam krotovinas; few black (10YR 2/1) iron and manganese oxide accumulations; neutral; gradual wavy boundary.

Cg1—39 to 48 inches; grayish brown (2.5Y 5/2) silty clay loam; many fine distinct brownish yellow (10YR 6/8) and common fine distinct gray (10YR 6/1) mottles; weak coarse prismatic structure; firm; discontinuous dark gray (5Y 6/1) organic coatings; few dark gray (10YR 4/1) silty clay loam krotovinas; few black (10YR 2/1) iron and manganese oxide accumulations; neutral; gradual wavy boundary.

Cg2—48 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam; many coarse distinct brownish yellow (10YR 6/8) and many medium distinct light gray (5Y 6/1) mottles; massive; friable; few dark gray (10YR 4/1) silty clay loam krotovinas; many small masses of white (2.5Y 8/2) calcium carbonate; slight effervescence; mildly alkaline.

The solum is 36 to 42 inches thick. The Ap horizon has chroma of 1 or 2. The Bg horizon has hue of 2.5Y or 10YR, value of 4 or 5, and chroma of 1 or 2. In some pedons the Cg horizon is stratified silty clay loam and silt loam.

Pekin Series

The Pekin series consists of deep, moderately well drained, very slowly permeable soils on old alluvial terraces. These soils formed in acid, silty material washed from the uplands. Slopes range from 2 to 6 percent.

Pekin soils are similar to Ava and Shakamak soils and are commonly adjacent to Bartle, Evansville, Peoga, and Uniontown soils. Ava and Shakamak soils are on knolls in the uplands. They have more sand and pebbles in the lower part than the Pekin soils. Bartle, Evansville, and Peoga soils do not have a fragipan. Bartle soils are somewhat poorly drained and are on ridgetops, in draws, and on terrace breaks. Evansville and Peoga soils are poorly drained and are on broad flats. Uniontown soils are well drained and are in draws and on terrace breaks.

A typical pedon of Pekin silt loam, 2 to 6 percent slopes, eroded, in a cultivated field; 360 feet north and 1,200 feet east of the southwest corner of sec. 12, T. 8 N., R. 7 W.

Ap—0 to 10 inches; brown (10YR 5/3) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; few small masses of light yellowish brown (10YR 6/4) silt loam; slightly acid; abrupt smooth boundary.

Bt1—10 to 16 inches; light yellowish brown (10YR 6/4) silt loam; weak fine subangular blocky structure; friable; thin continuous yellowish brown (10YR 5/6) clay films on faces of peds; about 10 percent small masses of dark grayish brown (10YR 4/2) silt loam in voids; very strongly acid; clear wavy boundary.

Bt2—16 to 24 inches; pale brown (10YR 6/3) silt loam; many fine distinct yellowish brown (10YR 5/6) and many medium distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; thin continuous pale brown (10YR 6/3) clay films on faces of peds; common black (10YR 2/1) iron and manganese oxide accumulations; very strongly acid; clear wavy boundary.

Btx1—24 to 30 inches; light yellowish brown (10YR 6/4) silt loam; many fine distinct yellowish brown (10YR 5/6) and many medium distinct light brownish gray (10YR 6/2) mottles; weak coarse prismatic structure; firm; brittle; thin continuous pale brown

(10YR 6/3) clay films on faces of peds; light gray (10YR 7/2) silt flows between prisms; many black (10YR 2/1) iron and manganese oxide accumulations; very strongly acid; gradual wavy boundary.

Btx2—30 to 43 inches; yellowish brown (10YR 5/6) silt loam; common fine distinct strong brown (7.5YR 5/8) and light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure; firm; brittle; thin discontinuous light brownish gray (10YR 6/2) clay films on faces of peds; light gray (10YR 7/2) silt flows between prisms; common black (10YR 2/1) iron and manganese oxide accumulations; very strongly acid; gradual wavy boundary.

BC—43 to 52 inches; yellowish brown (10YR 5/6) silt loam; common fine distinct strong brown (7.5YR 5/8) and light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure; friable; few small dark brown (7.5YR 3/2) iron and manganese oxide accumulations; strongly acid; gradual wavy boundary.

Cg—52 to 60 inches; light brownish gray (10YR 6/2) silt loam stratified with thin layers of silty clay loam; many medium distinct yellowish brown (10YR 5/6) mottles; massive; friable; medium acid.

The solum is about 45 to 60 inches thick. The depth to the fragipan ranges from 24 to 30 inches. The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The Bt, Btx, and Bx horizons have value of 5 or 6 and chroma of 3 to 6. The C horizon has value of 5 or 6 and chroma of 2 to 6. It is silt loam or stratified silt loam and silty clay loam.

Peoga Series

The Peoga series consists of deep, poorly drained, slowly permeable soils on lake plains and low terraces. These soils formed in acid, silty sediments. Slopes are 0 to 1 percent.

Peoga soils are similar to Evansville and Vigo soils and are commonly adjacent to Bonnie, Evansville, Pekin, and Stendal soils. Evansville and Bonnie soils have less clay in the subsoil than the Peoga soils. Also, Evansville soils are less acid. They are on low terraces. Bonnie soils are on bottom land. Vigo soils are on upland flats. They have an E horizon that is thicker than that of the Peoga soils. Also, the lower part of their subsoil is more acid. Pekin soils are moderately well drained and are on ridgetops and breaks from terraces to bottom land. Stendal soils are somewhat poorly drained and are on bottom land.

A typical pedon of Peoga silt loam, in a cultivated field; 1,000 feet east and 100 feet north of the center of sec. 25, T. 8 N., R. 7 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; medium acid; abrupt smooth boundary.

Eg—9 to 16 inches; light brownish gray (10YR 6/2) silt loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak thick platy structure parting to weak fine subangular blocky; friable; common fine tubular pores; numerous black (10YR 2/1) iron and manganese oxide concretions; voids filled with dark grayish brown (10YR 4/2) silt loam; very strongly acid; clear wavy boundary.

Btg1—16 to 24 inches; light brownish gray (10YR 6/2) silt loam; many fine distinct strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; grayish brown (10YR 5/2) thin discontinuous clay films on faces of peds and in pores; light brownish gray (2.5Y 6/2) silt films on faces of prisms; common tubular pores; numerous black (10YR 2/1) iron and manganese oxide concretions; very strongly acid; clear wavy boundary.

Btg2—24 to 37 inches; gray (10YR 6/1) silt loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate coarse prismatic structure; firm; thin discontinuous grayish brown (10YR 5/2) clay films on faces of peds and lining pores; light gray (10YR 7/1) silt films on prisms and in krotovinas; common black (10YR 2/1) iron and manganese oxide concretions and accumulations; very strongly acid; gradual irregular boundary.

Btg3—37 to 46 inches; light brownish gray (10YR 6/2) silt loam; common fine faint strong brown (7.5YR 5/6) and many coarse distinct yellowish brown (10YR 5/6) mottles; moderate very coarse prismatic structure; friable; thin discontinuous gray (10YR 6/1) clay films; light gray (10YR 7/1) silt flows between prisms and in krotovinas; common black (10YR 2/1) iron and manganese oxide accumulations; medium acid; gradual irregular boundary.

Bt—46 to 56 inches; yellowish brown (10YR 5/6) silt loam; many medium faint dark yellowish brown (10YR 4/6) and many medium distinct light gray (10YR 7/2) mottles; weak very coarse prismatic structure; friable; thin discontinuous gray (10YR 6/1) clay films on faces of peds; light gray (10YR 7/1) silt films between prisms and silt flows in krotovinas; many black (10YR 2/1) iron and manganese oxide accumulations; medium acid; gradual wavy boundary.

C—56 to 60 inches; yellowish brown (10YR 5/6) stratified silt loam and silty clay loam; many fine distinct light brownish gray (10YR 6/2) and common fine faint dark yellowish brown (10YR 4/6) mottles; massive; friable; slightly acid.

The Ap horizon has value of 4 or 5 and chroma of 2. Some pedons have a BE horizon. The B horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 6.

The Bt horizon is silt loam or silty clay loam. It is strongly acid or very strongly acid in the upper part and ranges to medium acid in the lower part. The C horizon is dominantly silt loam or silty clay loam, but in some pedons it has thin strata of loam or fine sandy loam.

Piankeshaw Series

The Piankeshaw series consists of deep, well drained, moderately permeable soils on bottom land. These soils formed in loamy alluvium. Slopes range from 0 to 2 percent.

Piankeshaw soils are similar to Cuba and Haymond soils and are commonly near Berks, Cuba, Gilpin, Haymond, and Stendal soils. Cuba, Haymond, and Stendal soils have fewer sandstone fragments throughout than the Piankeshaw soils. Also, Cuba soils are more acid. The somewhat poorly drained Stendal soils are in swales and meander channels. Berks and Gilpin soils are shallower over bedrock than the Piankeshaw soils. They are steep or very steep and are on breaks and in draws.

A typical profile of Piankeshaw silt loam, frequently flooded, in a hayfield; 2,530 feet west and 2,200 feet south of the northeast corner of sec. 23, T. 6 N., R. 4 W.

Ap—0 to 6 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many fine roots; about 12 percent sandstone fragments; neutral; abrupt smooth boundary.

Bw1—6 to 13 inches; dark yellowish brown (10YR 4/4) loam; weak medium subangular blocky structure parting to weak fine granular; friable; many fine roots; discontinuous dark brown (10YR 3/3) organic coatings on faces of peds; about 14 percent sandstone fragments; neutral; clear wavy boundary.

Bw2—13 to 20 inches; dark yellowish brown (10YR 4/4) channery loam; weak coarse subangular blocky structure; friable; discontinuous dark brown (10YR 3/3) organic coatings on faces of peds; about 25 percent sandstone fragments; neutral; clear wavy boundary.

Bw3—20 to 26 inches; dark yellowish brown (10YR 4/4) channery loam; weak coarse subangular blocky structure; friable; about 20 percent sandstone fragments; neutral; gradual wavy boundary.

C1—26 to 48 inches; brown (10YR 5/3) channery loam; few fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; few dark brown (7.5YR 4/3) iron and manganese oxide accumulations; about 15 percent sandstone fragments; neutral; gradual wavy boundary.

C2—48 to 60 inches; brown (10YR 4/3) very channery loam; few fine faint brown (10YR 4/3) mottles; massive; friable; about 50 percent sandstone fragments; neutral.

The solum is 20 to 30 inches thick. It is slightly acid or neutral. It has a clay content of 18 to 25 percent. The content of sandstone fragments ranges from 5 to 14 percent in the A horizon, from 8 to 30 percent in the B horizon, and from 15 to 60 percent in the C horizon.

The Ap horizon has value of 4 or 5 and chroma of 3 or 4. It is silt loam or loam. The B horizon has value of 4 or 5 and chroma of 3 to 6. It is loam or channery loam. The C horizon has value of 4 or 5 and chroma of 3 or 4. It is channery loam or very channery loam. The depth to sandstone bedrock is more than 60 inches.

Pike Series

The Pike series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in loess and in the underlying glacial outwash. Slopes range from 2 to 12 percent.

Pike soils are similar to Alford and Parke soils and are commonly adjacent to Ava, Chetwynd, Cincinnati, Newark, and Parke soils. Alford soils are on knolls and ridgetops. They have more silt and less sand in the lower part of the subsoil and in the substratum than the Pike soils. Parke soils are on ridges and knolls. They have more sand and less silt in the lower part of the solum than the Pike soils. The moderately well drained Ava and well drained Cincinnati soils are on ridgetops or side slopes. They have a fragipan. Chetwynd soils are on breaks and in draws on terraces. They have more sand and less silt throughout the solum than the Pike soils. The somewhat poorly drained Newark soils are on bottom land. They have less clay in the subsoil than the Pike soils.

A typical pedon of Pike silt loam, 2 to 6 percent slopes, eroded, in a cultivated field; 2,450 feet east and 1,000 feet south of the center of sec. 30, T. 8 N., R. 7 W.

Ap—0 to 9 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; friable; many fine roots; about 10 percent small masses of brown (7.5YR 5/4) silt loam; neutral; abrupt smooth boundary.

Bt1—9 to 18 inches; brown (7.5YR 5/4) silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; few small masses of yellowish brown (10YR 5/4) silt loam filling voids; medium acid; clear wavy boundary.

Bt2—18 to 27 inches; brown (7.5YR 5/4) silt loam; moderate coarse subangular blocky structure; firm; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt3—27 to 35 inches; dark yellowish brown (10YR 4/6) silt loam; moderate coarse subangular blocky structure; firm; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; discontinuous pale brown (10YR 6/3) silt coatings on faces of peds; very strongly acid; clear wavy boundary.

Bt4—35 to 44 inches; brown (7.5YR 4/4) silt loam; weak coarse subangular blocky structure; friable; thin continuous dark brown (7.5YR 4/4) clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt5—44 to 56 inches; brown (7.5YR 4/4) silt loam; weak coarse subangular blocky structure; friable; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; yellowish brown (10YR 5/4) silt flows in vertical cracks; very strongly acid; clear wavy boundary.

2Bt6—56 to 66 inches; reddish brown (5YR 4/4) sandy clay loam; weak coarse subangular blocky structure; firm; fillings of light yellowish brown (10YR 6/4) fine sandy loam in cracks; very strongly acid; clear wavy boundary.

2C—66 to 80 inches; reddish brown (5YR 4/4) sandy loam; massive; very friable; strongly acid.

The solum is 60 to 96 inches thick. The loess is 40 to 60 inches thick.

The Ap horizon has value of 4 or 5 and chroma of 3 or 4. The less eroded pedons have a BE horizon. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is silty clay loam or silt loam. The 2Bt horizon has hue of 5YR or 2.5YR, value of 3 to 5, and chroma of 4 to 6. It is silt loam or loam.

Princeton Series

The Princeton series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in wind-deposited silt and fine sand. Slopes range from 2 to 12 percent.

Princeton soils are similar to Alford, Alvin, and Pike soils and are commonly adjacent to Alford, Alvin, Ayrshire, Bloomfield, and Stendal soils. Alford soils have more silt and less sand throughout than the Princeton soils. They are on knolls. Alvin and Bloomfield soils have more sand and less clay in the solum than the Princeton soils. They are on knolls or side slopes. The somewhat poorly drained Ayrshire soils are on flats and in drainageways. Pike soils have less sand throughout the solum than the Princeton soils. They are on ridges, knolls, and side slopes. The somewhat poorly drained Stendal soils are along drainageways at the bottom of draws. They have less clay in the subsoil than the Princeton soils.

A typical pedon of Princeton fine sandy loam, 2 to 6 percent slopes, in a cultivated field; 200 feet east and 500 feet south of the northwest corner of sec. 10, T. 8 N., R. 6 W.

Ap—0 to 11 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine granular structure; very friable; neutral; abrupt smooth boundary.

Bt1—11 to 15 inches; brown (7.5YR 4/4) fine sandy loam; weak fine subangular blocky structure; friable; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; slightly acid; clear wavy boundary.

Bt2—15 to 23 inches; dark brown (7.5YR 4/4) fine sandy loam; moderate medium subangular blocky structure; friable; thin discontinuous reddish brown (5YR 4/4) clay films on faces of peds; slightly acid; clear wavy boundary.

Bt3—23 to 35 inches; dark brown (7.5YR 4/4) fine sandy loam; moderate medium subangular blocky structure; friable; thin discontinuous reddish brown (5Y 4/4) clay films on faces of peds; medium acid; gradual wavy boundary.

Bt4—35 to 41 inches; brown (7.5YR 4/4) fine sandy loam; weak coarse subangular blocky structure; friable; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; clear wavy boundary.

Bt5—41 to 51 inches; brown (7.5YR 4/4) very fine sandy loam; weak coarse subangular blocky structure; friable; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; strongly acid; gradual wavy boundary.

BC—51 to 64 inches; yellowish brown (10YR 5/6) loamy fine sand; weak very coarse subangular blocky structure; very friable; many small masses and bands of dark brown (7.5YR 4/4) fine sandy loam; strongly acid; gradual wavy boundary.

C—64 to 70 inches; yellowish brown (10YR 5/4) stratified fine sandy loam, loamy fine sand, and silt; common fine distinct strong brown (7.5YR 5/8) mottles; massive; very friable; medium acid.

The solum is 50 to 72 inches thick. The Ap horizon has chroma of 2 to 4. Some pedons have an E horizon. The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. It is loam, sandy clay loam, very fine sandy loam, or fine sandy loam. It generally is more sandy in the lower part than in the upper part. The BC horizon is loamy fine sand, silt loam, loam, or sandy loam. The C horizon is stratified fine sand, loamy fine sand, fine sandy loam, silt loam, or silt.

Reesville Series

The Reesville series consists of deep, somewhat poorly drained, moderately permeable soils on uplands. These soils formed in loess underlain by glacial till. Slopes range from 0 to 2 percent.

Reesville soils are similar to Bartle soils and are commonly adjacent to Ava soils. Bartle and Ava soils have a fragipan. Bartle soils have less clay in the control section than the Reesville soils. The moderately well drained Ava soils are on knolls. They have more sand in the solum than the Reesville soils.

A typical pedon of Reesville silt loam, 0 to 2 percent slopes, in a cultivated field; 1,250 feet west and 3,050 feet north of the southeast corner of sec. 34, T. 6 N., R. 7 W.

Ap—0 to 9 inches; grayish brown (10YR 5/2) silt loam; weak fine granular structure; friable; neutral; abrupt smooth boundary.

BE—9 to 13 inches; light brownish gray (2.5Y 6/2) silt loam; common fine distinct yellowish brown (10YR 5/6) and few fine distinct light olive brown (2.5Y 5/6) mottles; weak fine subangular blocky structure; friable; light brownish gray (2.5Y 6/2) silt coatings on peds; neutral; clear wavy boundary.

Bt1—13 to 19 inches; brownish yellow (10YR 6/6) silty clay loam; common fine distinct dark grayish brown (10YR 4/2) mottles; moderate fine subangular blocky structure; firm; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; few light brownish gray (10YR 6/2) silt coatings; neutral; gradual wavy boundary.

Bt2—19 to 26 inches; light olive brown (2.5Y 5/6) silty clay loam; common fine distinct yellowish brown (10YR 5/8) mottles; moderate medium angular blocky structure; firm; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; neutral; gradual wavy boundary.

Bt3—26 to 33 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct strong brown (7.5YR 5/8) and common fine distinct light brownish gray (2.5Y 6/2) mottles; weak coarse prismatic structure parting to weak coarse subangular blocky; firm; thin discontinuous grayish brown (2.5Y 5/2) clay films on faces of peds; threadlike accumulations of dark gray (10YR 4/1) iron and manganese oxide; neutral; gradual wavy boundary.

BC—33 to 44 inches; light olive brown (2.5Y 5/4) silty clay loam; common medium distinct brownish yellow (10YR 6/8) mottles; weak coarse prismatic structure; friable; thin discontinuous grayish brown (2.5Y 5/2) clay films on faces of peds; few black (10YR 2/1) iron and manganese oxide accumulations; neutral; gradual wavy boundary.

C—44 to 60 inches; light olive brown (2.5Y 5/4) silt loam; many fine distinct grayish brown (10YR 5/2) and many medium distinct brownish yellow (10YR 6/8) mottles; massive; friable; common black (N 2/0) iron and manganese oxide accumulations; slight effervescence; mildly alkaline.

The loess is 50 to 60 inches thick. The solum is 40 to 60 inches thick. Some pedons have an E horizon. The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 6. It is neutral to strongly acid in the upper part and neutral or slightly acid in the lower part.

Rensselaer Series

The Rensselaer series consists of deep, very poorly drained, moderately permeable soils on low terraces. These soils formed in loamy sediments. Slopes are 0 to 1 percent.

Rensselaer soils are similar to Ambraw soils and are commonly adjacent to Ayrshire, Elston, Muskego, Roby, and Waupecan soils. Ambraw soils are in the lower positions on the landscape. They have less sand in the substratum than the Rensselaer soils. Ayrshire and Roby soils are in the higher positions on the landscape and are somewhat poorly drained. They do not have a mollic epipedon. Elston and Waupecan soils are on terraces and are well drained. Muskego soils are muck in the upper part and coprogenous earth in the lower part. They are in depressions.

A typical pedon of Rensselaer loam, in a cultivated field; 150 feet south and 35 feet west of the center of sec. 30, T. 8 N., R. 5 W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

A—9 to 15 inches; very dark gray (10YR 3/1) loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; neutral; abrupt smooth boundary.

Btg1—15 to 26 inches; dark gray (10YR 4/1) sandy clay loam; few fine distinct dark yellowish brown (10YR 4/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; thin continuous very dark gray (10YR 3/1) clay and organic films on faces of peds; very dark gray (10YR 3/1) loam krotovinas and fillings in root channels; neutral; gradual wavy boundary.

Btg2—26 to 38 inches; dark gray (10YR 4/1) sandy clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; friable; thin continuous very dark gray (10YR 3/1) clay and organic films on faces of peds; about 10 percent dark gray (10YR 4/1) loam krotovinas; neutral; gradual wavy boundary.

Btg3—38 to 50 inches; dark gray (10YR 4/1) clay loam; many coarse distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; thin discontinuous dark gray (10YR 4/1) clay films on faces of some peds; about 10 percent dark gray (10YR 4/1) sandy clay loam krotovinas; neutral; gradual wavy boundary.

Cg1—50 to 59 inches; dark gray (10YR 4/1) clay loam; common coarse distinct yellowish brown (10YR 5/6) mottles; massive; firm; about 15 percent very dark gray (10YR 3/1) sandy clay loam krotovinas 2 to 3 inches in diameter; neutral; clear wavy boundary.

Cg2—59 to 70 inches; light brownish gray (10YR 6/2) stratified fine sand, sand, sandy loam, and sandy clay loam; common medium distinct yellowish brown (10YR 5/4) mottles; single grain; massive; very friable; loose; slight effervescence; mildly alkaline.

The solum is 40 to 60 inches thick. The A horizon has value of 2 or 3 and chroma of 1 or 2. It is 12 to 16 inches thick. It is loam or sandy loam. The Btg horizon has value of 4 to 6 and chroma of 1 or 2. It is dominantly sandy clay loam or clay loam, but in some pedons it has subhorizons of loam or sandy loam. The C horizon is dominantly clay loam, fine sand, sandy loam, or sandy clay loam. In some pedons, however, it has strata of loamy sand or loam.

Roby Series

The Roby series consists of deep, somewhat poorly drained, moderately permeable soils on low terraces. These soils formed in stratified, sandy and loamy sediments. Slopes range from 0 to 2 percent.

These soils are less acid and more gray in the upper part of the subsoil than is definitive for the Roby series. These differences, however, do not alter the usefulness or behavior of the soils.

Roby soils are similar to Ayrshire soils and are commonly adjacent to Alvin, Ayrshire, Bloomfield, and Rensselaer soils. Ayrshire soils are somewhat poorly drained. They are in positions on the landscape similar to those of the Roby soils. They have less sand and more clay in the control section than the Roby soils. Alvin and Bloomfield soils are in the higher landscape positions. Alvin soils are well drained, and Bloomfield soils are well drained or somewhat excessively drained. Rensselaer soils are in depressions and are very poorly drained. They have a mollic epipedon.

A typical pedon of Roby sandy loam, 0 to 2 percent slopes, in a cultivated field; 1,260 feet north and 2,420 feet west of the southeast corner of sec. 19, T. 6 N., R. 6 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) sandy loam, light brownish gray (10YR 6/2) dry; weak medium granular structure; very friable; medium acid; abrupt smooth boundary.

BE—10 to 18 inches; pale brown (10YR 6/3) sandy loam; many medium distinct yellowish brown (10YR 5/6) and common fine faint light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; very friable; slightly acid; gradual wavy boundary.

Btg1—18 to 32 inches; light brownish gray (10YR 6/2) sandy loam; many medium distinct strong brown (7.5YR 5/6) and common fine distinct brown (7.5YR 4/4) mottles; weak medium subangular blocky structure; very friable; thin discontinuous grayish brown (10YR 5/2) clay films on faces of most peds; few reddish brown (5YR 4/4) iron and manganese oxide accumulations; slightly acid; gradual wavy boundary.

Btg2—32 to 44 inches; light brownish gray (10YR 6/2) sandy loam; common fine distinct brown (7.5YR 4/4) mottles; weak coarse subangular blocky structure; very friable; bands and masses of dark brown (7.5YR 4/4) sandy clay loam 0.5 to 1.0 inch thick (about 3 inches total thickness); thin discontinuous grayish brown (10YR 5/2) clay films on faces of peds and clay bridges between sand grains in the bands and masses; neutral; gradual wavy boundary.

Btg3—44 to 52 inches; gray (10YR 6/1) sandy loam; many medium distinct grayish brown (10YR 5/2) and common medium distinct brown (7.5YR 4/4) mottles; weak coarse subangular blocky structure; very friable; bands and masses of dark brown (7.5YR 4/4) sandy clay loam (about 2 inches total thickness); about 2 percent fine gravel; slightly acid; gradual wavy boundary.

Cg1—52 to 64 inches; grayish brown (10YR 5/2) sandy loam; common medium distinct brown (7.5YR 4/4) mottles; massive; very friable; about 3 percent fine gravel; slightly acid; gradual wavy boundary.

Cg2—64 to 80 inches; grayish brown (10YR 5/2) stratified sand, loamy sand, and sandy loam; massive; very friable; about 5 percent fine gravel; slight effervescence; mildly alkaline.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. It is loamy sand or sandy loam. Some pedons have an E horizon. The BE horizon is loamy sand or sandy loam. The Btg horizon has value of 4 to 6 and chroma of 1 to 6. It is mainly sandy loam but has thin strata of loamy sand or sandy clay loam in some pedons. The C horizon is sandy loam, loamy sand, or sand.

Shakamak Series

The Shakamak series consists of deep, somewhat poorly drained or moderately well drained, very slowly permeable soils on uplands. These soils formed in loess and in the underlying glacial till. Slopes range from 1 to 3 percent.

Shakamak soils are similar to Ava and Pekin soils and are commonly adjacent to Ava, Cincinnati, Fairpoint, and Vigo soils. Ava and Pekin soils have a subsoil that is browner than that of the Shakamak soils. Also, Pekin soils have less sand in the solum. Ava soils are on knolls and ridgetops, and Pekin soils are between draws or are on breaks from terraces to bottom land. The well drained Cincinnati soils are on knolls, in draws, and on breaks. Fairpoint and Vigo soils do not have a fragipan. The well drained Fairpoint soils formed in spoil in surface-mined areas on uplands. They have a higher content of coarse fragments throughout than the Shakamak soils. The poorly drained Vigo soils are on flats between draws.

A typical pedon of Shakamak silt loam, 1 to 3 percent slopes, in a cultivated field; 150 feet west and 2,600 feet north of the southeast corner of sec. 32, T. 8 N., R. 6 W.

Ap—0 to 10 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; many fine roots; neutral; abrupt wavy boundary.

BE—10 to 14 inches; light yellowish brown (10YR 6/4) silt loam; weak medium subangular blocky structure; friable; many fine roots; wormholes and root channels filled with brown (10YR 4/3) silt loam; few fine pores; strongly acid; clear wavy boundary.

Bt1—14 to 18 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; friable; few roots; few fine pores; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of most peds; strongly acid; clear wavy boundary.

Bt2—18 to 23 inches; yellowish brown (10YR 5/6) silty clay loam; common fine distinct light brownish gray (10YR 6/2) and common fine faint dark yellowish brown (10YR 4/4) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; few fine pores; thick continuous grayish brown (10YR 5/2) clay films on faces of peds; continuous light gray (10YR 7/2) silt films on faces of peds; very strongly acid; clear wavy boundary.

Bt3—23 to 28 inches; yellowish brown (10YR 5/6) silty clay loam; common fine distinct light brownish gray (10YR 6/2) and common fine faint strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; common fine pores; thick continuous grayish brown (10YR 5/2) clay films on faces of peds; continuous light gray (10YR 7/2) silt films on faces of peds and vertical silt flows between prisms; few black (10YR 2/1) iron and manganese oxide accumulations; very strongly acid; clear wavy boundary.

Btx1—28 to 35 inches; yellowish brown (10YR 5/6) silt loam; common fine distinct light brownish gray (10YR 6/2) and dark brown (7.5YR 4/4) mottles; moderate coarse prismatic structure parting to moderate thick platy; very firm; brittle; few flattened roots between prisms; thick continuous grayish brown (10YR 5/2) clay films on faces of prisms; pale brown (10YR 6/3) silt flows between prisms; very strongly acid; gradual wavy boundary.

Btx2—35 to 47 inches; yellowish brown (10YR 5/6) silt loam; common fine distinct light brownish gray (10YR 6/2) mottles; moderate very coarse prismatic structure parting to moderate very thick platy; very firm; brittle; common fine pores; thick grayish brown (10YR 5/2) silty clay loam flows between prisms; pale brown (10YR 6/3) silt films on faces of prisms and silt flows between prisms; very strongly acid; gradual wavy boundary.

2Btx3—47 to 57 inches; yellowish brown (10YR 5/6) silt loam; few fine distinct light brownish gray (10YR 6/2) mottles; moderate very coarse prismatic structure; very firm; brittle; few fine pores; thin discontinuous brown (7.5YR 4/4) clay films on faces of peds; grayish brown (10YR 5/2) silt flows between prisms; few black (10YR 2/1) iron and manganese oxide accumulations; about 2 percent fine gravel; very strongly acid; gradual wavy boundary.

2Bt—57 to 69 inches; yellowish brown (10YR 5/6) loam; common fine distinct pale brown (10YR 6/3) mottles; weak very coarse subangular blocky structure; friable; thin discontinuous grayish brown (10YR 5/2) clay films on faces of peds; few brown (10YR 5/3) silt flows; few black (10YR 2/1) iron and manganese oxide accumulations; about 2 percent fine gravel; very strongly acid; gradual wavy boundary.

2BC—69 to 80 inches; yellowish brown (10YR 5/6) clay loam; common fine distinct pale brown (10YR 6/3) and strong brown (7.5YR 5/8) mottles; weak very coarse subangular blocky structure; firm; common black (10YR 2/1) iron and manganese oxide accumulations; about 2 percent fine gravel; very strongly acid.

The solum is 60 to more than 80 inches thick. The loess is 40 to 60 inches thick.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. Some pedons have an E horizon. The Bt horizon has value of 4 to 6 and chroma of 4 to 8. The Bt2 and Bt3 horizons have common or many mottles with chroma of 2 or less. The Bt horizon is silt loam or silty clay loam. It has a clay content of 24 to 32 percent. It is medium acid to very strongly acid. The Btx, 2Btx, and 2Bt horizons are strongly acid or very strongly acid. The Btx and 2Btx horizons have value of 4 or 5 and chroma of 4 to 8. The Btx horizon is silt loam or silty clay loam. The 2Btx horizon is silt loam or loam. The 2Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8.

Steff Series

The Steff series consists of deep, moderately well drained, moderately permeable soils on bottom land. These soils formed in acid, silty alluvium washed from loess-mantled uplands. Slopes are 0 to 1 percent.

These soils have less clay in the subsoil than is definitive for the Steff series. This difference, however, does not alter the usefulness or behavior of the soils.

Steff soils are similar to Cuba soils and are commonly adjacent to Bonnie, Cuba, Pekin, and Stendal soils. All of the adjacent soils are on bottom land, except for Pekin soils, which are on terraces. Cuba soils are well drained, Bonnie soils are poorly drained, and Stendal soils are somewhat poorly drained. Pekin soils have a fragipan.

A typical pedon of Steff silt loam, frequently flooded, in a cultivated field; 900 feet south and 150 feet west of the northeast corner of sec. 25, T. 8 N., R. 7 W.

Ap—0 to 10 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak fine granular structure; friable; medium acid; abrupt smooth boundary.

Bw1—10 to 21 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; few thin pale brown (10YR 6/3) silt coatings on faces of peds; very strongly acid; clear wavy boundary.

Bw2—21 to 27 inches; pale brown (10YR 6/3) silt loam; common fine distinct light gray (10YR 7/2) and yellowish brown (10YR 5/6) mottles; weak fine prismatic structure; friable; thin very pale brown (10YR 7/3) silt coatings; common dark reddish brown (5YR 3/3) iron and manganese oxide accumulations; very strongly acid; clear wavy boundary.

Cg1—27 to 35 inches; light brownish gray (10YR 6/2) silt loam; common fine faint light gray (10YR 7/2) and common fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; common light gray (10YR 7/2) silt flows 2 to 5 millimeters thick; dark reddish brown (5YR 3/3) iron and manganese oxide accumulations; very strongly acid; gradual wavy boundary.

Cg2—35 to 45 inches; light gray (10YR 7/2) silt loam; common fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; light gray (10YR 7/2) silt flows 2 to 5 millimeters thick; many strong brown (7.5YR 5/6) iron and manganese oxide accumulations; very strongly acid; gradual wavy boundary.

Cg3—45 to 60 inches; light yellowish brown (10YR 6/4) stratified silt loam, loam, and fine sandy loam; common fine distinct light gray (10YR 7/2) and strong brown (7.5YR 5/6) mottles; massive; friable; very strongly acid.

The control section is strongly acid or very strongly acid. The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The Bw horizon has value of 4 to 6 and chroma of 2 to 4.

Stendal Series

The Stendal series consists of deep, somewhat poorly drained, moderately permeable soils on bottom land. These soils formed in acid, silty alluvium washed from the loess-mantled uplands. Slopes are 0 to 1 percent.

These soils have less clay in the subsoil than is definitive for the Stendal series. This difference, however, does not affect the usefulness or behavior of the soils.

Stendal soils are similar to Newark soils and are commonly adjacent to Bonnie, Cuba, Pekin, Peoga, Piankeshaw, and Steff soils. The somewhat poorly drained Newark, poorly drained or very poorly drained Bonnie, well drained Cuba and Piankeshaw, and moderately well drained Steff soils are on bottom land. Newark soils are less acid than the Stendal soils and have more sand and less clay in the solum. Piankeshaw soils have a higher content of coarse fragments in the solum than the Stendal soils. The moderately well drained Pekin soils are on breaks or between draws on terraces. They have a fragipan. The poorly drained Peoga soils are on low terraces. They have more clay in the subsoil than the Stendal soils.

A typical pedon of Stendal silt loam, frequently flooded, in a cultivated field; 600 feet east and 1,550 feet south of the center of sec. 3, T. 8 N., R. 7 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; slightly acid; abrupt smooth boundary.

Bg1—8 to 21 inches; dark grayish brown (10YR 4/2) silt loam; many fine distinct brown (7.5YR 4/4) mottles; weak medium subangular blocky structure; friable; medium acid; clear wavy boundary.

Bg2—21 to 29 inches; grayish brown (10YR 5/2) silt loam; many fine distinct dark yellowish brown (10YR 4/6) mottles; weak medium subangular blocky structure; friable; very strongly acid; clear wavy boundary.

Cg1—29 to 39 inches; light brownish gray (10YR 6/2) silt loam; common fine distinct strong brown (7.5YR 5/8) and many fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; common continuous light gray (10YR 7/2) silt flows in cracks and root channels; about 10 percent masses of grayish brown (10YR 5/2) silt loam; very strongly acid; gradual wavy boundary.

Cg2—39 to 50 inches; light brownish gray (10YR 6/2) silt loam; many coarse distinct yellowish brown (10YR 5/6) mottles; massive; friable; common continuous distinct light gray (10YR 7/2) silt flows in root channels; few black (10YR 2/1) iron and manganese oxide accumulations; common dark grayish brown (10YR 4/2) krotovinas; very strongly acid; gradual wavy boundary.

Cg3—50 to 60 inches; grayish brown (10YR 5/2) silt loam stratified with thin layers of silty clay loam; common fine distinct strong brown (7.5YR 5/6) and common medium distinct brownish yellow (10YR 6/6) mottles; massive; friable; few yellowish red (5YR 4/6) iron and manganese oxide concretions; common dark grayish brown (10YR 4/2) krotovinas; strongly acid.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3. The B horizon has value of 4 to 6 and chroma of 2 or 3. The C horizon has value of 5 to 7 and chroma of 1 or 2. It is mainly silt loam, but it has thin strata of silty clay loam, loam, or fine sandy loam.

Uniontown Series

The Uniontown series consists of deep, well drained or moderately well drained, moderately permeable or moderately slowly permeable soils on old alluvial terraces. These soils formed in alluvium. Slopes range from 18 to 30 percent.

Uniontown soils are similar to Hickory soils and are commonly adjacent to Bartle, Haymond, and Pekin soils. Hickory soils are in draws and on breaks. They have more sand and less silt and clay in the subsoil than the Uniontown soils. Bartle and Pekin soils are on ridgetops. They have a fragipan. Bartle soils are somewhat poorly drained, and Pekin soils are moderately well drained. Haymond soils are on bottom land. They have more silt throughout than the Uniontown soils.

A typical pedon of Uniontown silt loam, 18 to 30 percent slopes, in an idle field; 900 feet east and 3,860 feet north of the southwest corner of sec. 23, T. 8 N., R. 3 W.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many fine roots; strongly acid; clear smooth boundary.

E—3 to 6 inches; brown (10YR 5/3) silt loam; weak medium granular structure; friable; many fine roots; few masses of very dark grayish brown (10YR 3/2) silt loam; strongly acid; clear wavy boundary.

Bt1—6 to 13 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct pale brown (10YR 6/3) mottles; weak fine subangular blocky structure; firm; many fine roots; thin discontinuous strong brown (7.5YR 5/6) clay films on faces of peds; strongly acid; clear wavy boundary.

Bt2—13 to 23 inches; yellowish brown (10YR 5/6) silty clay loam; common fine distinct strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to moderate fine subangular blocky; firm; common fine roots; thin continuous light brownish gray (2.5Y 6/2) silt flows and clay films on faces of peds; strongly acid; clear wavy boundary.

Bt3—23 to 30 inches; yellowish brown (10YR 5/6) silty clay loam; many medium distinct gray (10YR 6/1) and common fine distinct reddish yellow (7.5YR 6/6) mottles; weak medium prismatic structure parting to moderate medium angular blocky; firm; thin discontinuous grayish brown (10YR 5/3) clay films on faces of peds; common discontinuous silt flows on faces of prisms; strongly acid; clear wavy boundary.

Bt4—30 to 38 inches; olive yellow (2.5Y 6/6) silty clay loam; few fine distinct strong brown (7.5YR 5/6) and many medium distinct light brownish gray (2.5Y 6/2) mottles; weak medium prismatic structure parting to moderate medium angular blocky; firm; thick discontinuous grayish brown (10YR 5/2) clay films on faces of peds and clay flows on faces of prisms; strongly acid; gradual wavy boundary.

Bt5—38 to 45 inches; brownish yellow (10YR 6/6) silty clay loam; many coarse distinct light brownish gray (2.5Y 6/2) and common fine distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure; firm; thin discontinuous grayish brown (10YR 5/2) clay films on vertical faces of prisms; few black (10YR 2/1) soft iron and manganese oxide accumulations; neutral; gradual wavy boundary.

Cg1—45 to 55 inches; light brownish gray (2.5Y 6/2) silty clay loam; many coarse distinct strong brown (7.5YR 5/6) mottles; massive; firm; neutral; gradual wavy boundary.

Cg2—55 to 60 inches; strong brown (7.5YR 5/6) stratified silty clay loam and silt loam; many coarse distinct light brownish gray (2.5Y 6/2) mottles; massive; firm; neutral.

The solum ranges from 40 to 60 inches in thickness. The A horizon has value of 3 or 4 and chroma of 2 or 3. The E horizon has chroma of 2 or 3. The upper part of the Bt horizon has value of 5 or 6 and chroma of 4 to 6. It is silt loam or silty clay loam. The lower part has hue of 2.5Y or 10YR, value of 5 or 6, and chroma of 2 to 6. It is silty clay loam or silty clay. The C horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 5 or 6, and chroma of 2 to 6.

Vigo Series

The Vigo series consists of deep, poorly drained, very slowly permeable soils on uplands. These soils formed in loess and in the underlying glacial till. Slopes range from 0 to 2 percent.

Vigo soils are similar to Evansville and Peoga soils and are commonly adjacent to Ava, Cincinnati, Fairpoint, and Shakamak soils. Evansville and Peoga soils are shallower to an E horizon than the Vigo soils. Also, Evansville soils have more clay in the subsoil, and Peoga soils are less acid in the lower part of the subsoil. Ava, Cincinnati, and Shakamak soils are on knolls, on ridgetops, or in draws. They have a fragipan. Ava soils are moderately well drained, Cincinnati soils are well drained, and Shakamak soils are somewhat poorly drained or moderately well drained. Fairpoint soils are well drained. They have a higher content of coarse fragments throughout than the Vigo soils. They are in landscape positions similar to those of the Vigo soils.

A typical pedon of Vigo silt loam, 0 to 2 percent slopes, in a cultivated field; 500 feet west and 2,500 feet north of the southeast corner of sec. 6, T. 8 N., R. 7 W.

Ap—0 to 8 inches; grayish brown (10YR 5/2) silt loam; weak fine granular structure; friable; strongly acid; abrupt smooth boundary.

E—8 to 18 inches; light gray (10YR 7/2) silt loam; common fine distinct light yellowish brown (10YR 6/4) mottles; weak thick platy structure; friable; few very dark brown (10YR 2/2) iron and manganese oxide concretions; very strongly acid; clear irregular boundary.

B/E—18 to 26 inches; light brownish gray (10YR 6/2) silty clay loam (Bt); many fine distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate fine subangular blocky (prisms are broader at the base and taper at the top); firm; common tubular pores; thin continuous light brownish gray (2.5Y 6/2) clay films on faces of peds; flows and tongues of light gray (10YR 7/2) silt loam (E) extending downward between prisms; friable; very strongly acid; clear irregular boundary.

Btg1—26 to 36 inches; light gray (10YR 6/1) silty clay loam; many medium distinct strong brown (7.5YR 5/8) mottles; moderate coarse prismatic structure; firm; thick continuous gray (10YR 6/1) clay films and silt coatings on faces of peds; fillings of light gray (10YR 7/2) silt in crawfish holes; common black (10YR 2/1) iron and manganese oxide concretions; very strongly acid; gradual wavy boundary.

Btg2—36 to 45 inches; light gray (10YR 6/1) silty clay loam; many medium distinct strong brown (7.5YR 5/8) and yellowish brown (10YR 5/8) mottles; weak coarse prismatic structure; firm; thin continuous gray (10YR 6/1) clay films and silt coatings on faces of peds; common black (10YR 2/1) iron and manganese oxide concretions; few pebbles; very strongly acid; gradual wavy boundary.

Btg3—45 to 55 inches; gray (10YR 6/1) silt loam; many medium distinct strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure; firm; thin discontinuous gray (10YR 6/1) clay films on faces of peds; light gray (10YR 7/2) silt flows and silt fillings in crawfish holes; common black (10YR 2/1) iron and manganese oxide concretions; few pebbles; very strongly acid; gradual wavy boundary.

2Bt—55 to 65 inches; strong brown (7.5YR 5/8) silt loam; common fine distinct light gray (10YR 7/1) mottles; weak coarse prismatic structure; firm; thin discontinuous gray (10YR 6/1) clay films on faces of peds; light gray (10YR 7/2) silt flows; common black (10YR 2/1) iron and manganese oxide concretions and accumulations; few pebbles; strongly acid; gradual wavy boundary.

2BC—65 to 80 inches; yellowish brown (10YR 5/6) silt loam; many medium distinct light brownish gray (10YR 6/2) mottles; weak very coarse prismatic structure; friable; few fine pebbles; strongly acid.

The loess is 50 to 60 inches thick. The Ap horizon has value of 4 or 5. The E, B/E, and Btg horizons have value of 5 to 7 and chroma of 1 or 2.

Waupecan Series

The Waupecan series consists of deep, well drained, moderately permeable soils on terraces. These soils formed in loamy water-deposited sediments underlain by gravelly or sandy outwash. Slopes range from 0 to 2 percent.

Waupecan soils are similar to Elston soils and are commonly near Ambraw, Ayrshire, Elston, and Haymond soils. Ambraw soils are poorly drained and are on low terraces. Ayrshire soils are somewhat poorly drained and are in the slightly lower positions on terraces. They have more sand in the B horizon than the Waupecan soils. Elston soils have less clay in the solum than the Waupecan soils. Haymond soils do not have a mollic epipedon. They are on bottom land.

A typical pedon of Waupecan silt loam, rarely flooded, 0 to 2 percent slopes, in a cultivated field; 350 feet north and 400 feet east of the southwest corner of sec. 21, T. 6 N., R. 6 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; medium acid; abrupt smooth boundary.

A—8 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; friable; medium acid; abrupt smooth boundary.

Bt1—11 to 21 inches; brown (10YR 4/3) silty clay loam; weak medium subangular blocky structure; friable; thin discontinuous dark brown (10YR 3/3) clay and organic films on faces of most peds; small masses of very dark grayish brown (10YR 3/2) silt loam in voids; medium acid; clear wavy boundary.

Bt2—21 to 28 inches; brown (10YR 4/3) clay loam; weak medium subangular blocky structure; firm; thin discontinuous dark brown (10YR 3/3) clay and organic films on faces of peds; strongly acid; clear wavy boundary.

2Bt3—28 to 36 inches; brown (10YR 4/3) clay loam; weak medium subangular blocky structure; firm; thin continuous dark grayish brown (10YR 4/2) clay films on faces of peds; about 2 percent gravel; strongly acid; gradual wavy boundary.

2Bt4—36 to 48 inches; brown (10YR 5/3) sandy clay loam; weak medium subangular blocky structure; firm; thin discontinuous dark brown (10YR 4/3) clay films on faces of peds; about 2 percent gravel; strongly acid; gradual wavy boundary.

2Bt5—48 to 66 inches; yellowish brown (10YR 5/4) coarse sandy loam; common fine distinct yellowish red (5YR 5/6) mottles; weak coarse subangular blocky structure; friable; thin discontinuous dark brown (10YR 4/3) clay films on faces of most peds and clay bridges between sand grains; about 10 percent gravel; about 10 percent small masses of brown (10YR 4/3) sandy loam; strongly acid; gradual wavy boundary.

2C—66 to 80 inches; yellowish brown (10YR 5/4) gravelly loamy sand; massive; about 10 percent small masses of brown (10YR 4/3) sandy loam in the upper part; very friable; about 18 percent gravel; medium acid.

The solum is 60 to 70 inches thick. The A horizon has value of 2 or 3. It is 10 to 14 inches thick. The Bt and 2Bt horizons have value of 4 or 5 and chroma 3 or 4. The 2Bt5 horizon is sandy clay loam, sandy loam, coarse sandy loam, or loamy sand. The 2C horizon is sand, loamy sand, gravelly coarse sand, or gravelly loamy sand.

Wellston Series

The Wellston series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in loess and in sandstone and shale residuum. Slopes range from 6 to 25 percent.

Wellston soils are similar to Hagarstown soils and commonly are near Berks, Ebal, Gilpin, Hagarstown, Pike, and Zanesville soils. Hagarstown soils have more clay in the subsoil than the Wellston soils. They are underlain by limestone. Berks and Gilpin soils are on breaks or in draws. They have a higher content of coarse fragments in the solum than the Wellston soils. Also, the solum of Berks soils has more sand. Ebal soils are moderately well drained and are in landscape positions similar to those of the Wellston soils. They have more clay in the B and C horizons than the Wellston soils. Pike soils have a lower content of coarse fragments in the B and C horizons than the Wellston soils and are underlain by outwash. They are in the slightly lower landscape positions. Zanesville soils are on knolls, ridges, breaks, and side slopes. They have a fragipan.

A typical pedon of Wellston silt loam, in a wooded area of Gilpin-Wellston silt loams, 18 to 25 percent slopes; 2,020 feet north and 1,190 feet east of the southwest corner of sec. 2, T. 6 N., R. 4 W.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; many fine and medium roots; neutral; abrupt smooth boundary.

E—2 to 5 inches; brown (10YR 5/3) silt loam; weak very fine subangular blocky structure; friable; many fine and medium roots; wormholes and root channels filled with very dark grayish brown (10YR 3/2) silt loam; slightly acid; clear wavy boundary.

BE—5 to 9 inches; yellowish brown (10YR 5/6) silt loam; weak fine subangular blocky structure; friable; common fine and medium roots; wormholes and root channels filled with brown (10YR 5/3) silt loam; strongly acid; clear wavy boundary.

Bt1—9 to 16 inches; yellowish brown (10YR 5/8) silt loam; weak medium subangular blocky structure; friable; few medium roots; thin discontinuous brown (7.5YR 5/4) clay films on faces of peds; about 2 percent sandstone fragments; very strongly acid; clear wavy boundary.

Bt2—16 to 22 inches; yellowish brown (10YR 5/8) silt loam; weak medium subangular blocky structure; friable; thin continuous brown (7.5YR 5/4) clay films on faces of peds; about 2 percent sandstone fragments; very strongly acid; gradual wavy boundary.

Bt3—22 to 27 inches; yellowish brown (10YR 5/6) silt loam; weak coarse subangular blocky structure; friable; thin discontinuous brown (7.5YR 5/4) clay films on faces of peds; about 5 percent sandstone fragments; very strongly acid; gradual wavy boundary.

2Bt4—27 to 36 inches; yellowish brown (10YR 5/6) channery loam; weak coarse subangular blocky structure; friable; thin discontinuous brown (7.5YR 5/4) clay films on faces of peds; about 30 percent sandstone fragments; very strongly acid; clear wavy boundary.

2Bt5—36 to 42 inches; yellowish brown (10YR 5/6) channery silty clay loam; weak coarse subangular blocky structure; firm; thin discontinuous brown (7.5YR 5/4) clay films on faces of peds; about 15 percent sandstone fragments; very strongly acid; gradual wavy boundary.

2C—42 to 53 inches; yellowish brown (10YR 5/6) channery silty clay loam; massive; firm; about 15 percent sandstone fragments; common masses of pale brown (10YR 6/3) silty clay loam; very strongly acid; abrupt smooth boundary.

2R—53 inches; fractured sandstone and shale bedrock; few cracks filled with yellowish brown (10YR 5/6) silt loam; massive; friable; very strongly acid.

The solum is 32 to 45 inches thick. The depth to the 2B horizon is 24 to 40 inches. The depth to bedrock is 40 to 60 inches. The A horizon has value of 3 to 5 and chroma of 2 to 6. The Bt and 2Bt horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 6 to 8.

Wilhite Series

The Wilhite series consists of deep, very poorly drained, very slowly permeable soils on bottom land. These soils formed in moderately fine textured or fine textured alluvium. Slopes are 0 to 1 percent.

Wilhite soils are similar to Bonnie soils and are commonly adjacent to Haymond, Newark, and Nolin soils. Bonnie and Newark soils have less clay in the control section than the Wilhite soils. Haymond, Newark, and Nolin soils are in the higher positions on the bottom land. Newark soils are somewhat poorly drained. Haymond and Nolin soils are well drained. Haymond soils have more sand in the solum than the Wilhite soils.

A typical pedon of Wilhite silty clay, frequently flooded, in a cultivated field; 300 feet north and 300 feet west of the southeast corner of sec. 16, T. 6 N., R. 6 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silty clay, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

Bg1—10 to 17 inches; dark gray (10YR 4/1) silty clay; common fine distinct yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; firm; many fine roots; very dark gray (10YR 3/1) organic coatings on faces of peds; slightly acid; gradual wavy boundary.

Bg2—17 to 23 inches; dark gray (10YR 4/1) clay loam; common fine distinct yellowish brown (10YR 5/4) and strong brown (7.5YR 5/8) mottles; weak medium prismatic structure parting to weak medium subangular blocky; firm; many fine roots; very dark gray (10YR 3/1) organic coatings on faces of peds; slightly acid; gradual wavy boundary.

Bg3—23 to 32 inches; dark gray (10YR 4/1) clay loam; common fine distinct yellowish brown (10YR 5/4) and strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure parting to weak medium subangular blocky; firm; very dark gray (10YR 3/1) organic fillings in cracks; yellowish red (5YR 4/8) stains on peds; few black (10YR 2/1) iron and manganese oxide accumulations; slightly acid; gradual wavy boundary.

Cg1—32 to 40 inches; dark gray (10YR 4/1) silty clay loam; common fine distinct dark yellowish brown (10YR 4/6) mottles; massive; firm; very dark gray (10YR 3/1) fillings in cracks; slightly acid; gradual wavy boundary.

Cg2—40 to 48 inches; dark gray (10YR 4/1) silty clay loam; few medium distinct yellowish brown (10YR 5/8) mottles; massive; friable; very dark gray (10YR 3/1) fillings in cracks; neutral; gradual wavy boundary.

Cg3—48 to 60 inches; dark gray (10YR 4/1) stratified silt loam and silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; massive; friable; very dark gray (10YR 3/1) fillings in cracks; neutral.

The Ap horizon has chroma of 1 or 2. The Bg horizon has value of 4 or 5. The Cg horizon has value of 4 or 5 and chroma of 1 or 2. It is silt loam, silty clay loam, or silty clay.

Wirt Series

The Wirt series consists of deep, well drained, moderately permeable soils on bottom land. These soils formed in sandy and loamy alluvium. Slopes are 0 to 1 percent.

Wirt soils are adjacent to Haymond, Newark, and Nolin soils. All of the adjacent soils are on bottom land. They contain more silt and less sand throughout than the Wirt soils. Newark soils are somewhat poorly drained.

A typical pedon of Wirt very fine sandy loam, frequently flooded, in a cultivated field; 500 feet west and 950 feet south of the center of sec. 21, T. 6 N., R. 6 W.

Ap—0 to 10 inches; brown (10YR 4/3) very fine sandy loam, pale brown (10YR 6/3) dry; weak fine granular structure; very friable; small masses of dark yellowish brown (10YR 4/4) fine sandy loam; medium acid; abrupt smooth boundary.

Bw—10 to 27 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak coarse subangular blocky structure; very friable; fillings of brown (10YR 4/3) fine sandy loam in wormholes in the upper part; slightly acid; gradual wavy boundary.

C1—27 to 39 inches; yellowish brown (10YR 5/4) fine sandy loam; massive; very friable; slightly acid; gradual wavy boundary.

C2—39 to 52 inches; yellowish brown (10YR 5/4) loam; common fine faint yellowish brown (10YR 5/6) mottles; massive; very friable; slightly acid; gradual wavy boundary.

C3—52 to 60 inches; brown (10YR 5/3) fine sandy loam; massive; very friable; slightly acid.

The Ap, B, and C horizons have value of 4 or 5 and chroma of 3 or 4. The B and C horizons are medium acid to neutral. The C horizon is loam or loamy fine sand in the lower part. The fine sandy loam in this horizon extends to a depth of 30 to 60 inches.

Zanesville Series

The Zanesville series consists of deep, well drained or moderately well drained, moderately slowly permeable or slowly permeable soils on uplands. These soils formed in loess and in sandstone and shale residuum. Slopes range from 1 to 12 percent.

Zanesville soils are similar to Cincinnati soils and are commonly adjacent to Berks, Ebal, Gilpin, and Wellston soils. Cincinnati soils have fewer sandstone fragments in the solum than the Zanesville soils and are underlain by glacial till. Berks and Gilpin soils are on the steeper breaks and in draws. Their solum is thinner than that of the Zanesville soils and has more sand and coarse fragments. Ebal and Wellston soils are in draws and on the sides of ridges. They do not have a fragipan. Ebal soils have more clay in the solum than the Zanesville soils.

A typical pedon of Zanesville silt loam, 6 to 12 percent slopes, eroded, in a hayfield; 250 feet west and 20 feet north of the center of sec. 8, T. 6 N., R. 3 W.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; few small masses of yellowish brown (10YR 5/6) silty clay loam; neutral; abrupt smooth boundary.

Bt1—8 to 16 inches; yellowish brown (10YR 5/6) silty clay loam; weak fine and medium subangular blocky structure; friable; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; few wormholes and root channels filled with brown (10YR 4/3) silt loam; strongly acid; clear wavy boundary.

Bt2—16 to 23 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; thin continuous brown (7.5YR 4/4) clay films on faces of peds; thin pale brown (10YR 6/3) silt coatings on faces of peds; strongly acid; clear irregular boundary.

Btx1—23 to 32 inches; brown (7.5YR 4/4) silty clay loam; common fine distinct strong brown (7.5YR 5/8) and pale brown (10YR 6/3) mottles; moderate medium prismatic structure; very firm; brittle; thin continuous grayish brown (10YR 5/2) clay films on faces of peds; grayish brown (10YR 5/2) silt coatings on faces of peds and silt flows between prisms; very strongly acid; clear wavy boundary.

2Btx2—32 to 46 inches; brown (7.5YR 4/4) silt loam; common medium distinct light brownish gray (10YR 6/2) mottles; strong very coarse prismatic structure; very firm; brittle; thin continuous light brownish gray (10YR 6/2) clay and silt films on faces of prisms; thick light brownish gray (10YR 6/2) silt flows between prisms; about 2 percent sandstone fragments; very strongly acid; gradual wavy boundary.

2BC—46 to 54 inches; yellowish brown (10YR 5/6) silt loam; common fine distinct light brownish gray (10YR 6/2) and strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure; friable; about 5 percent sandstone fragments; very strongly acid; gradual wavy boundary.

2C—54 to 60 inches; strong brown (7.5YR 5/8) loam; massive; friable; about 12 percent sandstone fragments; very strongly acid.

The solum is 50 to 60 inches thick. The depth to bedrock ranges from 50 to 80 inches. The depth to the fragipan is 23 to 36 inches.

The Bt, Btx, and 2Btx horizons have hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8. They are silt loam or silty clay loam. The depth to mottles, silt flows, and clay films with chroma of 2 is 20 to 26 inches. The 2C horizon is silt loam, silty clay loam, shaly or channery silt loam, silty clay loam, or loam.

Zanesville silt loam, 1 to 3 percent slopes, is a taxadjunct to the series because it has mottles with chroma of 2 in the upper 10 inches of the argillic horizon. This difference, however, does not alter the usefulness or behavior of the soil.

Zipp Series

The Zipp series consists of deep, very poorly drained, slowly permeable or very slowly permeable soils on lake plains. These soils formed in fine textured sediments. Slopes are 0 to 1 percent.

The B horizon of these soils is more acid than is definitive for the Zipp series. This difference, however, does not alter the usefulness or behavior of the soils.

Zipp soils are commonly adjacent to Booker, Evansville, and Montgomery soils. All of the adjacent soils are on lake plains. Booker and Montgomery soils have a mollic epipedon. Booker soils contain more montmorillonitic clay than the Zipp soils. Evansville soils have less clay throughout the solum than the Zipp soils.

A typical pedon of Zipp silty clay, in a cultivated field; 250 feet north and 1,000 feet east of the southwest corner of sec. 33, T. 7 N., R. 7 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silty clay, light brownish gray (10YR 6/2) dry; moderate fine angular blocky structure; firm; slightly acid; abrupt smooth boundary.

Bg1—7 to 15 inches; dark gray (10YR 4/1) clay; few medium distinct strong brown (7.5YR 5/6) mottles; moderate fine angular blocky structure; very firm; very strongly acid; clear wavy boundary.

Bg2—15 to 27 inches; dark gray (5Y 4/1) clay; many medium distinct olive brown (2.5Y 4/4) and strong brown (7.5YR 5/6) mottles; moderate coarse prismatic structure parting to moderate medium angular blocky; very firm; continuous dark gray (10YR 4/1) organic films on pressure faces of peds and in cracks; dark gray (10YR 4/1) silty clay tongues 4 to 6 inches apart; very strongly acid; clear wavy boundary.

Bg3—27 to 37 inches; gray (5Y 6/1) clay; many medium distinct strong brown (7.5YR 5/8) and yellowish brown (10YR 5/6) mottles; moderate coarse prismatic structure parting to moderate medium angular blocky; very firm; continuous dark gray (10YR 4/1) organic films on pressure faces of peds and in cracks; dark gray (10YR 4/1) silty clay tongues 6 to 12 inches apart; strongly acid; gradual wavy boundary.

Bg4—37 to 47 inches; dark gray (5Y 4/1) clay; many medium distinct brown (7.5YR 4/4) and few fine distinct olive (5Y 4/6) mottles; weak coarse prismatic structure; very firm; continuous dark gray (10YR 4/1) organic films in vertical cracks; dark gray (10YR 4/1) silty clay tongues 6 to 12 inches apart; medium acid; clear wavy boundary.

Cg—47 to 60 inches; dark gray (N 4/0) clay; few fine distinct strong brown (7.5YR 5/6) mottles; massive; very friable; neutral.

The solum is 36 to 48 inches thick. The Ap horizon has chroma of 1 or 2. The Bg horizon has hue of 10YR, 2.5Y, or 5Y or is neutral in hue. It has value of 4 to 6. It is very strongly acid to medium acid. The Bg and Cg horizons are dominantly clay, but in some pedons they have subhorizons of silty clay loam or silty clay.

Formation of the Soils

This section relates the major factors of soil formation to the soils in the county. It also describes the processes of soil formation.

Factors of Soil Formation

Soils form through the physical and chemical weathering of geologic material. The characteristics of the soil at any given point are determined by the physical and mineralogical composition of the parent material; the climate under which the soil material accumulated and has existed since accumulation; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time that the forces of soil formation have acted on the soil material.

Climate and plant and animal life, chiefly plants, are active factors of soil formation. They act on the parent material that has accumulated through the weathering of rocks and slowly change it into a natural body that has genetically related horizons. The effects of climate and plant and animal life are conditioned by relief. The parent material affects the kind of soil profile that forms and, in extreme cases, determines it almost entirely. Finally, time is needed for the transformation of the parent material into a soil. Some time is always required for the differentiation of soil horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effects of any one factor unless conditions are specified for the other four.

Time

Usually, a long time is required for the development of distinct soil horizons. Some soils mature more slowly than others because of differences in the kind of parent material or in relief or climate. A mature soil is one that has well developed A and B horizons resulting from the natural processes of soil formation. Young soils show little or no evidence of horizon differentiation. Examples are soils that formed in alluvium, such as Bonnie and Stendal soils, which are immature because the parent material is young and because new material is deposited during periods of flooding. Other examples of immature soils are Zipp soils, which formed in glacial lake deposits of Wisconsinan age, and steep soils in areas where erosion removes the soil material before a soil can form.

The soils that formed in a thin layer of loess and in the underlying Illinoian glacial drift or old lacustrine material have well developed profiles and are considered mature or nearly mature. Examples are Vigo and Cincinnati soils.

Climate

The climate of Greene County is midcontinental. It is characterized by a wide range of temperature. The rainfall totals about 41 inches annually. It is well distributed throughout the year, but the amount is slightly higher in spring and summer than in fall and winter. The rainfall has leached plant nutrients from the surface layer and has leached calcium carbonates to the deeper parts of the profile. Basic cations are leached more quickly than they are released through the weathering of minerals, and most of the soils are strongly weathered, acid, and low in fertility.

The climate is so nearly uniform throughout the county that differences among the soils cannot be explained solely on the basis of differences in climate. Climatic forces act upon rocks, forming the parent material of the soils. Many of the more important soil characteristics, however, result from the activity of plant and animal life.

Parent Material

Parent material is the unconsolidated mass in which a soil forms. The parent materials in Greene County are roughly divided by a very irregular line that runs diagonally across the county from Scotland to Newark. To the west of this line, the soils generally formed in glacial till and outwash, lacustrine material, and windblown sandy and silty material. To the east of the line, the soils generally formed in sandstone, shale, and limestone residuum and in windblown silty material.

As the glacial ice sheet receded from the uplands, glacial till, which consists of a mixture of rock fragments, sand, silt, and clay, was exposed. On the ridges and slopes, the till generally ranges from a few to many feet in thickness. In some areas in the valleys, it extends to a depth of 50 feet or more. Hickory soils formed in this material.

The melting glacial ice produced a large volume of water that carried large amounts of sand and gravel. Sandy and gravelly outwash was deposited along and in stream valleys and on knolls in the uplands. Chetwynd soils are an example of soils that formed in loamy outwash.

In some areas shallow lakes formed as the ice receded. Clay- and silt-size particles settled out of the meltwater and local runoff. Booker soils are an example of soils that formed in these areas.

A layer of loess was deposited on the uplands in the county. This mantle of mostly silt-size material ranges from a few inches to more than 7 feet in thickness. Most of the loess was washed away in the steeper areas, but it remained in the nearly level to moderately sloping areas. It is the material in which many of the soils formed. Alford soils are an example of soils that formed in more than 5 feet of loess. The loess mantle is less than 5 feet thick throughout much of the county. Cincinnati, Ava, and Vigo are examples of soils that formed in loess and in the underlying glacial till.

Material consisting mainly of fine sand and sand was carried by the wind and deposited as dunes on uplands near the flood plain along the White River. This material was first deposited in the valley by glacial meltwater. These deposits range from a few feet to more than 20 feet in thickness. Alvin and Bloomfield soils formed in this material.

The soils on bottom land and terraces along rivers and streams formed in sediments deposited by water. Haymond and Stendal are examples.

The rock formations in the eastern part of the county are of Mississippian age. Soils formed in material weathered from these rocks and in the overlying loess. The rock formations along the extreme eastern edge of the county have thick beds of limestone, shale, and sandstone. In the areas farther west, the beds of sandstone are thicker and the beds of limestone and shale are thin. Berks and Gilpin are examples of soils that formed in material weathered from sandstone and shale.

Relief

Slopes in Greene County range from nearly level on bottom land, terraces, and upland flats to very steep on breaks along draws. Most of the county has been dissected by streams.

Variations in relief have influenced the formation of the soils in Greene County by affecting drainage, runoff, and water erosion. Steep soils are less strongly developed than nearly level or sloping soils that formed in the same kind of parent material. Runoff is more rapid on the steeper soils. As a result, the rate of erosion also is more rapid and less water is available for plant growth and for the leaching of soluble material downward through the profile.

Because of the variations in relief in the county, several different soils have formed in the same kind of parent material. Vigo and Cincinnati soils, for example, formed in loess and the underlying glacial till. Vigo soils are nearly level and poorly drained and have a grayish, mottled subsoil. Cincinnati soils are moderately sloping and strongly sloping, are well drained, and have a brownish subsoil.

Plant and Animal Life

Before Greene County was settled, the native vegetation was the most important organism that affected soil formation. Plants, bacteria, fungi, earthworms, burrowing animals, and human activities have affected the formation of the soils in the county. The chief contribution of plant and animal life is the addition of organic matter and nitrogen to the soil. Organic matter is produced by plants. Plants absorb nutrients from the lower part of the soil. When the plants die and decay, some of these nutrients are left on or near the surface. Bacteria and fungi help to decompose plant and animal remains into organic matter. Small burrowing animals and earthworms mix the organic matter into the soil.

The native vegetation in Greene County was mainly deciduous hardwoods. The common trees were yellow-poplar, oak, hickory, elm, maple, and ash. A small amount of organic matter from decayed leaves and twigs is mixed throughout the upper 1 or 2 inches of Cincinnati, Zanesville, and other soils that formed mainly under hardwood trees.

In some areas the native vegetation consisted of swamp grasses, sedges, and water-tolerant trees. These areas were covered with water much of the time. As organic material fell into the water, it decayed and accumulated slowly. Montgomery and Patton soils formed in these areas.

Human activities have significantly affected the soils since the forests were cleared. Sloping areas become more susceptible to erosion when the natural plant cover is removed and the soil is cultivated. In severely eroded areas, the natural, friable surface layer is replaced by a hard, cloddy layer that has a lower organic matter content. Alluvium washing from eroding uplands has been deposited on bottom land at an accelerated rate since the forests were cleared. Soil blowing has removed much of the surface layer from sandy soils in some cultivated areas. Drainage measures have improved the aeration of wet soils and thus have accelerated the oxidation of organic matter. In some areas strip-mining has greatly changed the soils.

Processes of Soil Formation

Several processes have been involved in the formation of the soils in Greene County. These processes are the accumulation of organic matter; the dissolution, transfer, and removal of calcium carbonates and bases; the liberation and translocation of silicate clay minerals; and the reduction and transfer of iron. In most soils more than one of these processes have helped to differentiate horizons.

Some organic matter has accumulated in the surface layer of all the soils in the county. The organic matter content of some soils is low, but that of others is high. Generally, the soils that have the most organic matter, such as Montgomery soils, have a thick, dark surface soil.

Carbonates and bases have been leached from the upper horizons of nearly all the soils in the county. Leaching probably preceded the translocation of silicate clay minerals. Nearly all of the carbonates and some of the bases have been leached from the A and B horizons of well drained soils. Even in the wettest soils, some leaching is indicated by the absence of carbonates and by an acid reaction. Leaching of wet soils is slow because of a high water table or the slow movement of water through the profile.

Silicate clays accumulate in pores and on the faces of the structural units along which water moves. The leaching of bases and the translocation of silicate clays are among the more important processes of horizon differentiation in the county. Pike soils are an example of soils in which translocated silicate clays in the form of clay films have accumulated in the Bt horizon.

Gleying, or the reduction and transfer of iron, has occurred in all of the very poorly drained to somewhat poorly drained soils in the county. In the naturally wet soils, this process has significantly affected horizon differentiation. A gray color in the subsoil indicates the redistribution of iron oxide. Reduction is commonly accompanied by some transfer of the iron, either from upper horizons to lower ones or completely out of the profile. Bonnie soils are an example of soils in which iron has been reduced. Mottles, which are in some horizons, indicate the segregation of iron.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

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.

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.

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

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 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.

Bottom land. The normal flood plain of a stream, subject to flooding.

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.

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.

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.

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.

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.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

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.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

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

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.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

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.

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.

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 meltwater.

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 meltwater. 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.

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.

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

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.

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.

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.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material. (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.

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 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.

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.

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
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that 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.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

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.

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 substratum. 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.

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.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

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.

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 grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

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.

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 specifying "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.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

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 1951-74 at Elliston, Indiana)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	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----	38.4	19.5	29.0	66	-8	16	2.76	1.17	4.10	6	3.4
February---	43.4	24.1	33.8	70	-2	38	2.79	1.51	3.91	6	3.7
March------	51.7	30.5	41.2	77	11	108	3.35	1.77	4.73	7	2.2
April------	64.2	41.8	53.0	84	22	390	3.91	2.16	5.46	8	.1
May--------	74.4	50.6	62.6	92	30	701	4.57	2.84	6.13	8	.0
June-------	84.2	60.6	72.4	99	42	972	4.67	2.73	6.39	7	.0
July-------	87.5	64.1	75.8	99	49	1,110	4.04	1.95	5.84	7	.0
August-----	86.0	61.7	73.9	99	47	1,051	3.36	1.51	4.94	6	.0
September--	80.3	54.0	67.2	97	36	816	2.36	1.00	3.51	5	.0
October----	71.0	43.0	57.0	91	26	527	2.31	.77	3.56	4	.0
November---	53.8	32.3	43.0	79	10	142	3.31	1.77	4.65	6	1.4
December---	41.3	23.7	32.6	68	-3	75	3.12	1.48	4.53	7	3.2
Yearly:											
Average--	64.7	42.2	53.5	---	---	---	---	---	---	---	---
Extreme--	---	---	---	101	-13	---	---	---	---	---	---
Total----	---	---	---	---	---	5,946	40.55	37.57	45.85	77	14.0

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-74 at Elliston, Indiana)

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--	Apr. 12	Apr. 22	May 11
2 years in 10 later than--	Apr. 7	Apr. 17	May 5
5 years in 10 later than--	Mar. 27	Apr. 10	Apr. 23
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 23	Oct. 15	Oct. 4
2 years in 10 earlier than--	Oct. 27	Oct. 19	Oct. 8
5 years in 10 earlier than--	Nov. 4	Oct. 27	Oct. 16

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-74 at Elliston, Indiana)

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	202	186	156
8 years in 10	208	191	162
5 years in 10	221	199	175
2 years in 10	234	208	187
1 year in 10	240	213	193

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AlB2	Alford silt loam, 2 to 6 percent slopes, eroded	1,850	0.5
AlC2	Alford silt loam, 6 to 12 percent slopes, eroded	760	0.2
AnB	Alvin-Bloomfield complex, 2 to 6 percent slopes	3,300	0.9
AnC	Alvin-Bloomfield complex, 6 to 12 percent slopes	2,900	0.8
Ao	Ambraw sandy clay loam, rarely flooded	760	0.2
Ar	Armiesburg silt loam, occasionally flooded	630	0.2
AvB2	Ava silt loam, 2 to 6 percent slopes, eroded	31,685	9.2
Ay	Ayrshire sandy loam	3,600	1.0
Bb	Bartle silt loam	720	0.2
BcF	Berks-Ebal complex, 15 to 60 percent slopes	6,600	1.9
BfG	Berks-Rock outcrop complex, 45 to 70 percent slopes	990	0.3
BlE	Bloomfield sand, 15 to 25 percent slopes	1,450	0.4
BlG	Bloomfield sand, 35 to 60 percent slopes	560	0.2
Bo	Bonnie silt loam, frequently flooded	8,000	2.3
Br	Booker clay	3,000	0.9
Bs	Booker mucky clay	2,400	0.7
CcE2	Chetwynd silt loam, 18 to 25 percent slopes, eroded	2,100	0.6
CcF	Chetwynd silt loam, 25 to 60 percent slopes	6,000	1.7
CfC2	Cincinnati silt loam, 6 to 12 percent slopes, eroded	10,200	2.9
CfC3	Cincinnati silt loam, 6 to 12 percent slopes, severely eroded	4,050	1.2
CfD2	Cincinnati silt loam, 12 to 18 percent slopes, eroded	4,200	1.2
CfD3	Cincinnati silt loam, 12 to 18 percent slopes, severely eroded	1,400	0.4
ChC2	Cincinnati silt loam, channery substratum, 6 to 12 percent slopes, eroded	3,400	1.0
Cu	Cuba silt loam, frequently flooded	3,000	0.9
EcD	Ebal-Gilpin silt loams, 12 to 18 percent slopes	1,000	0.3
EfD2	Ebal-Wellston silt loams, 10 to 18 percent slopes, eroded	7,500	2.1
EnA	Elston loam, 0 to 2 percent slopes	1,400	0.4
Ev	Evansville silt loam, rarely flooded	2,000	0.6
FaB	Fairpoint silt loam, reclaimed, 2 to 6 percent slopes	520	0.1
FcC	Fairpoint shaly clay loam, 2 to 12 percent slopes	1,800	0.5
FcE	Fairpoint shaly clay loam, 18 to 35 percent slopes	1,700	0.5
FcG	Fairpoint very shaly loam, 35 to 90 percent slopes	12,700	3.6
GcE2	Gilpin silt loam, 18 to 25 percent slopes, eroded	2,000	0.6
GfF	Gilpin-Berks complex, 30 to 60 percent slopes	6,500	1.9
GgE	Gilpin-Ebal silt loams, 18 to 30 percent slopes	6,100	1.7
GmE	Gilpin-Wellston silt loams, 18 to 25 percent slopes	20,750	6.0
HaE2	Hagerstown silt loam, 18 to 25 percent slopes, eroded	570	0.2
Hb	Haymond silt loam, frequently flooded	17,900	5.1
Hc	Haymond silt loam, rarely flooded	840	0.2
HdA	Henshaw silt loam, 1 to 3 percent slopes	1,150	0.3
HeD2	Hickory silt loam, 12 to 18 percent slopes, eroded	2,150	0.6
HeE	Hickory silt loam, 18 to 25 percent slopes	6,200	1.8
HeG	Hickory loam, 30 to 60 percent slopes	2,850	0.8
MbB2	Markland silty clay loam, 2 to 6 percent slopes, eroded	500	0.1
MgA	McGary silt loam, 0 to 2 percent slopes	600	0.2
Mo	Montgomery silty clay loam	4,850	1.4
Mu	Muskego muck	178	0.1
Ne	Newark loam, frequently flooded	3,600	1.0
No	Nolin silt loam, occasionally flooded	1,750	0.5
Nr	Nolin silt loam, rarely flooded	1,000	0.3
PbC2	Parke silt loam, 6 to 12 percent slopes, eroded	1,000	0.3
PbD2	Parke silt loam, 12 to 18 percent slopes, eroded	2,000	0.6
Pc	Patton silty clay loam	3,600	1.0
PdB2	Pekin silt loam, 2 to 6 percent slopes, eroded	2,150	0.6
Pf	Peoga silt loam	6,000	1.7
Pg	Piankeshaw silt loam, frequently flooded	3,500	1.0
PkB2	Pike silt loam, 2 to 6 percent slopes, eroded	3,700	1.1
PkC2	Pike silt loam, 6 to 12 percent slopes, eroded	2,600	0.7
PrB	Princeton fine sandy loam, 2 to 6 percent slopes	2,400	0.7
PrC	Princeton fine sandy loam, 6 to 12 percent slopes	1,200	0.3
RaA	Reesville silt loam, 0 to 2 percent slopes	200	0.1
Rb	Rensselaer sandy loam	3,500	1.0
Rd	Rensselaer loam	3,850	1.1
RmA	Roby sandy loam, 0 to 2 percent slopes	1,000	0.3
ScA	Shakamak silt loam, 1 to 3 percent slopes	9,700	2.8

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
So	Steff silt loam, rarely flooded	1,100	0.3
Sr	Steff silt loam, frequently flooded	3,900	1.1
St	Stendal silt loam, frequently flooded	13,200	3.8
Ud	Udorthents, loamy	175	0.1
UnE	Uniontown silt loam, 18 to 30 percent slopes	1,050	0.3
VgA	Vigo silt loam, 0 to 2 percent slopes	12,800	3.7
WcA	Waupecan silt loam, rarely flooded, 0 to 2 percent slopes	860	0.2
WeD2	Wellston silt loam, 12 to 18 percent slopes, eroded	18,600	5.3
WeD3	Wellston silt loam, 12 to 18 percent slopes, severely eroded	2,900	0.8
WgD2	Wellston silt loam, karst, 6 to 18 percent slopes, eroded	1,000	0.3
Wm	Wilhite silty clay, frequently flooded	1,600	0.5
Wt	Wirt very fine sandy loam, frequently flooded	1,900	0.5
ZaA	Zanesville silt loam, 1 to 3 percent slopes	470	0.1
ZaB2	Zanesville silt loam, 2 to 6 percent slopes, eroded	11,500	3.3
ZaC2	Zanesville silt loam, 6 to 12 percent slopes, eroded	12,900	3.7
ZaC3	Zanesville silt loam, 6 to 12 percent slopes, severely eroded	4,000	1.1
Zp	Zipp silty clay	3,300	0.9
	Total	349,318	100.0

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
AlB2	Alford silt loam, 2 to 6 percent slopes, eroded
Ao	Ambraw sandy clay loam, rarely flooded (where drained)
Ar	Armiesburg silt loam, occasionally flooded
AvB2	Ava silt loam, 2 to 6 percent slopes, eroded
Ay	Ayrshire sandy loam (where drained)
Bb	Bartle silt loam (where drained)
Bo	Bonnie silt loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
Br	Booker clay (where drained)
Bs	Booker mucky clay (where drained)
Cu	Cuba silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
EnA	Elston loam, 0 to 2 percent slopes
Ev	Evansville silt loam, rarely flooded (where drained)
Hb	Haymond silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
Hc	Haymond silt loam, rarely flooded
HdA	Henshaw silt loam, 1 to 3 percent slopes
MbB2	Markland silty clay loam, 2 to 6 percent slopes, eroded
MgA	McGary silt loam, 0 to 2 percent slopes (where drained)
Mo	Montgomery silty clay loam (where drained)
Ne	Newark loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
No	Nolin silt loam, occasionally flooded
Nr	Nolin silt loam, rarely flooded
Pc	Patton silty clay loam (where drained)
PdB2	Pekin silt loam, 2 to 6 percent slopes, eroded
Pf	Peoga silt loam (where drained)
Pg	Piankeshaw silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
PkB2	Pike silt loam, 2 to 6 percent slopes, eroded
PrB	Princeton fine sandy loam, 2 to 6 percent slopes
RaA	Reesville silt loam, 0 to 2 percent slopes (where drained)
Rb	Rensselaer sandy loam (where drained)
Rd	Rensselaer loam (where drained)
RmA	Roby sandy loam, 0 to 2 percent slopes
ScA	Shakamak silt loam, 1 to 3 percent slopes
So	Steff silt loam, rarely flooded
Sr	Steff silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
St	Stendal silt loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
VgA	Vigo silt loam, 0 to 2 percent slopes (where drained)
WcA	Waupecan silt loam, rarely flooded, 0 to 2 percent slopes
Wt	Wirt very fine sandy loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
ZaA	Zanesville silt loam, 1 to 3 percent slopes
ZaB2	Zanesville silt loam, 2 to 6 percent slopes, eroded
Zp	Zipp silty clay (where drained)

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Tall fescue
		Bu	Bu	Bu	Tons	AUM*
AlB2 Alford	IIe	115	40	46	3.8	7.6
AlC2 Alford	IIIe	110	38	44	3.6	7.2
AnB		90	32	45	3.9	7.8
Alvin	IIe					
Bloomfield	IIIs					
AnC Alvin-Bloomfield	IIIe	85	30	43	3.6	7.2
Ao Ambraw	IIw	132	43	52	4.6	9.2
Ar Armiesburg	IIw	110	42	47	3.8	8.8
AvB2 Ava	IIe	105	37	41	4.0	6.8
Ay Ayrshire	IIw	115	40	46	3.8	7.6
Bb Bartle	IIw	110	38	50	3.6	7.2
BcF		---	---	---	---	---
Berks	VIIe					
Ebal	IVe					
BfG** Berks-Rock outcrop	VIIe	---	---	---	---	---
BlE Bloomfield	VIe	---	---	---	---	4.5
BlG Bloomfield	VIIe	---	---	---	---	---
Bo Bonnie	IIIw	113	37	46	4.0	8.0
Br Booker	IIIw	80	28	34	2.9	3.8
Bs Booker	IIIw	105	37	---	3.5	7.0
CcE2 Chetwynd	VIe	---	---	---	---	4.0
CcF Chetwynd	VIIe	---	---	---	---	3.2
CfC2 Cincinnati	IIIe	100	35	40	4.5	9.0

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Tall fescue
		Bu	Bu	Bu	Tons	AUM*
CfC3 Cincinnati	IVe	90	20	35	4.0	8.0
CfD2 Cincinnati	IVe	85	20	30	4.0	8.0
CfD3 Cincinnati	VIe	---	---	---	3.5	7.0
ChC2 Cincinnati	IIIe	90	27	35	4.4	8.0
Cu Cuba	IIw	105	37	41	3.5	8.0
EcD Ebal-Gilpin	IVe	82	27	36	2.3	4.6
EfD2 Ebal-Wellston	IVe	85	28	29	2.6	5.2
EnA Elston	IIs	95	33	43	3.1	6.2
Ev Evansville	IIw	145	51	58	4.8	9.6
FaB Fairpoint	IIIs	70	20	25	2.5	5.0
FcC Fairpoint	IVs	45	15	20	2.0	4.0
FcE Fairpoint	VIs	---	---	---	1.5	3.0
FcG Fairpoint	VIIe	---	---	---	---	---
GcE2 Gilpin	VIe	---	---	---	2.5	5.0
GfF Gilpin-Berks	VIIe	---	---	---	---	---
GgE Gilpin-Ebal	VIe	---	---	---	2.5	5.0
GmE Gilpin-Wellston	VIe	---	---	---	2.9	5.8
HaE2 Hagerstown	VIe	---	---	---	3.0	6.0
Hb Haymond	IIw	110	39	42	3.7	8.0
Hc Haymond	I	125	44	50	4.1	8.2
HdA Henshaw	IIw	115	40	46	4.5	9.0

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Tall fescue
		Bu	Bu	Bu	Tons	AUM*
HeD2: Hickory	IIIe	85	24	27	2.8	5.6
HeE: Hickory	VIe	---	---	---	2.4	4.8
HeG: Hickory	VIIe	---	---	---	---	---
MbB2: Markland	IIIe	80	28	36	2.6	5.2
MgA: McGary	IIIw	100	35	45	2.3	4.6
Mo: Montgomery	IIIw	120	42	48	4.0	8.0
Mu: Muskego	IVw	90	35	40	3.0	6.0
Ne: Newark	IIw	105	37	30	4.5	9.0
No: Nolin	IIw	115	38	40	4.0	8.0
Nr: Nolin	I	135	45	48	4.5	9.0
PbC2: Parke	IIIe	105	37	42	3.4	6.8
PbD2: Parke	IVe	90	32	36	3.0	6.0
Pc: Patton	IIw	148	48	56	5.6	11.2
PdB2: Pekin	IIe	95	33	43	3.1	6.2
Pf: Peoga	IIIw	125	44	50	4.1	8.2
Pg: Piankeshaw	IIs	90	31	39	3.2	6.4
PkB2: Pike	IIe	115	40	46	3.8	7.6
PkC2: Pike	IIIe	105	37	42	3.4	6.8
PrB: Princeton	IIe	100	35	45	3.3	6.6
PrC: Princeton	IIIe	90	32	40	3.0	6.0
RaA: Reesville	IIw	120	42	52	5.0	10.0

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Orchardgrass-alfalfa hay	Tall fescue
		Bu	Bu	Bu	Tons	AUM*
Rb----------------------- Rensselaer	IIw	135	50	55	5.0	10.0
Rd----------------------- Rensselaer	IIw	150	53	60	5.0	10.0
RmA---------------------- Roby	IIs	105	36	45	4.0	8.0
ScA---------------------- Shakamak	IIw	115	35	50	4.3	7.2
So----------------------- Steff	I	120	45	45	5.0	10.0
Sr----------------------- Steff	IIw	110	38	45	4.5	9.0
St----------------------- Stendal	IIw	110	38	40	3.7	7.4
Ud. Udorthents						
UnE---------------------- Uniontown	VIe	---	---	---	3.5	7.0
VgA---------------------- Vigo	IIw	110	38	50	3.6	7.2
WcA---------------------- Waupecan	I	149	50	62	5.3	10.6
WeD2--------------------- Wellston	IVe	90	32	32	3.2	6.4
WeD3--------------------- Wellston	VIe	---	---	---	3.0	6.0
WgD2--------------------- Wellston	IVe	90	32	32	3.2	6.4
Wm----------------------- Wilhite	IVw	85	30	---	2.8	5.6
Wt----------------------- Wirt	IIw	95	32	42	4.0	7.4
ZaA---------------------- Zanesville	IIw	120	40	35	3.5	7.0
ZaB2--------------------- Zanesville	IIe	85	35	35	3.5	7.0
ZaC2--------------------- Zanesville	IIIe	75	30	30	3.5	7.0
ZaC3--------------------- Zanesville	IVe	60	25	25	3.0	7.0
Zp----------------------- Zipp	IIIw	105	37	42	3.4	6.8

* 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 7.--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	3,800	---	---	---	---
II	149,395	55,265	88,230	5,900	---
III	67,600	37,610	28,150	1,840	---
IV	50,138	46,560	1,778	1,800	---
V	---	---	---	---	---
VI	44,320	42,620	---	1,700	---
VII	33,643	33,643	---	---	---
VIII	---	---	---	---	---

TABLE 8.--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: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
A1B2, A1C2: Alford	5A	Slight	Slight	Slight	Slight	White oak Yellow-poplar Sweetgum	90 98 76	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, black locust.
AnB*, AnC*:								
Alvin	4A	Slight	Slight	Slight	Slight	White oak Northern red oak Black walnut Yellow-poplar	80 80 --- 90	Green ash, black walnut, yellow-poplar, white oak, eastern white pine, American sycamore, sugar maple.
Bloomfield	4S	Slight	Slight	Moderate	Slight	Black oak White oak Scarlet oak Shagbark hickory	70 --- --- ---	Eastern white pine, red pine, eastern redcedar.
Ar: Armiesburg	8A	Slight	Slight	Slight	Slight	Yellow-poplar White oak Black walnut	100 90 70	Eastern white pine, black walnut, yellow-poplar, black locust.
AvB2: Ava	4A	Slight	Slight	Slight	Slight	White oak Northern red oak Yellow-poplar Black walnut	75 80 90 ---	Black walnut, eastern cottonwood, sweetgum, yellow-poplar, white oak, American sycamore.
Ay: Ayrshire	5A	Slight	Slight	Slight	Slight	White oak Pin oak Yellow-poplar Sweetgum	85 100 100 100	Eastern white pine, baldcypress, white ash, red maple, yellow-poplar, American sycamore.
Bb: Bartle	4A	Slight	Slight	Slight	Slight	White oak Pin oak Yellow-poplar Sweetgum	75 85 85 80	Eastern white pine, baldcypress, white ash, red maple, yellow-poplar, American sycamore.
BcF*:								
Berks	4F	Moderate	Severe	Moderate	Slight	Northern red oak Black oak Virginia pine	70 70 70	Virginia pine, eastern white pine, Japanese larch, red pine.
Ebal	4R	Moderate	Moderate	Moderate	Moderate	Black oak Northern red oak Yellow-poplar	80 --- ---	Yellow-poplar, eastern cottonwood, American sycamore, pin oak, Austrian pine, green ash, red maple, black oak.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Trees to plant
BfG*:								
Berks	4F	Moderate	Severe	Moderate	Slight	Northern red oak	70	Virginia pine, eastern white pine, Japanese larch, red pine.
						Black oak	70	
						Virginia pine	70	
Rock outcrop.								
BlE, BlG: Bloomfield	4R	Moderate	Moderate	Moderate	Slight	Black oak	70	Eastern white pine, red pine, eastern redcedar.
						White oak	---	
						Scarlet oak	---	
						Shagbark hickory	---	
Bo: Bonnie	5W	Slight	Severe	Severe	Severe	Pin oak	90	Eastern cottonwood, red maple, American sycamore, sweetgum, baldcypress, pin oak.
						Eastern cottonwood	100	
						Sweetgum	---	
						Cherrybark oak	---	
						American sycamore	---	
Br, Bs: Booker	4W	Slight	Severe	Severe	Severe	Eastern cottonwood	85	Eastern cottonwood, pin oak, green ash, baldcypress, silver maple.
CcE2: Chetwynd	7R	Moderate	Moderate	Slight	Slight	Yellow-poplar	99	Eastern white pine, black walnut, yellow-poplar, red pine.
						Northern red oak	88	
CcF: Chetwynd	7R	Severe	Severe	Slight	Slight	Yellow-poplar	99	Eastern white pine, black walnut, yellow-poplar, red pine.
						Northern red oak	88	
CfC2, CfC3: Cincinnati	4A	Slight	Slight	Slight	Slight	Northern red oak	80	Eastern white pine, black walnut, yellow-poplar, white ash, red pine, northern red oak, white oak.
						White oak	---	
						Black walnut	---	
						Black cherry	---	
						Sugar maple	---	
						White ash	---	
						Yellow-poplar	---	
CfD2, CfD3: Cincinnati	4R	Moderate	Moderate	Moderate	Slight	Northern red oak	80	Eastern white pine, black walnut, yellow-poplar, white ash, red pine, northern red oak, white oak.
						White oak	---	
						Black walnut	---	
						Black cherry	---	
						Sugar maple	---	
						White ash	---	
						Yellow-poplar	---	
ChC2: Cincinnati	4A	Slight	Slight	Slight	Slight	Northern red oak	80	Eastern white pine, black walnut, yellow-poplar, white ash, red pine, northern red oak, white oak.
						White oak	---	
						Black walnut	---	
						Black cherry	---	
						Sugar maple	---	
						White ash	---	
						Yellow-poplar	---	
Cu: Cuba	8A	Slight	Slight	Slight	Slight	Yellow-poplar	100	Eastern white pine, black walnut, yellow-poplar, black locust.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
EcD*:								
Ebal	4C	Slight	Slight	Moderate	Moderate	Black oak Northern red oak Yellow-poplar	80 --- ---	Yellow-poplar, eastern cottonwood, American sycamore, pin oak, Austrian pine, green ash, red maple, black oak.
Gilpin	4R	Moderate	Moderate	Slight	Slight	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
EfD2*:								
Ebal	4C	Slight	Slight	Moderate	Moderate	Black oak Northern red oak Yellow-poplar	80 --- ---	Yellow-poplar, eastern cottonwood, American sycamore, pin oak, Austrian pine, green ash, red maple, black oak.
Wellston	4R	Moderate	Moderate	Slight	Slight	Northern red oak Yellow-poplar Virginia pine White oak Black walnut Black cherry Sugar maple White ash	71 90 70 --- --- --- --- ---	Eastern white pine, black walnut, yellow-poplar, white oak, northern red oak, white spruce, white ash, Fraser fir, red pine, green ash, black cherry, black locust, American sycamore.
Ev Evansville	5W	Slight	Severe	Moderate	Moderate	Pin oak White oak Sweetgum	90 75 90	Eastern white pine, baldcypress, red maple, white ash, sweetgum.
FaB, FcC, FcE, FcG- Fairpoint	---	--------	--------	--------	--------		---	Eastern white pine, black locust, yellow-poplar, white spruce, blue spruce.
GcE2 Gilpin	4R	Moderate	Moderate	Slight	Slight	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
GfF*:								
Gilpin	4R	Severe	Severe	Slight	Slight	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Berks	4F	Moderate	Severe	Moderate	Slight	Northern red oak Black oak Virginia pine	70 70 70	Virginia pine, eastern white pine, Japanese larch, red pine.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Trees to plant
GgE*:								
Gilpin	4R	Moderate	Moderate	Slight	Slight	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Ebal	4R	Moderate	Moderate	Moderate	Moderate	Black oak Northern red oak Yellow-poplar	80 --- ---	Yellow-poplar, eastern cottonwood, American sycamore, pin oak, Austrian pine, green ash, red maple, black oak.
GmE*:								
Gilpin	4R	Moderate	Moderate	Slight	Slight	Northern red oak Yellow-poplar	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
Wellston	4R	Moderate	Moderate	Slight	Slight	Northern red oak Yellow-poplar Virginia pine White oak Black walnut Black cherry Sugar maple White ash	71 90 70 --- --- --- --- ---	Eastern white pine, black walnut, yellow-poplar, white oak, northern red oak, white spruce, white ash, Fraser fir, red pine, green ash, black cherry, black locust, American sycamore.
HaE2 Hagerstown	5C	Moderate	Severe	Slight	Slight	Northern red oak Yellow-poplar	85 95	Black walnut, yellow-poplar, eastern white pine.
Hb, Hc Haymond	8A	Slight	Slight	Slight	Slight	Yellow-poplar White oak Black walnut	100 90 70	Eastern white pine, black walnut, yellow-poplar, black locust.
HdA Henshaw	5W	Slight	Moderate	Slight	Severe	Pin oak Green ash Sweetgum Hackberry American sycamore White oak Red maple	95 --- 95 --- --- --- ---	Green ash, sweetgum, eastern cottonwood, yellow-poplar, eastern white pine.
HeD2 Hickory	5A	Slight	Slight	Slight	Slight	White oak Northern red oak Black oak Green ash Bitternut hickory Yellow-poplar	85 85 --- --- --- 95	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
HeE Hickory	5R	Moderate	Moderate	Slight	Slight	White oak Northern red oak Black oak Green ash Bitternut hickory Yellow-poplar	85 85 --- --- --- 95	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Trees to plant
HeG---------------- Hickory	5R	Severe	Severe	Slight	Slight	White oak----------- Northern red oak---- Black oak----------- Green ash----------- Bitternut hickory--- Yellow-poplar-------	85 85 --- --- --- 95	Eastern white pine, red pine, yellow-poplar, sugar maple, white oak, black walnut.
MbB2--------------- Markland	4C	Slight	Slight	Severe	Severe	White oak----------- Northern red oak----	75 78	Eastern white pine, red pine, yellow-poplar, white ash.
MgA---------------- McGary	4W	Slight	Moderate	Severe	Severe	White oak----------- Pin oak------------- Yellow-poplar------- Sweetgum------------	70 85 85 80	Eastern white pine, baldcypress, white ash, red maple, yellow-poplar, American sycamore.
Mo----------------- Montgomery	5W	Slight	Severe	Severe	Severe	Pin oak------------- White oak----------- Sweetgum------------	88 75 90	Eastern white pine, baldcypress, red maple, white ash, sweetgum.
Mu----------------- Muskego	3W	Slight	Severe	Severe	Severe	Tamarack------------ Red maple----------- White ash----------- Green ash----------- Black willow-------- Quaking aspen------- Silver maple--------	50 51 52 --- --- 56 ---	
Ne----------------- Newark	5W	Slight	Moderate	Slight	Moderate	Pin oak------------- Eastern cottonwood-- Sweetgum------------ Green ash-----------	96 89 85 ---	Eastern cottonwood, sweetgum, American sycamore.
No, Nr------------- Nolin	8A	Slight	Slight	Slight	Slight	Sweetgum------------ Yellow-poplar------- Cherrybark oak------ Eastern cottonwood-- American sycamore--- River birch---------	92 107 97 --- --- ---	Yellow-poplar, eastern white pine, eastern cottonwood, white ash, sweetgum.
PbC2, PbD2--------- Parke	5A	Slight	Slight	Slight	Slight	White oak----------- Yellow-poplar-------	90 98	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, black locust, northern red oak, green ash, black cherry, American sycamore, eastern cottonwood, white oak.
Pc----------------- Patton	5W	Slight	Severe	Moderate	Moderate	Pin oak------------- White oak----------- Sweetgum------------ Northern red oak----	85 75 80 75	Eastern white pine, baldcypress, red maple, white ash, sweetgum.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
PdB2---------------- Pekin	4A	Slight	Slight	Slight	Slight	White oak----------- Yellow-poplar------- Virginia pine------- Sugar maple----------	70 85 75 75	Eastern white pine, shortleaf pine, red pine, yellow-poplar, white ash.
Pf----------------- Peoga	5W	Slight	Severe	Severe	Moderate	Pin oak------------ White oak----------- Sweetgum------------	90 75 90	Eastern white pine, baldcypress, red maple, white ash, sweetgum.
Pg----------------- Piankeshaw	7A	Slight	Slight	Slight	Slight	Yellow-poplar------- Eastern cottonwood-- American sycamore--- Sweetgum------------ Southern red oak----	95 105 --- --- ---	Black walnut, white oak, yellow-poplar, northern red oak, white ash, green ash, eastern white pine, red pine, black cherry, black locust, American sycamore, eastern cottonwood.
PkB2, PkC2--------- Pike	5A	Slight	Slight	Slight	Slight	White oak----------- Yellow-poplar------- Sweetgum------------	90 98 76	Eastern white pine, red pine, black walnut, black locust, yellow-poplar, white ash.
PrB, PrC----------- Princeton	5A	Slight	Slight	Slight	Slight	White oak----------- Yellow-poplar------- Sweetgum------------	90 98 76	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, black locust.
RaA---------------- Reesville	4W	Slight	Moderate	Slight	Slight	Northern red oak---- Yellow-poplar------- Sugar maple--------- Green ash----------- Swamp white oak----- Black cherry-------- Red maple----------- Pin oak------------ Eastern cottonwood--	76 86 90 --- --- --- --- --- ---	Red maple, silver maple, pin oak, sweetgum, red pine, swamp white oak, baldcypress, green ash, eastern cottonwood, American sycamore.
Rb, Rd------------- Rensselaer	5W	Slight	Severe	Severe	Severe	Pin oak------------ White oak----------- Sweetgum------------ Northern red oak----	86 75 90 76	Eastern white pine, baldcypress, sweetgum, red maple, white ash.
RmA---------------- Roby	4A	Slight	Slight	Slight	Slight	White oak----------- Northern red oak---- Yellow-poplar------- Black walnut--------	80 80 90 ---	Black walnut, eastern cottonwood, American sycamore, yellow-poplar, white oak, eastern white pine.
ScA---------------- Shakamak	4A	Slight	Slight	Slight	Slight	White oak----------- Yellow-poplar------- Sugar maple---------	75 90 70	Eastern white pine, red pine, shortleaf pine, yellow-poplar, white ash.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Trees to plant
So, Sr: Steff	8A	Slight	Slight	Slight	Slight	Yellow-poplar	107	Yellow-poplar, eastern white pine, sweetgum, black walnut, white oak, white ash, northern red oak, shortleaf pine.
						River birch	---	
						Silver maple	---	
						American sycamore	---	
						Black oak	88	
						White oak	---	
						Sweetgum	100	
						White ash	---	
						Red maple	---	
						Blackgum	---	
St: Stendal	5W	Slight	Moderate	Slight	Slight	Pin oak	90	Eastern white pine, baldcypress, American sycamore, red maple, white ash.
						Sweetgum	85	
						Yellow-poplar	90	
						Virginia pine	90	
UnE: Uniontown	6R	Moderate	Moderate	Slight	Slight	Yellow-poplar	89	Yellow-poplar, black walnut, white ash, white oak, northern red oak, eastern white pine, sweetgum.
						Northern red oak	83	
						Black oak	82	
						Shumard oak	83	
						Sweetgum	79	
						Hickory	---	
						White oak	---	
VgA: Vigo	5W	Slight	Severe	Moderate	Moderate	Pin oak	90	Eastern white pine, baldcypress, red maple, sweetgum, white ash.
						Eastern cottonwood	100	
						Sweetgum	90	
						American sycamore	---	
						White oak	---	
						Northern red oak	---	
WeD2, WeD3, WgD2: Wellston	4R	Moderate	Moderate	Slight	Slight	Northern red oak	71	Eastern white pine, black walnut, yellow-poplar, white oak, northern red oak, white spruce, white ash, Fraser fir, red pine, green ash, black cherry, black locust, American sycamore.
						Yellow-poplar	90	
						Virginia pine	70	
						White oak	---	
						Black walnut	---	
						Black cherry	---	
						Sugar maple	---	
						White ash	---	
Wm: Wilhite	5W	Slight	Severe	Severe	Severe	Pin oak	86	Eastern white pine, baldcypress, sweetgum, red maple, white ash.
						White oak	75	
						Sweetgum	90	
Wt: Wirt	7A	Slight	Slight	Slight	Slight	Yellow-poplar	95	Eastern white pine, black walnut, yellow-poplar, black locust.
ZaA, ZaB2, ZaC2: Zanesville	7A	Slight	Slight	Slight	Slight	Virginia pine	66	Yellow-poplar, white ash, white oak, northern red oak, eastern white pine, shortleaf pine.
						Black oak	75	
						White oak	69	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
ZaC3: Zanesville	6D	Slight	Slight	Moderate	Moderate	Virginia pine Black oak White oak Scarlet oak Black locust Post oak	60 60 60 --- --- ---	Virginia pine, shortleaf pine, eastern white pine, white oak.
Zp: Zipp	5W	Slight	Severe	Severe	Severe	Pin oak White oak Sweetgum	88 75 90	Eastern white pine, baldcypress, red maple, white ash, sweetgum.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
AlB2, AlC2-------- Alford	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
AnB*, AnC*: Alvin------------	---	Amur privet, Washington hawthorn, Amur honeysuckle, American cranberrybush, Tatarian honeysuckle.	Austrian pine, northern white-cedar, osageorange, eastern redcedar.	Eastern white pine, red pine, Norway spruce.	---
Bloomfield-------	Siberian peashrub	Radiant crabapple, eastern redcedar, autumn-olive, Washington hawthorn, Amur honeysuckle, lilac, Tatarian honeysuckle.	Austrian pine, jack pine, red pine.	Eastern white pine	---
Ao---------------- Ambraw	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
Ar---------------- Armiesburg	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
AvB2-------------- Ava	---	Washington hawthorn, Amur privet, eastern redcedar, Tatarian honeysuckle, arrowwood, Amur honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
Ay---------------- Ayrshire	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Bb----------------- Bartle	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
BcF*:					
Berks-------------	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
Ebal-------------	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
BfG*:					
Berks-------------	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
Rock outcrop.					
BlE, BlG---------- Bloomfield	Siberian peashrub	Radiant crabapple, eastern redcedar, autumn-olive, Washington hawthorn, Amur honeysuckle, lilac, Tatarian honeysuckle.	Austrian pine, jack pine, red pine.	Eastern white pine	---
Bo----------------- Bonnie	---	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	White fir, blue spruce, Washington hawthorn, northern white-cedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
Br, Bs: Booker	---	Amur honeysuckle, silky dogwood, American cranberrybush, Amur privet.	Washington hawthorn, white fir, blue spruce, northern white-cedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
CcE2, CcF: Chetwynd	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.
CfC2, CfC3, CfD2, CfD3, ChC2: Cincinnati	---	Eastern redcedar, Washington hawthorn, Tatarian honeysuckle, Amur privet, Amur honeysuckle, arrowwood, American cranberrybush.	Green ash, Austrian pine, osageorange.	Pin oak, eastern white pine.	---
Cu: Cuba	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
EcD*: Ebal	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
Gilpin	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
EfD2*:					
Ebal	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
Wellston	---	Amur honeysuckle, Amur privet, American cranberrybush, silky dogwood.	White fir, northern white-cedar, blue spruce, Washington hawthorn.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.
EnA Elston	---	Amur honeysuckle, Amur privet, American cranberrybush, Washington hawthorn, Tatarian honeysuckle.	Austrian pine, eastern redcedar, northern white-cedar, osageorange.	Eastern white pine, Norway spruce, red pine.	---
Ev Evansville	---	Amur honeysuckle, Amur privet, American cranberrybush, silky dogwood.	Northern white-cedar, Norway spruce, Austrian pine, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
FaB, FcC, FcE, FcG. Fairpoint					
GcE2 Gilpin	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
GfF*:					
Gilpin	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
GfF*:					
Berks	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
GgE*:					
Gilpin	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
Ebal	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
GmE*:					
Gilpin	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle, lilac, autumn-olive, Washington hawthorn, radiant crabapple, eastern redcedar.	Jack pine, Austrian pine, red pine, eastern white pine.	---	---
Wellston	---	Amur honeysuckle, Amur privet, American cranberrybush, silky dogwood.	White fir, northern white-cedar, blue spruce, Washington hawthorn.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.
HaE2 Hagerstown	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern white-cedar, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
Hb, Hc Haymond	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
HdA: Henshaw	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern white-cedar, white fir, Austrian pine.	Norway spruce	Pin oak, eastern white pine.
HeD2, HeE, HeG: Hickory	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
MbB2: Markland	---	Arrowwood, Washington hawthorn, eastern redcedar, Amur honeysuckle, American cranberrybush, Tatarian honeysuckle, Amur privet.	Austrian pine, green ash, osageorange.	Eastern white pine	---
MgA: McGary	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
Mo: Montgomery	---	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Northern white-cedar, Norway spruce, Austrian pine, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
Mu: Muskego	Common ninebark, whitebelle honeysuckle.	Amur privet, nannyberry viburnum, silky dogwood, Tatarian honeysuckle, Amur honeysuckle.	Tall purple willow	Golden willow, black willow.	Imperial Carolina poplar.
Ne: Newark	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern white-cedar, white fir, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
No, Nr. Nolin	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern white-cedar, white fir, Austrian pine.	Norway spruce	Pin oak, eastern white pine.
PbC2, PbD2. Parke	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern white-cedar, blue spruce, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
Pc. Patton	---	Amur privet, silky dogwood, American cranberrybush, Amur honeysuckle.	White fir, northern white-cedar, blue spruce, Austrian pine, Washington hawthorn, Norway spruce.	Eastern white pine	Pin oak.
PdB2. Pekin	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
Pf. Peoga	---	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	Northern white-cedar, Norway spruce, Austrian pine, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
Pg. Piankeshaw	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
PkB2, PkC2. Pike	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern white-cedar, blue spruce, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
PrB, PrC. Princeton	---	Washington hawthorn, Amur honeysuckle, American cranberrybush, Amur privet, Tatarian honeysuckle.	Eastern redcedar, Austrian pine, osageorange, northern white-cedar.	Eastern white pine, Norway spruce, red pine.	---
RaA. Reesville	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Rb, Rd. Rensselaer	---	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	Northern white-cedar, Norway spruce, Austrian pine, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
RmA. Roby	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush, Washington hawthorn.	Austrian pine, white fir, blue spruce, northern white-cedar.	Norway spruce	Eastern white pine, pin oak.
ScA. Shakamak	---	Arrowwood, eastern redcedar, Washington hawthorn, Amur honeysuckle, American cranberrybush, Amur privet, Tatarian honeysuckle.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
So, Sr. Steff	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern white-cedar, white fir, Austrian pine.	Norway spruce	Pin oak, eastern white pine.
St. Stendal	---	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	Northern white-cedar, Austrian pine, white fir, blue spruce, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
Ud. Udorthents					

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
UnE: Uniontown	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, blue spruce, northern white-cedar, white fir.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.
VgA: Vigo	---	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	Northern white-cedar, Norway spruce, Austrian pine, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
WcA: Waupecan	---	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern white-cedar, blue spruce, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
WeD2, WeD3, WgD2: Wellston	---	Amur honeysuckle, Amur privet, American cranberrybush, silky dogwood.	White fir, northern white-cedar, blue spruce, Washington hawthorn.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.
Wm: Wilhite	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern white-cedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.
Wt: Wirt	---	Amur honeysuckle, American cranberrybush, Amur privet, silky dogwood.	Austrian pine, white fir, blue spruce, northern white-cedar, Washington hawthorn.	Norway spruce	Eastern white pine, pin oak.
ZaA, ZaB2, ZaC2, ZaC3: Zanesville	---	American cranberrybush, Amur honeysuckle, Tatarian honeysuckle, Amur privet, arrowwood, Washington hawthorn, eastern redcedar.	Hackberry, osageorange, Austrian pine.	Pin oak, eastern white pine.	---
Zp: Zipp	---	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	Northern white-cedar, Norway spruce, Austrian pine, blue spruce, white fir, Washington hawthorn.	Eastern white pine	Pin oak.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--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
AlB2------------------ Alford	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
AlC2------------------ Alford	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
AnB*:					
Alvin----------------	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
Bloomfield-----------	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
AnC*:					
Alvin----------------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
Bloomfield-----------	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
Ao-------------------- Ambraw	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Ar-------------------- Armiesburg	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding.
AvB2------------------ Ava	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight----------	Slight.
Ay-------------------- Ayrshire	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Bb-------------------- Bartle	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
BcF*:					
Berks----------------	Severe: slope, small stones.	Severe: small stones, slope.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
Ebal-----------------	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Severe: slope.
BfG*:					
Berks----------------	Severe: slope, small stones.	Severe: small stones, slope.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
Rock outcrop.					
BlE------------------- Bloomfield	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
BlG------------------ Bloomfield	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bo------------------- Bonnie	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
Br, Bs--------------- Booker	Severe: ponding, percs slowly, too clayey.	Severe: too clayey, percs slowly, ponding.	Severe: too clayey, ponding, percs slowly.	Severe: too clayey, ponding.	Severe: too clayey, ponding.
CcE2----------------- Chetwynd	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
CcF------------------ Chetwynd	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CfC2, CfC3----------- Cincinnati	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
CfD2, CfD3----------- Cincinnati	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
ChC2----------------- Cincinnati	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Cu------------------- Cuba	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
EcD*:					
Ebal-----------------	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Severe: slope.
Gilpin---------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
EfD2*:					
Ebal-----------------	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Severe: slope.
Wellston-------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
EnA------------------ Elston	Slight---------	Slight---------	Slight---------	Slight---------	Slight.
Ev------------------- Evansville	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
FaB------------------ Fairpoint	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Severe: erodes easily.	Moderate: droughty.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
FcC------------------- Fairpoint	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: erodes easily.	Severe: small stones, droughty.
FcE------------------- Fairpoint	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: erodes easily.	Severe: small stones, droughty, slope.
FcG------------------- Fairpoint	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, erodes easily.	Severe: small stones, droughty, slope.
GcE2------------------ Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
GfF*:					
Gilpin---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Berks----------------	Severe: slope.	Severe: small stones.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
GgE*:					
Gilpin---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ebal-----------------	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Severe: slope.
GmE*:					
Gilpin---------------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Wellston-------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
HaE2------------------ Hagerstown	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Hb-------------------- Haymond	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
Hc-------------------- Haymond	Severe: flooding.	Slight----------	Slight----------	Slight----------	Slight.
HdA------------------- Henshaw	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Severe: erodes easily.	Moderate: wetness.
HeD2------------------ Hickory	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
HeE------------------- Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
HeG------------------- Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
MbB2: Markland	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
MgA: McGary	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Mo: Montgomery	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Mu: Muskego	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Ne: Newark	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness, erodes easily.	Severe: wetness, flooding.
No: Nolin	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
Nr: Nolin	Severe: flooding.	Slight	Slight	Slight	Slight.
PbC2: Parke	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
PbD2: Parke	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Pc: Patton	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
PdB2: Pekin	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight	Slight.
Pf: Peoga	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Pg: Piankeshaw	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
PkB2: Pike	Slight	Slight	Moderate: slope.	Slight	Slight.
PkC2: Pike	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
PrB: Princeton	Slight	Slight	Moderate: slope.	Slight	Slight.
PrC: Princeton	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
RaA: Reesville	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
Rb, Rd: Rensselaer	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
RmA------------------ Roby	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
ScA------------------ Shakamak	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness.
So------------------- Steff	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Severe: erodes easily.	Moderate: wetness.
Sr------------------- Steff	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Severe: erodes easily.	Severe: flooding.
St------------------- Stendal	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: flooding, wetness.	Severe: flooding.
Ud. Udorthents					
UnE------------------ Uniontown	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
VgA------------------ Vigo	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
WcA------------------ Waupecan	Severe: flooding.	Slight----------	Slight----------	Slight----------	Slight.
WeD2, WeD3----------- Wellston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
WgD2----------------- Wellston	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Wm------------------- Wilhite	Severe: flooding, ponding, percs slowly.	Severe: ponding, too clayey, percs slowly.	Severe: too clayey, ponding, flooding.	Severe: ponding, too clayey.	Severe: ponding, flooding, too clayey.
Wt------------------- Wirt	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
ZaA------------------ Zanesville	Moderate: percs slowly, wetness.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: erodes easily.	Slight.
ZaB2----------------- Zanesville	Moderate: percs slowly, wetness.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Slight.
ZaC2, ZaC3----------- Zanesville	Moderate: slope, percs slowly, wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Zp------------------- Zipp	Severe: ponding, percs slowly, too clayey.	Severe: ponding, too clayey, percs slowly.	Severe: too clayey, ponding, percs slowly.	Severe: ponding, too clayey.	Severe: ponding, too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--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
A1B2---------------Alford	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
A1C2---------------Alford	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AnB*:										
Alvin-------------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Bloomfield--------	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
AnC*:										
Alvin-------------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Bloomfield--------	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Ao-----------------Ambraw	Good	Fair	Good	Good	Fair	Good	Good	Good	Good	Good.
Ar-----------------Armiesburg	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
AvB2---------------Ava	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Ay-----------------Ayrshire	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Bb-----------------Bartle	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
BcF*:										
Berks-------------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Ebal--------------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BfG*:										
Berks-------------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop.										
BlE, BlG-----------Bloomfield	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Bo-----------------Bonnie	Poor	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Good.
Br, Bs-------------Booker	Fair	Fair	Fair	Fair	Poor	Good	Good	Fair	Fair	Fair.

See footnote at end of table.

TABLE 11.--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
CcE2 Chetwynd	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CcF Chetwynd	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CfC2, CfC3 Cincinnati	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CfD2, CfD3 Cincinnati	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
ChC2 Cincinnati	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Cu Cuba	Poor	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
EcD*:										
Ebal	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
EfD2*:										
Ebal	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Wellston	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
EnA Elston	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ev Evansville	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
FaB Fairpoint	Fair	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
FcC Fairpoint	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.
FcE, FcG Fairpoint	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
GcE2 Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
GfF*:										
Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Berks	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
GgE*:										
Gilpin	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 11.--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
GgE*:										
Ebal	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GmE*:										
Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Wellston	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
HaE2 Hagerstown	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Hb Haymond	Poor	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
Hc Haymond	Good	Good	Fair	Good	Good	Poor	Poor	Good	Good	Poor.
HdA Henshaw	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
HeD2 Hickory	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HeE Hickory	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
HeG Hickory	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
MbB2 Markland	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MgA McGary	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Mo Montgomery	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Mu Muskego	Good	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Ne Newark	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
No, Nr Nolin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
PbC2 Parke	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
PbD2 Parke	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Pc Patton	Good	Good	Good	Fair	Fair	Good	Good	Good	Fair	Good.

See footnote at end of table.

TABLE 11.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
PdB2: Pekin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Pf: Peoga	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Pg: Piankeshaw	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
PkB2: Pike	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
PkC2: Pike	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
PrB: Princeton	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
PrC: Princeton	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
RaA: Reesville	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Rb, Rd: Rensselaer	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
RmA: Roby	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
ScA: Shakamak	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
So, Sr: Steff	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
St: Stendal	Fair	Good	Fair	Good	Good	Good	Fair	Fair	Good	Fair.
Ud. Udorthents										
UnE: Uniontown	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
VgA: Vigo	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
WcA: Waupecan	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WeD2, WeD3: Wellston	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
WgD2: Wellston	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Wm: Wilhite	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.

See footnote at end of table.

TABLE 11.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Wt----------------- Wirt	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
ZaA---------------- Zanesville	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
ZaB2--------------- Zanesville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ZaC2, ZaC3--------- Zanesville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Zp----------------- Zipp	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--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
AlB2: Alford	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
AlC2: Alford	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
AnB*:						
Alvin	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight.
Bloomfield	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty, too sandy.
AnC*:						
Alvin	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Bloomfield	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty, too sandy.
Ao: Ambraw	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, frost action, ponding.	Severe: ponding.
Ar: Armiesburg	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.	Moderate: flooding.
AvB2: Ava	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Slight.
Ay: Ayrshire	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
Bb: Bartle	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
BcF*:						
Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Ebal	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.

See footnote at end of table.

TABLE 12.--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
BfG*:						
Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Rock outcrop.						
BlE, BlG: Bloomfield	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bo: Bonnie	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.
Br, Bs: Booker	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, shrink-swell, ponding.	Severe: too clayey, ponding.
CcE2, CcF: Chetwynd	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CfC2, CfC3: Cincinnati	Moderate: dense layer, wetness, slope.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
CfD2, CfD3: Cincinnati	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
ChC2: Cincinnati	Moderate: dense layer, wetness, slope.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
Cu: Cuba	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.	Severe: flooding.
EcD*:						
Ebal	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
EfD2*:						
Ebal	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.

See footnote at end of table.

TABLE 12.--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
EfD2*:						
Wellston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
EnA Elston	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Slight.
Ev Evansville	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
FaB Fairpoint	Moderate: large stones.	Moderate: shrink-swell.	Moderate: shrink-swell, large stones.	Moderate: shrink-swell, slope.	Moderate: frost action, shrink-swell.	Moderate: droughty.
FcC Fairpoint	Moderate: large stones.	Moderate: shrink-swell, large stones.	Moderate: shrink-swell, large stones.	Moderate: shrink-swell, slope, large stones.	Moderate: frost action, shrink-swell.	Severe: small stones, droughty.
FcE, FcG Fairpoint	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: small stones, droughty, slope.
GcE2 Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GfF*:						
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Berks	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
GgE*:						
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ebal	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
GmE*:						
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wellston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
HaE2 Hagerstown	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Hb Haymond	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.	Severe: flooding.

See footnote at end of table.

TABLE 12.--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
Hc----------------- Haymond	Slight---------	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: frost action.	Slight.
HdA---------------- Henshaw	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
HeD2, HeE, HeG---- Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
MbB2--------------- Markland	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
MgA---------------- McGary	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness.
Mo----------------- Montgomery	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, shrink-swell.	Severe: ponding.
Mu----------------- Muskego	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
Ne----------------- Newark	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
No----------------- Nolin	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.	Moderate: flooding.
Nr----------------- Nolin	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, frost action.	Slight.
PbC2--------------- Parke	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
PbD2--------------- Parke	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
Pc----------------- Patton	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
PdB2--------------- Pekin	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength, frost action.	Slight.

See footnote at end of table.

TABLE 12.--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
Pf---------------- Peoga	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
Pg---------------- Piankeshaw	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
PkB2-------------- Pike	Slight---------	Slight---------	Slight---------	Moderate: slope.	Severe: low strength, frost action.	Slight.
PkC2-------------- Pike	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
PrB--------------- Princeton	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.
PrC--------------- Princeton	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
RaA--------------- Reesville	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
Rb, Rd------------ Rensselaer	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
RmA--------------- Roby	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness, droughty.
ScA--------------- Shakamak	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Moderate: wetness.
So---------------- Steff	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, frost action.	Moderate: wetness.
Sr---------------- Steff	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding, frost action.	Severe: flooding.
St---------------- Stendal	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action, low strength.	Severe: flooding.
Ud. Udorthents						
UnE--------------- Uniontown	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.

See footnote at end of table.

TABLE 12.--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
VgA: Vigo	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
WcA: Waupecan	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, frost action.	Slight.
WeD2, WeD3: Wellston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
WgD2: Wellston	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Severe: frost action.	Moderate: slope.
Wm: Wilhite	Severe: ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding, too clayey.
Wt: Wirt	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
ZaA: Zanesville	Moderate: depth to rock, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: low strength, frost action.	Slight.
ZaB2: Zanesville	Moderate: depth to rock, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Severe: low strength, frost action.	Slight.
ZaC2, ZaC3: Zanesville	Moderate: slope, wetness, depth to rock.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
Zp: Zipp	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: low strength, ponding, shrink-swell.	Severe: ponding, too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--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
AlB2----------------- Alford	Slight-----------	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
AlC2----------------- Alford	Moderate: slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
AnB*:					
Alvin---------------	Slight-----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: thin layer.
Bloomfield----------	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
AnC*:					
Alvin---------------	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope, thin layer.
Bloomfield----------	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Ao------------------- Ambraw	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
Ar------------------- Armiesburg	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Poor: hard to pack.
AvB2----------------- Ava	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
Ay------------------- Ayrshire	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
Bb------------------- Bartle	Severe: wetness, percs slowly.	Slight-----------	Severe: wetness.	Severe: wetness.	Poor: wetness.
BcF*:					
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, depth to rock.
Ebal----------------	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.

See footnote at end of table.

TABLE 13.--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
BfG*:					
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, depth to rock.
Rock outcrop.					
BlE, BlG Bloomfield	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
Bo Bonnie	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.
Br, Bs Booker	Severe: ponding, percs slowly.	Slight	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
CcE2, CcF Chetwynd	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
CfC2, CfC3 Cincinnati	Severe: wetness, percs slowly.	Severe: slope.	Moderate: wetness, slope, too clayey.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
CfD2, CfD3 Cincinnati	Severe: wetness, percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
ChC2 Cincinnati	Severe: wetness, percs slowly.	Severe: slope.	Moderate: wetness, slope, too clayey.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
Cu Cuba	Severe: flooding.	Severe: flooding.	Severe: flooding, too sandy.	Severe: flooding.	Good.
EcD*:					
Ebal	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Gilpin	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.

See footnote at end of table.

TABLE 13.--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
EfD2*:					
Ebal	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Wellston	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
EnA Elston	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage.
Ev Evansville	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: hard to pack, ponding.
FaB Fairpoint	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey, large stones.	Slight	Poor: small stones.
FcC Fairpoint	Severe: percs slowly.	Severe: slope.	Moderate: too clayey, large stones.	Slight	Poor: small stones.
FcE, FcG Fairpoint	Severe: percs slowly, slope, slippage.	Severe: slope.	Severe: slope, slippage.	Severe: slope.	Poor: small stones, slope.
GcE2 Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, thin layer, depth to rock.
GfF*:					
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, thin layer, depth to rock.
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, depth to rock.
GgE*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Ebal	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
GmE*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Wellston	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.

TABLE 13.--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
HaE2: Hagerstown	Severe: slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Hb: Haymond	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
Hc: Haymond	Moderate: flooding.	Moderate: seepage.	Moderate: flooding.	Moderate: flooding.	Good.
HdA: Henshaw	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
HeD2, HeE, HeG: Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
MbB2: Markland	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
MgA: McGary	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Mo: Montgomery	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
Mu: Muskego	Severe: ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: ponding, excess humus.	Severe: seepage, ponding.	Poor: hard to pack, ponding.
Ne: Newark	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
No: Nolin	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey.
Nr: Nolin	Moderate: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
PbC2: Parke	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
PbD2: Parke	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Pc: Patton	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
PdB2: Pekin	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.

See footnote at end of table.

TABLE 13.--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
Pf------------------ Peoga	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Pg------------------ Piankeshaw	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Poor: small stones.
PkB2---------------- Pike	Slight-----------	Moderate: seepage, slope.	Severe: seepage.	Slight-----------	Good.
PkC2---------------- Pike	Moderate: slope.	Severe: slope.	Severe: seepage.	Moderate: slope.	Fair: slope.
PrB----------------- Princeton	Slight-----------	Severe: seepage.	Severe: seepage.	Slight-----------	Good.
PrC----------------- Princeton	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: slope.
RaA----------------- Reesville	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Rb, Rd-------------- Rensselaer	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
RmA----------------- Roby	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
ScA----------------- Shakamak	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: wetness.
So------------------ Steff	Severe: wetness.	Severe: flooding, wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Fair: too clayey, wetness.
Sr------------------ Steff	Severe: flooding, wetness.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness, seepage.	Severe: flooding, wetness, seepage.	Fair: too clayey, wetness.
St------------------ Stendal	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Ud. Udorthents					
UnE----------------- Uniontown	Severe: wetness, slope.	Severe: wetness, slope.	Severe: wetness, slope.	Severe: slope.	Poor: slope.
VgA----------------- Vigo	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack, wetness.

See footnote at end of table.

TABLE 13.--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
WcA: Waupecan	Moderate: flooding.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey, thin layer.
WeD2, WeD3: Wellston	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
WgD2: Wellston	Moderate: percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: slope.	Fair: too clayey, slope.
Wm: Wilhite	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, ponding.
Wt: Wirt	Severe: flooding.	Severe: seepage, flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Good.
ZaA, ZaB2: Zanesville	Severe: percs slowly, wetness.	Severe: wetness.	Severe: depth to rock.	Moderate: wetness.	Fair: too clayey.
ZaC2, ZaC3: Zanesville	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: depth to rock.	Moderate: slope, wetness.	Fair: slope, too clayey.
Zp: Zipp	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--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
AlB2: Alford	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
AlC2: Alford	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
AnB*:				
Alvin	Good	Probable	Improbable: too sandy.	Fair: too sandy.
Bloomfield	Good	Probable	Improbable: too sandy.	Poor: too sandy.
AnC*:				
Alvin	Good	Probable	Improbable: too sandy.	Fair: too sandy, slope.
Bloomfield	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Ao: Ambraw	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Ar: Armiesburg	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
AvB2: Ava	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Ay: Ayrshire	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Bb: Bartle	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
BcF*:				
Berks	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Ebal	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
BfG*:				
Berks	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Rock outcrop.				
BlE: Bloomfield	Fair: slope.	Probable	Improbable: too sandy.	Poor: slope.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
BlG: Bloomfield	Poor: slope.	Probable	Improbable: too sandy.	Poor: slope.
Bo: Bonnie	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Br, Bs: Booker	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
CcE2: Chetwynd	Fair: slope.	Probable	Improbable: too sandy.	Poor: slope.
CcF: Chetwynd	Poor: slope.	Probable	Improbable: too sandy.	Poor: slope.
CfC2, CfC3: Cincinnati	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, slope.
CfD2, CfD3: Cincinnati	Fair: low strength, wetness, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
ChC2: Cincinnati	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, slope.
Cu: Cuba	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
EcD*:				
Ebal	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Gilpin	Fair: thin layer, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
EfD2*:				
Ebal	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Wellston	Fair: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
EnA: Elston	Good	Probable	Improbable: too sandy.	Fair: small stones, area reclaim.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ev------ Evansville	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
FaB------ Fairpoint	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
FcC------ Fairpoint	Fair: large stones, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
FcE------ Fairpoint	Fair: large stones, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
FcG------ Fairpoint	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
GcE2------ Gilpin	Fair: thin layer, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
GfF*:				
Gilpin------	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Berks------	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
GgE*:				
Gilpin------	Fair: thin layer, slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Ebal------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
GmE*:				
Gilpin------	Fair: thin layer, slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Wellston------	Fair: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
HaE2------ Hagerstown	Poor: low strength, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Hb, Hc------ Haymond	Good------	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
HdA: Henshaw	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
HeD2: Hickory	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
HeE: Hickory	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
HeG: Hickory	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
MbB2: Markland	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
MgA: McGary	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Mo: Montgomery	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Mu: Muskego	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
Ne: Newark	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
No, Nr: Nolin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
PbC2: Parke	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
PbD2: Parke	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Pc: Patton	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
PdB2: Pekin	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Pf: Peoga	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Pg: Piankeshaw	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
PkB2: Pike	Good	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
PkC2 Pike	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
PrB Princeton	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
PrC Princeton	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
RaA Reesville	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Rb, Rd Rensselaer	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
RmA Roby	Fair: wetness.	Probable	Improbable: too sandy.	Poor: thin layer.
ScA Shakamak	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
So, Sr Steff	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
St Stendal	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Ud. Udorthents				
UnE Uniontown	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
VgA Vigo	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
WcA Waupecan	Good	Probable	Probable	Poor: area reclaim.
WeD2, WeD3 Wellston	Fair: depth to rock, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
WgD2 Wellston	Fair: depth to rock, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Wm Wilhite	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Wt Wirt	Good	Improbable: excess fines.	Improbable: excess fines.	Good.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
ZaA, ZaB2, ZaC2, ZaC3- Zanesville	Severe: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Zp-------------------- Zipp	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--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-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
AlB2: Alford	Moderate: seepage, slope.	Moderate: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
AlC2: Alford	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
AnB*:						
Alvin	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Soil blowing	Favorable.
Bloomfield	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty, rooting depth.
AnC*:						
Alvin	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope.
Bloomfield	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty, rooting depth.
Ao: Ambraw	Moderate: seepage.	Severe: ponding.	Severe: slow refill.	Frost action	Wetness	Wetness.
Ar: Armiesburg	Moderate: seepage.	Moderate: hard to pack.	Severe: no water.	Deep to water	Favorable	Favorable.
AvB2: Ava	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
Ay: Ayrshire	Moderate: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Frost action	Wetness, soil blowing.	Wetness.
Bb: Bartle	Moderate: seepage.	Moderate: piping, wetness.	Severe: no water.	Percs slowly, frost action.	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
BcF*:						
Berks	Severe: seepage, slope.	Moderate: seepage.	Severe: no water.	Deep to water	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.
Ebal	Severe: slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, rooting depth.
BfG*:						
Berks	Severe: seepage, slope.	Moderate: seepage.	Severe: no water.	Deep to water	Depth to rock, slope, large stones.	Droughty, depth to rock, slope.

See footnote at end of table.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
BfG*: Rock outcrop.						
BlE, BlG: Bloomfield	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty, rooting depth.
Bo: Bonnie	Slight	Severe: ponding.	Severe: slow refill.	Ponding, flooding, frost action.	Erodes easily, ponding.	Wetness, erodes easily.
Br, Bs: Booker	Slight	Severe: hard to pack, ponding.	Severe: no water.	Percs slowly, ponding.	Ponding, percs slowly.	Wetness, droughty, percs slowly.
CcE2, CcF: Chetwynd	Severe: slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope	Slope.
CfC2, CfC3, CfD2, CfD3, ChC2: Cincinnati	Severe: slope.	Severe: thin layer.	Severe: no water.	Percs slowly, frost action, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
Cu: Cuba	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily, too sandy.	Erodes easily.
EcD*: Ebal	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, rooting depth.
Gilpin	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, large stones.	Slope, large stones.
EfD2*: Ebal	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, rooting depth.
Wellston	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
EnA: Elston	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy	Favorable.
Ev: Evansville	Moderate: seepage.	Severe: ponding.	Moderate: slow refill.	Ponding, frost action.	Erodes easily, ponding.	Wetness, erodes easily.
FaB, FcC: Fairpoint	Moderate: slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones, erodes easily.	Large stones, erodes easily.
FcE, FcG: Fairpoint	Severe: slope, slippage.	Severe: piping.	Severe: no water.	Deep to water	Slope, large stones, erodes easily.	Large stones, slope, erodes easily.
GcE2: Gilpin	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.

See footnote at end of table.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
GfF*:						
Gilpin	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Berks	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, droughty, depth to rock.
GgE*:						
Gilpin	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, large stones.	Slope, large stones.
Ebal	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, rooting depth.
GmE*:						
Gilpin	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, large stones.	Slope, large stones.
Wellston	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
HaE2 Hagerstown	Severe: slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope	Slope.
Hb, Hc Haymond	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
HdA Henshaw	Slight	Severe: piping, wetness.	Severe: slow refill.	Frost action	Erodes easily, wetness.	Wetness, erodes easily.
HeD2, HeE, HeG Hickory	Severe: slope.	Moderate: thin layer.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
MbB2 Markland	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Erodes easily, percs slowly.	Erodes easily, percs slowly.
MgA McGary	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, rooting depth.
Mo Montgomery	Slight	Severe: hard to pack, ponding.	Severe: slow refill.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
Mu Muskego	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Ponding, percs slowly.	Ponding, soil blowing, percs slowly.	Wetness, percs slowly.
Ne Newark	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding, frost action.	Erodes easily, wetness.	Wetness, erodes easily.
No, Nr Nolin	Severe: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Deep to water	Erodes easily	Erodes easily.

See footnote at end of table.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
PbC2, PbD2: Parke	Severe: slope.	Slight	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
Pc: Patton	Slight	Severe: ponding.	Moderate: slow refill.	Ponding, frost action.	Ponding	Wetness.
PdB2: Pekin	Moderate: seepage, slope.	Severe: piping.	Severe: slow refill.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
Pf: Peoga	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly, frost action.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Pg: Piankeshaw	Moderate: seepage.	Moderate: large stones.	Severe: no water.	Deep to water	Large stones, erodes easily.	Large stones, erodes easily, droughty.
PkB2: Pike	Moderate: seepage, slope.	Moderate: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
PkC2: Pike	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
PrB: Princeton	Moderate: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Soil blowing	Favorable.
PrC: Princeton	Severe: slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope.
RaA: Reesville	Moderate: seepage.	Severe: piping.	Severe: no water.	Frost action	Erodes easily, wetness.	Wetness, erodes easily.
Rb: Rensselaer	Moderate: seepage.	Severe: thin layer, ponding.	Severe: cutbanks cave.	Ponding, frost action.	Ponding, soil blowing.	Wetness.
Rd: Rensselaer	Moderate: seepage.	Severe: thin layer, ponding.	Severe: cutbanks cave.	Ponding, frost action.	Ponding	Wetness.
RmA: Roby	Moderate: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness, too sandy, soil blowing.	Wetness, droughty.
ScA: Shakamak	Slight	Severe: piping.	Severe: no water.	Percs slowly, frost action.	Erodes easily, wetness, percs slowly.	Erodes easily, rooting depth, percs slowly.
So: Steff	Severe: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Frost action	Erodes easily, wetness.	Erodes easily.
Sr: Steff	Severe: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding, frost action.	Erodes easily, wetness.	Erodes easily.

See footnote at end of table.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
St----------------- Stendal	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding, frost action.	Erodes easily, wetness.	Wetness, erodes easily.
Ud. Udorthents						
UnE---------------- Uniontown	Moderate: seepage.	Severe: piping.	Severe: slow refill.	Slope-----------	Slope, erodes easily, wetness.	Slope, erodes easily.
VgA---------------- Vigo	Slight----------	Severe: wetness.	Severe: slow refill.	Percs slowly, frost action.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
WcA---------------- Waupecan	Severe: seepage.	Moderate: thin layer.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
WeD2, WeD3, WgD2-- Wellston	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
Wm----------------- Wilhite	Slight----------	Severe: ponding.	Severe: slow refill.	Ponding, percs slowly, flooding.	Ponding, percs slowly.	Wetness, percs slowly.
Wt----------------- Wirt	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
ZaA---------------- Zanesville	Moderate: depth to rock, seepage.	Severe: piping.	Severe: no water.	Percs slowly---	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth.
ZaB2--------------- Zanesville	Moderate: depth to rock, seepage.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth.
ZaC2, ZaC3--------- Zanesville	Moderate: depth to rock, seepage.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
Zp----------------- Zipp	Slight----------	Severe: ponding.	Severe: slow refill.	Ponding, percs slowly.	Ponding, percs slowly.	Wetness, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AlE2, AlC2-------- Alford	0-6	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	20-30	5-15
	6-61	Silty clay loam, silt loam.	CL	A-6, A-4	0	100	100	90-100	80-100	25-35	8-15
	61-80	Silt loam, silt	ML, CL-ML, CL	A-4	0	100	100	90-100	70-100	<25	NP-10
AnB*, AnC*:											
Alvin-----------	0-12	Loamy sand-------	SM	A-2	0	100	100	50-75	15-30	<20	NP-4
	12-27	Very fine sandy loam, sandy loam, sandy clay loam.	SM, SC, CL, ML	A-2, A-4, A-6	0	100	100	90-100	20-80	15-38	NP-13
	27-60	Stratified sandy loam to sand.	SM, SP, SP-SM	A-2, A-3	0-5	95-100	90-100	70-95	4-35	<20	NP-4
Bloomfield------	0-32	Sand, loamy sand	SM, SP, SP-SM	A-2-4, A-3	0	100	100	60-90	4-20	---	NP
	32-60	Loamy sand, loamy fine sand, sand.	SP, SM, SP-SM	A-2-4, A-3	0	100	100	70-90	4-35	---	NP
	60-80	Fine sand, loamy fine sand, sand.	SM, SP, SP-SM	A-2-4, A-3	0	100	100	65-90	4-35	<20	NP-3
Ao--------------- Ambraw	0-14	Sandy clay loam	CL	A-6	0	100	100	85-95	60-90	30-40	10-20
	14-51	Clay loam, sandy clay loam.	CL	A-7, A-6	0	100	100	85-95	50-85	30-50	10-25
	51-60	Stratified silty clay loam to sandy loam.	SC, ML, CL, SM	A-6, A-4	0	100	90-100	80-90	40-80	20-40	NP-17
Ar--------------- Armiesburg	0-16	Silt loam--------	CL, CH	A-6, A-7	0	100	100	95-100	85-95	35-55	20-35
	16-60	Silty clay loam, loam, silt loam.	CL, CH	A-6, A-7	0	100	100	95-100	85-95	35-55	20-35
AvB2------------- Ava	0-7	Silt loam--------	CL	A-6, A-4	0	100	100	95-100	90-100	25-35	8-15
	7-17	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	25-45	10-20
	17-29	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	25-45	10-20
	29-53	Silty clay loam, loam, clay loam.	CL, CL-ML	A-4, A-6, A-7	0	100	95-100	90-100	80-90	20-45	5-20
	53-80	Loam, silt loam, clay loam.	CL	A-4, A-6	0	100	95-100	90-100	80-90	25-40	7-20
Ay--------------- Ayrshire	0-16	Sandy loam-------	CL, CL-ML, SC, SM-SC	A-4, A-6	0	100	95-100	60-85	40-60	20-30	5-15
	16-43	Sandy clay loam, loam, clay loam.	SC, CL	A-6	0	100	95-100	80-90	35-55	25-35	10-15
	43-54	Sandy loam-------	SC, SM-SC	A-4, A-6, A-2-4, A-2-6	0	100	95-100	60-70	30-40	15-25	5-15
	54-70	Stratified silt to fine sand.	SM, ML, CL-ML, SM-SC	A-2-4, A-4	0	100	95-100	65-90	20-55	<20	NP-5

See footnote at end of table.

TABLE 16.--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	
Bb----------------- Bartle	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	85-100	65-90	20-35	5-15
	8-27	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-35	5-15
	27-52	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	90-100	70-95	30-45	10-25
	52-60	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	100	90-100	70-95	30-45	10-25
BcF*: Berks-----------	0-3	Channery silt loam.	GM, ML, GC, SC	A-2, A-4	0-30	50-80	45-75	40-60	30-55	25-36	5-10
	3-23	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
	23	Weathered bedrock	---	---	---	---	---	---	---	---	---
Ebal------------	0-6	Silt loam--------	CL-ML, CL	A-4, A-6	0	95-100	95-100	85-100	70-90	25-35	5-15
	6-19	Silt loam, channery silt loam, channery silty clay loam.	CL, GC	A-6, A-7	0-3	60-70	50-70	45-70	40-65	30-45	12-20
	19-33	Channery silty clay, clay.	CL, CH, GC	A-7	3-15	60-70	50-70	45-70	40-65	40-55	20-30
	33-54	Clay, silty clay	CH	A-7	0-3	95-100	90-100	80-100	70-95	60-75	35-45
	54-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
BfG*: Berks-----------	0-3	Channery loam----	GM, ML, GC, SC	A-2, A-4	0-30	50-80	45-75	40-60	30-55	25-36	5-10
	3-23	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
	23	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop.											
BlE, BlG--------- Bloomfield	0-9	Sand-------------	SM, SP, SP-SM	A-2-4, A-3	0	100	100	70-90	4-35	---	NP
	9-32	Fine sand, loamy fine sand, sand.	SP, SM, SP-SM	A-2-4, A-3	0	100	100	70-90	4-35	---	NP
	32-80	Fine sand, loamy fine sand, sand.	SM, SP, SP-SM	A-2-4, A-3	0	100	100	65-90	4-35	<20	NP-3
Bo---------------- Bonnie	0-8	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	90-100	27-34	8-12
	8-39	Silt loam--------	CL	A-4, A-6	0	100	100	95-100	90-100	27-34	8-12
	39-60	Silt loam, silty clay loam, loam.	CL	A-4, A-6	0	100	100	90-100	80-100	25-39	8-15
Br---------------- Booker	0-12	Clay-------------	CL, CH	A-7	0	100	100	95-100	95-100	45-75	30-45
	12-60	Clay, silty clay	CH	A-7	0	100	100	100	95-100	65-85	40-55
Bs---------------- Booker	0-12	Mucky clay-------	CL, CH	A-7	0	100	100	95-100	80-95	45-75	30-45
	12-60	Clay, silty clay	CH	A-7	0	100	100	100	95-100	65-85	40-55
CcE2, CcF-------- Chetwynd	0-5	Silt loam--------	CL-ML, CL	A-4, A-6	0	90-100	85-100	75-95	60-95	22-33	4-12
	5-33	Sandy clay loam, loam.	SC, CL	A-4, A-6	0	90-100	85-100	70-95	40-75	20-35	8-18
	33-80	Sandy loam, loam, sandy clay loam.	SM-SC, SC, CL-ML, CL	A-2-4, A-2-6, A-4, A-6	0	76-95	65-95	60-90	30-65	20-32	5-15

TABLE 16.--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	
CfC2, CfC3, CfD2, CfD3----------- Cincinnati	0-8	Silt loam--------	ML, CL	A-4, A-6	0	100	100	90-100	80-100	25-40	3-16
	8-22	Silty clay loam, silt loam.	CL	A-6, A-4	0	95-100	90-100	90-100	70-100	25-40	8-15
	22-46	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0	95-100	85-95	75-90	65-80	25-40	6-20
	46-80	Clay loam, loam, silt loam.	CL, ML, CL-ML	A-6, A-4	0	95-100	85-95	75-90	65-80	25-40	5-20
ChC2------------- Cincinnati	0-6	Silt loam--------	ML, CL	A-4, A-6	0	100	100	90-100	80-100	25-40	3-16
	6-21	Silty clay loam, loam, silt loam.	CL	A-6, A-4	0	95-100	90-100	90-100	70-100	25-40	8-15
	21-52	Clay loam, loam, silty clay loam.	CL, CL-ML	A-6, A-4	0	95-100	85-95	75-90	65-80	25-40	6-20
	52-74	Channery clay loam, loam.	CL, ML, SM, SC	A-6, A-4	0	70-100	70-95	55-90	35-80	25-40	5-20
	74-80	Extremely channery sandy loam.	SM, SM-SC	A-6, A-4	0	15-25	15-25	10-20	5-20	<25	NP-5
	80	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Cu--------------- Cuba	0-25	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	95-100	90-100	70-90	25-35	3-12
	25-60	Stratified silt loam to sandy loam.	CL, ML, CL-ML	A-4	0	100	80-100	75-100	50-85	15-30	2-10
EcD*: Ebal------------	0-6	Silt loam--------	CL-ML, CL	A-4, A-6	0	95-100	95-100	85-100	70-90	25-35	5-15
	6-19	Silt loam, channery silt loam, channery silty clay loam.	CL, GC	A-6, A-7	0-3	60-70	50-70	45-70	40-65	30-45	12-20
	19-33	Channery silty clay, silty clay, clay.	CL, CH, GC	A-7	3-15	60-70	50-70	45-70	40-65	40-55	20-30
	33-54	Clay, silty clay	CH	A-7	0-3	95-100	90-100	80-100	70-95	60-75	35-45
	54-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Gilpin----------	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	8-22	Channery loam, silt loam, clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	22-48	Channery loam, very channery loam, channery silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	48	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
EfD2*: Ebal------------	0-6	Silt loam--------	CL-ML, CL	A-4, A-6	0	95-100	95-100	85-100	70-90	25-35	5-15
	6-19	Silt loam, channery silt loam, channery silty clay loam.	CL, GC	A-6, A-7	0-3	60-95	50-95	45-70	40-65	30-45	12-20
	19-33	Channery silty clay, silty clay, clay.	CL, CH, GC	A-7	3-15	60-95	50-95	45-70	40-65	40-55	20-30
	33-54	Clay, silty clay	CH	A-7	0-3	95-100	90-100	80-100	70-95	60-75	35-45
	54-60	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
EfD2*: Wellston--------	0-5	Silt loam--------	ML	A-4	0	95-100	90-100	85-100	70-95	25-35	3-10
	5-27	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0-5	75-100	70-100	60-95	60-90	25-40	5-20
	27-53	Silt loam, channery loam, channery silt loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0-10	65-90	65-90	60-90	40-65	20-35	5-15
	53	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
EnA-------------- Elston	0-16	Loam-------------	CL, CL-ML	A-4, A-6	0	100	100	85-95	60-75	20-35	5-15
	16-30	Sandy loam, loam, sandy clay loam.	SM, SM-SC, ML, CL-ML		0	95-100	75-95	50-80	35-65	<25	NP-7
	30-53	Loamy sand, sandy loam, gravelly sandy loam.	SP-SM, SM	A-2-4, A-3, A-1-b	0-3	95-100	75-95	45-75	5-30	<20	NP
	53-60	Sand, gravelly coarse sand.	SP-SM, SM	A-3, A-2-4, A-1-b	0-3	95-100	70-95	40-70	5-25	---	NP
Ev--------------- Evansville	0-11	Silt loam--------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	70-98	25-40	3-15
	11-50	Silty clay loam, silt loam.	CL, CH	A-6, A-7	0	100	100	95-100	85-98	35-55	20-35
	50-60	Stratified silt loam to silty clay loam.	CL	A-6, A-7	0	100	100	90-100	70-98	30-45	10-25
FaB-------------- Fairpoint	0-16	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	90-100	80-100	70-100	50-90	20-40	4-18
	16-60	Shaly to extremely shaly silt loam to clay loam.	GC, CL, CL-ML, SC	A-4, A-6, A-7, A-2	15-30	55-75	25-65	20-65	15-60	25-50	4-24
FcC, FcE--------- Fairpoint	0-3	Shaly clay loam	CL, SC, GC	A-6, A-7	5-20	55-90	45-85	40-85	35-80	35-50	12-24
	3-60	Shaly to extremely shaly silt loam to clay loam.	GC, CL, CL-ML, SC	A-4, A-6, A-7, A-2	15-30	55-75	25-65	20-65	15-60	25-50	4-24
FcG-------------- Fairpoint	0-3	Very shaly loam	CL, CL-ML, SC, GC	A-4, A-6, A-2	5-15	55-90	45-85	40-85	30-75	20-40	4-18
	3-60	Shaly to extremely shaly silt loam to clay loam.	GC, CL, CL-ML, SC	A-4, A-6, A-7, A-2	15-30	55-75	25-65	20-65	15-60	25-50	4-24
GcE2------------- Gilpin	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	8-22	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	22-34	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 16.--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	
GfF*:											
Gilpin	0-8	Silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	8-22	Loam, silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	22-34	Channery loam, very channery loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Berks	0-3	Loam	CL, ML, CL-ML	A-4	0-10	80-100	75-100	65-85	50-75	25-36	5-10
	3-23	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
	23	Weathered bedrock	---	---	---	---	---	---	---	---	---
GgE*:											
Gilpin	0-8	Silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	8-22	Loam, silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	22-42	Channery loam, very channery loam, very channery silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	42	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ebal	0-6	Silt loam	CL-ML, CL	A-4, A-6	0	95-100	95-100	85-100	70-90	25-35	5-15
	6-19	Silt loam, channery silt loam, channery silty clay loam.	CL, GC	A-6, A-7	0-3	60-70	50-70	45-70	40-65	30-45	12-20
	19-33	Channery silty clay, silty clay, clay.	CL, CH, GC	A-7	3-15	60-70	50-70	45-70	40-65	40-55	20-30
	33-54	Clay, silty clay	CH	A-7	0-3	95-100	90-100	80-100	70-95	60-75	35-45
	54-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
GmE*:											
Gilpin	0-8	Silt loam	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	8-22	Loam, silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	22-49	Channery loam, very channery loam, very channery silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	49	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Wellston	0-5	Silt loam	ML	A-4	0	95-100	90-100	85-100	70-95	25-35	3-10
	5-27	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0-5	75-100	70-100	60-95	60-90	25-40	5-20
	27-53	Silt loam, channery loam, channery silty clay loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0-10	65-90	65-90	60-90	40-65	20-35	5-15
	53	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

TABLE 16.--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	
HaE2------------- Hagerstown	0-6	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
	6-26	Silt loam, silty clay loam, loam.	CL, CH	A-7	0-5	90-100	80-100	75-100	55-95	48-65	26-34
	26-58	Clay, silty clay	CH, CL	A-7, A-6	0-5	85-100	80-100	75-100	75-95	30-70	15-40
	58	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Hb, Hc----------- Haymond	0-9	Silt loam--------	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	9-40	Silt loam, loam	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	40-60	Fine sandy loam, silt loam, loam.	ML, SM	A-4	0	95-100	90-100	80-100	35-90	27-36	4-10
HdA-------------- Henshaw	0-11	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	95-100	90-100	80-100	20-35	3-10
	11-54	Silty clay loam, silt loam.	CL	A-6, A-4	0	95-100	95-100	95-100	85-100	30-40	8-18
	54-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	75-100	25-40	5-15
HeD2, HeE-------- Hickory	0-9	Silt loam--------	CL	A-6, A-4	0-5	95-100	90-100	90-100	75-95	20-35	8-15
	9-56	Clay loam, silty clay loam.	CL	A-6, A-7	0-5	95-100	90-100	80-95	65-80	30-50	15-30
	56-80	Clay loam, sandy loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0-5	85-100	80-95	80-95	60-80	20-40	5-20
HeG-------------- Hickory	0-9	Loam-------------	CL	A-6, A-4	0-5	95-100	90-100	90-100	75-95	20-35	8-15
	9-56	Clay loam, silty clay loam, loam.	CL	A-6, A-7	0-5	95-100	90-100	80-95	65-80	30-50	15-30
	56-80	Clay loam, sandy clay loam, loam.	CL-ML, CL	A-4, A-6	0-5	85-100	80-95	80-95	60-80	20-40	5-20
MbB2------------- Markland	0-9	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-95	30-45	10-20
	9-36	Silty clay, clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-95	45-60	19-32
	36-60	Stratified clay to silt loam.	CL, CH, ML, MH	A-7	0	100	100	90-100	75-95	40-55	15-25
MgA-------------- McGary	0-11	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-95	25-40	5-15
	11-39	Silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-100	45-60	25-35
	39-60	Stratified silty clay loam to clay.	CL, CH	A-6, A-7	0	95-100	95-100	95-100	85-100	35-55	20-35
Mo--------------- Montgomery	0-15	Silty clay loam, silty clay.	CL	A-7	0	100	100	100	85-100	40-50	20-30
	15-38	Silty clay loam, silty clay.	CH	A-7	0	100	100	95-100	90-100	50-65	30-42
	38-60	Stratified clay to silty clay loam.	CL, CH	A-7	0	100	100	90-100	85-100	40-55	20-32
Mu--------------- Muskego	0-19	Sapric material	PT	A-8	0	---	---	---	---	---	---
	19-60	Coprogenous earth	OL	A-5	0	95-100	95-100	85-100	75-96	41-50	2-8
Ne--------------- Newark	0-10	Loam-------------	ML, CL, CL-ML	A-4	0	95-100	90-100	80-100	55-95	<32	NP-10
	10-32	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	70-98	22-42	3-20
	32-60	Silt loam, silty clay loam, loam.	ML, CL, CL-ML	A-4, A-6, A-7	0-3	75-100	70-100	65-100	55-95	22-42	3-20

See footnote at end of table.

TABLE 16.--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	
No, Nr: Nolin	0-8	Silt loam	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-100	25-40	5-18
	8-48	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6, A-7	0	100	95-100	85-100	75-100	25-46	5-23
	48-60	Loam, silt loam, fine sandy loam.	ML, CL, CL-ML, SM	A-4, A-6	0-10	50-100	50-100	40-95	35-95	<30	NP-15
PbC2, PbD2: Parke	0-8	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	90-100	70-100	20-35	7-15
	8-31	Silty clay loam, silt loam, clay loam.	CL	A-6, A-4	0	95-100	95-100	90-100	80-100	25-40	7-15
	31-80	Sandy clay loam, loam, sandy loam.	SC, CL	A-2, A-6, A-4	0-3	90-100	85-95	55-90	30-60	25-35	7-15
Pc: Patton	0-16	Silty clay loam	CL	A-6	0	100	100	95-100	75-95	30-40	15-25
	16-60	Silty clay loam	CL, CH, ML, MH	A-7	0	100	100	95-100	80-100	40-55	15-25
PdB2: Pekin	0-10	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	85-100	65-100	20-30	5-15
	10-24	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	70-100	25-40	10-20
	24-52	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	88-98	65-90	25-35	5-15
	52-60	Stratified silt loam and silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	80-95	50-85	20-40	5-15
Pf: Peoga	0-16	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-100	25-40	5-15
	16-56	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	85-100	35-50	20-30
	56-60	Stratified silty clay loam and silt loam.	CL, ML	A-6, A-7	0	100	100	90-100	70-95	35-50	10-25
Pg: Piankeshaw	0-6	Silt loam	CL, CL-ML	A-4	0-10	95-100	80-95	75-85	55-75	20-30	5-10
	6-26	Loam, channery loam.	CL, SC	A-4, A-6	5-15	75-95	55-90	50-90	45-75	25-30	8-12
	26-60	Channery loam, very channery loam.	SC, GC, GM-GC, SM-SC	A-2-4, A-1-b	10-30	55-80	55-75	35-55	20-35	<25	5-8
PkB2, PkC2: Pike	0-9	Silt loam	CL	A-4, A-6	0	100	100	90-100	80-95	25-35	8-15
	9-44	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	95-100	85-100	80-90	30-45	10-25
	44-66	Loam, silt loam, sandy clay loam.	CL, SC	A-6, A-2-6	0	80-90	70-90	60-90	30-80	20-35	10-20
	66-80	Stratified sand to sandy clay loam.	CL-ML, ML, SM, SM-SC	A-4, A-2-4, A-1	0	70-90	65-85	35-70	15-65	<20	NP-5
PrB, PrC: Princeton	0-11	Fine sandy loam	SM, SC, ML, CL	A-4, A-2-4	0	100	100	60-85	30-55	<25	NP-10
	11-51	Sandy clay loam, fine sandy loam, very fine sandy loam.	SC, CL	A-6	0	100	100	70-90	35-70	25-35	10-15
	51-64	Stratified loamy fine sand to loam.	SC, SM-SC, CL, CL-ML	A-4, A-6, A-2-4, A-2-6	0	100	100	60-90	30-70	15-25	5-15
	64-70	Stratified fine sand to silt.	SM, ML, CL-ML, SM-SC	A-2-4, A-4	0	100	100	65-90	20-55	<20	NP-5

TABLE 16.--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	
RaA: Reesville	0-13	Silt loam	ML, CL-ML	A-4	0	100	90-100	90-100	85-100	25-35	4-10
	13-44	Silty clay loam	CL, CL-ML	A-6, A-7, A-4	0	100	90-100	90-100	90-100	20-50	4-28
	44-60	Silt loam	CL, CL-ML	A-4, A-6	0	100	90-100	85-100	80-90	20-40	4-20
Rb: Rensselaer	0-15	Sandy loam	SM, SM-SC	A-2-4, A-4	0	95-100	90-100	80-100	30-50	<25	NP-6
	15-59	Clay loam, sandy loam, sandy clay loam.	CL	A-6, A-4	0	95-100	90-100	80-100	50-95	25-40	8-20
	59-70	Stratified fine sand to silt loam.	CL, SC, ML, SM	A-4, A-2	0	95-100	90-100	45-95	25-85	<25	2-10
Rd: Rensselaer	0-15	Loam	CL, ML, CL-ML	A-4, A-6	0	95-100	90-100	80-100	55-90	15-35	4-15
	15-59	Clay loam, sandy loam, sandy clay loam.	CL	A-6, A-4	0	95-100	90-100	80-100	50-95	25-40	8-20
	59-70	Stratified fine sand to silt loam.	CL, SC, ML, SM	A-4, A-2	0	95-100	90-100	45-95	25-85	<25	2-10
RmA: Roby	0-10	Sandy loam	SM, SM-SC	A-4	0	95-100	95-100	85-95	35-50	<25	NP-7
	10-64	Sandy loam, sandy clay loam, loamy sand.	SM, ML	A-4, A-2	0	90-100	90-100	85-95	30-75	20-34	NP-7
	64-80	Stratified sand to sandy loam.	SM, SM-SC, SP-SM, ML	A-4, A-2	0	80-100	75-90	50-90	10-65	<20	NP-7
ScA: Shakamak	0-10	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	85-100	20-30	5-15
	10-28	Silt loam, silty clay loam.	CL	A-6	0	100	100	90-100	85-100	25-35	10-20
	28-57	Silt loam	CL, CL-ML	A-4	0	100	100	85-100	70-100	20-30	5-10
	57-80	Loam, clay loam	CL, CL-ML	A-4, A-6	0	95-100	85-100	75-95	60-80	20-35	5-15
So, Sr: Steff	0-10	Silt loam	ML	A-4	0	95-100	90-100	80-100	55-95	<35	NP-10
	10-27	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	90-100	85-100	70-95	20-40	3-20
	27-60	Silt loam, loam, fine sandy loam.	ML, CL-ML, SM	A-4, A-2, A-1	0-10	50-100	40-100	35-95	20-90	<35	NP-10
St: Stendal	0-8	Silt loam	CL, CL-ML	A-4, A-6	0	100	100	90-100	75-90	25-40	5-15
	8-60	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	100	100	90-100	75-90	25-40	5-15
Ud. Udorthents											
UnE: Uniontown	0-6	Silt loam	ML, CL-ML, CL	A-4	0	100	95-100	90-100	80-100	20-35	2-10
	6-45	Silt loam, silty clay loam.	CL, ML	A-6, A-4, A-7	0	100	95-100	90-100	85-100	30-45	7-20
	45-60	Silt loam, silty clay loam.	ML, CL	A-4, A-6, A-7	0	90-100	90-100	85-100	75-100	30-45	7-20

See footnote at end of table.

TABLE 16.--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	
VgA-------------- Vigo	0-8	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-95	25-35	5-15
	8-18	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	95-100	90-100	80-95	25-35	5-15
	18-80	Silty clay loam, silt loam.	CL, CH	A-6, A-7	0	100	95-100	90-100	80-95	35-55	20-40
WcA-------------- Waupecan	0-11	Silt loam--------	CL	A-4, A-6	0	100	100	90-100	85-95	20-35	8-15
	11-28	Silty clay loam, silt loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	85-95	35-45	15-25
	28-48	Stratified clay loam to gravelly loamy sand.	SM, SC, ML, CL	A-2, A-4	0	90-100	65-90	50-70	25-65	<20	NP-10
	48-80	Sand and gravel, very gravelly sandy loam.	GP, SP, SP-SM, GP-GM	A-1	10-35	40-95	30-85	30-50	0-15	---	NP
WeD2, WeD3, WgD2- Wellston	0-5	Silt loam--------	ML	A-4	0	95-100	90-100	85-100	70-95	25-35	3-10
	5-27	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0-5	75-100	70-100	60-95	60-90	25-40	5-20
	27-53	Silt loam, channery loam, channery silty clay loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0-10	65-90	65-90	60-90	40-65	20-35	5-15
	53	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Wm--------------- Wilhite	0-10	Silty clay-------	CH, CL, ML, MH	A-7	0	100	100	95-100	90-95	40-55	15-25
	10-32	Silty clay, silty clay loam, clay loam.	CL, ML	A-6, A-7	0	100	100	95-100	85-95	35-50	12-21
	32-60	Silty clay, clay, silty clay loam.	CH, CL	A-6, A-7	0	100	100	90-100	80-95	35-60	12-30
Wt--------------- Wirt	0-10	Very fine sandy loam.	CL-ML, ML	A-4	0	95-100	90-100	80-100	65-90	<25	3-7
	10-27	Silt loam, loam, fine sandy loam.	CL-ML, ML	A-4	0	95-100	90-100	75-100	55-90	<25	3-7
	27-60	Stratified loam to gravelly sandy loam.	SM, SM-SC, ML, CL-ML	A-4, A-2, A-1-b	0	85-100	50-100	40-95	20-75	<25	NP-7
ZaA, ZaB2, ZaC2, ZaC3------------ Zanesville	0-8	Silt loam--------	CL-ML, CL, ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	4-15
	8-23	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	90-100	80-100	25-40	5-20
	23-54	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0-3	90-100	85-100	80-100	60-100	20-40	2-20
	54-60	Silty clay loam, silt loam, channery silty clay loam.	SC, CL, SM, GM	A-6, A-4, A-2, A-1-b	0-10	65-100	50-100	40-100	20-85	20-40	2-20
Zp--------------- Zipp	0-7	Silty clay-------	CL, CH	A-7, A-6	0	100	100	95-100	90-95	35-55	20-30
	7-47	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-95	45-60	25-35
	47-60	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	100	100	90-100	75-95	45-60	25-35

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
AlB2, AlC2------- Alford	0-6	12-26	1.25-1.40	0.6-2.0	0.22-0.24	3.6-7.3	Low-----------	0.37	5	5	.5-2
	6-61	22-30	1.35-1.50	0.6-2.0	0.18-0.20	3.6-6.0	Moderate------	0.37			
	61-80	8-20	1.30-1.45	0.6-2.0	0.20-0.22	4.5-7.3	Low-----------	0.37			
AnB*, AnC*:											
Alvin-----------	0-12	5-10	1.50-1.70	6.0-20	0.10-0.12	5.1-6.5	Low-----------	0.17	5	2	.5-1
	12-27	12-22	1.45-1.65	0.6-6.0	0.12-0.20	4.5-6.5	Low-----------	0.24			
	27-60	3-10	1.55-1.75	2.0-6.0	0.05-0.13	5.1-7.8	Low-----------	0.24			
Bloomfield------	0-32	2-10	1.60-1.80	6.0-20	0.07-0.09	5.1-7.3	Low-----------	0.15	5	1	.5-2
	32-60	2-10	1.60-1.80	6.0-20	0.06-0.11	5.1-7.3	Low-----------	0.15			
	60-80	5-13	1.60-1.80	2.0-20	0.05-0.10	5.1-7.8	Low-----------	0.15			
Ao--------------- Ambraw	0-14	20-27	1.40-1.60	0.6-2.0	0.14-0.20	5.6-7.3	Moderate------	0.28	5	5	2-3
	14-51	20-35	1.45-1.65	0.2-2.0	0.15-0.19	5.1-7.3	Moderate------	0.28			
	51-60	18-30	1.50-1.70	0.2-2.0	0.11-0.22	5.6-8.4	Low-----------	0.28			
Ar--------------- Armiesburg	0-16	20-27	1.30-1.45	0.6-2.0	0.21-0.24	6.1-7.3	Moderate------	0.28	5	6	2-4
	16-60	25-35	1.30-1.45	0.6-2.0	0.18-0.20	6.1-7.8	Moderate------	0.28			
AvB2------------- Ava	0-7	20-27	1.30-1.50	0.6-2.0	0.20-0.23	4.5-7.3	Low-----------	0.43	4	6	.5-2
	7-17	22-33	1.40-1.60	0.6-2.0	0.18-0.21	4.5-6.0	Moderate------	0.43			
	17-29	24-35	1.50-1.70	0.2-0.6	0.18-0.21	4.5-5.5	Moderate------	0.43			
	29-53	20-30	1.65-1.80	<0.06	0.09-0.11	4.5-5.5	Low-----------	0.43			
	53-80	20-30	1.55-1.75	0.2-0.6	0.15-0.18	4.5-6.0	Low-----------	0.43			
Ay--------------- Ayrshire	0-16	5-12	1.35-1.50	0.6-2.0	0.13-0.20	5.6-7.3	Low-----------	0.24	5	3	.5-2
	16-43	22-32	1.40-1.55	0.6-2.0	0.16-0.18	5.1-7.3	Low-----------	0.32			
	43-54	8-20	1.45-1.60	0.6-2.0	0.12-0.14	5.1-7.3	Low-----------	0.32			
	54-70	4-10	1.40-1.60	2.0-6.0	0.06-0.08	6.6-8.4	Low-----------	0.20			
Bb--------------- Bartle	0-8	15-26	1.30-1.45	0.6-2.0	0.20-0.24	5.1-7.3	Low-----------	0.43	4	5	1-3
	8-27	22-35	1.40-1.60	0.6-2.0	0.20-0.22	4.5-6.5	Low-----------	0.43			
	27-52	22-35	1.60-1.80	<0.06	0.06-0.08	4.5-5.5	Low-----------	0.43			
	52-60	22-35	1.40-1.60	0.2-0.6	0.15-0.18	5.1-7.3	Low-----------	0.43			
BcF*:											
Berks-----------	0-3	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low-----------	0.17	3	8	.5-3
	3-23	5-27	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low-----------	0.17			
	23	---	---	---	---	---	--------------	----			
Ebal------------	0-6	20-27	1.35-1.50	0.6-2.0	0.22-0.24	4.5-6.5	Low-----------	0.37	3	5	.5-2
	6-19	20-30	1.40-1.60	0.6-2.0	0.12-0.17	4.5-6.0	Moderate------	0.28			
	19-33	40-50	1.45-1.65	0.2-0.6	0.06-0.09	4.5-6.0	Moderate------	0.28			
	33-54	40-70	1.55-1.75	<0.06	0.07-0.10	4.5-6.0	High----------	0.28			
	54-60	---	---	---	---	---	--------------	----			

See footnote at end of table.

TABLE 17.--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	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
BfG*:											
Berks-----------	0-3	5-23	1.20-1.50	0.6-6.0	0.08-0.12	3.6-6.5	Low----------	0.17	3	8	.5-3
	3-23	5-27	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low----------	0.17			
	23	---	---	---	---	---	-------------	----			
Rock outcrop.											
BlE, BlG--------- Bloomfield	0-9	5-10	1.50-1.70	6.0-20	0.07-0.12	5.1-7.8	Low----------	0.15	5	2	.5-2
	9-32	2-10	1.60-1.80	6.0-20	0.06-0.11	5.1-7.3	Low----------	0.15			
	32-80	5-13	1.60-1.80	2.0-20	0.05-0.10	5.1-7.8	Low----------	0.15			
Bo--------------- Bonnie	0-8	18-27	1.20-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.43	5	6	1-3
	8-39	18-27	1.40-1.60	0.2-0.6	0.20-0.22	4.5-5.5	Low----------	0.43			
	39-60	18-30	1.45-1.65	0.2-0.6	0.18-0.20	4.5-7.8	Low----------	0.43			
Br--------------- Booker	0-12	40-70	1.30-1.50	<0.06	0.11-0.14	5.6-7.3	Very high----	0.28	5	4	1-3
	12-60	60-80	1.30-1.60	<0.06	0.09-0.11	5.6-7.8	Very high----	0.28			
Bs--------------- Booker	0-12	40-70	0.80-1.20	0.2-0.6	0.20-0.25	5.6-7.3	Very high----	0.28	5	4	10-2[illegible]
	12-60	60-80	1.30-1.60	<0.06	0.09-0.11	5.6-7.8	Very high----	0.28			
CcE2, CcF-------- Chetwynd	0-5	12-24	1.30-1.50	0.6-2.0	0.20-0.24	4.5-7.3	Low----------	0.32	5	5	1-3
	5-33	18-25	1.40-1.60	0.6-2.0	0.13-0.17	4.5-5.5	Moderate-----	0.32			
	33-80	18-25	1.35-1.60	0.6-2.0	0.11-0.17	4.5-6.0	Low----------	0.32			
CfC2, CfC3, CfD2, CfD3----------- Cincinnati	0-8	15-25	1.30-1.50	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.37	4-3	6	1-3
	8-22	22-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-5.5	Low----------	0.37			
	22-46	24-35	1.60-1.85	0.06-0.6	0.08-0.12	4.5-6.5	Moderate-----	0.37			
	46-80	24-40	1.55-1.75	0.06-0.6	0.08-0.12	4.5-6.5	Moderate-----	0.37			
ChC2------------- Cincinnati	0-6	15-25	1.30-1.50	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.37	4	6	1-3
	6-21	20-35	1.45-1.65	0.6-2.0	0.15-0.22	4.5-6.0	Moderate-----	0.43			
	21-52	20-35	1.60-1.85	0.06-0.6	0.06-0.08	4.5-5.5	Moderate-----	0.43			
	52-74	24-40	1.55-1.75	0.06-0.6	0.12-0.14	4.5-6.5	Moderate-----	0.32			
	74-80	8-15	1.55-1.75	2.0-6.0	0.04-0.05	4.5-5.5	Low----------	0.20			
	80	---	---	---	---	---	-------------	----			
Cu--------------- Cuba	0-25	15-25	1.30-1.45	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.37	5	5	1-3
	25-60	14-20	1.45-1.65	0.6-2.0	0.17-0.21	4.5-5.5	Low----------	0.37			
EcD*:											
Ebal------------	0-6	20-27	1.35-1.50	0.6-2.0	0.22-0.24	4.5-6.5	Low----------	0.37	3	5	.5-2
	6-19	20-30	1.40-1.60	0.6-2.0	0.12-0.22	4.5-6.0	Moderate-----	0.28			
	19-33	40-50	1.45-1.65	0.2-0.6	0.06-0.12	4.5-6.0	Moderate-----	0.28			
	33-54	40-70	1.55-1.75	<0.06	0.07-0.12	4.5-6.0	High---------	0.28			
	54-60	---	---	---	---	---	-------------	----			
Gilpin----------	0-8	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-7.3	Low----------	0.32	3	6	.5-4
	8-22	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24			
	22-48	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24			
	48	---	---	---	---	---	-------------	----			
EfD2*:											
Ebal------------	0-6	20-27	1.35-1.50	0.6-2.0	0.22-0.24	4.5-6.5	Low----------	0.37	3	5	.5-2
	6-19	20-30	1.40-1.60	0.6-2.0	0.12-0.22	4.5-6.0	Moderate-----	0.28			
	19-33	40-50	1.45-1.65	0.2-0.6	0.06-0.12	4.5-6.0	Moderate-----	0.28			
	33-54	40-70	1.55-1.75	<0.06	0.07-0.12	4.5-6.0	High---------	0.28			
	54-60	---	---	---	---	---	-------------	----			

See footnote at end of table.

TABLE 17.--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	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
EfD2*:											
Wellston--------	0-5	13-27	1.30-1.50	0.6-2.0	0.18-0.22	5.1-7.3	Low-----------	0.37	4	6	1-3
	5-27	18-35	1.30-1.65	0.6-2.0	0.17-0.21	4.5-6.0	Low-----------	0.37			
	27-53	15-27	1.30-1.60	0.6-2.0	0.12-0.17	4.5-6.0	Low-----------	0.37			
	53	---	---	---	---	---	-------------	-----			
EnA-------------- Elston	0-16	8-15	1.30-1.55	2.0-6.0	0.12-0.22	5.1-7.3	Low-----------	0.28	4	5	2-6
	16-30	10-22	1.35-1.60	2.0-6.0	0.12-0.18	6.1-7.3	Low-----------	0.20			
	30-53	4-10	1.45-1.65	2.0-6.0	0.08-0.13	6.1-7.3	Low-----------	0.20			
	53-60	1-5	1.60-1.75	>20	0.05-0.07	5.6-8.4	Low-----------	0.15			
Ev--------------- Evansville	0-11	20-26	1.30-1.45	0.6-2.0	0.20-0.24	6.1-7.3	Low-----------	0.37	5	5	1-3
	11-50	25-34	1.40-1.55	0.6-2.0	0.18-0.20	4.5-5.5	Moderate-----	0.37			
	50-60	25-34	1.40-1.55	0.6-2.0	0.19-0.21	5.6-8.4	Low-----------	0.37			
FaB-------------- Fairpoint	0-16	18-27	1.60-1.80	0.06-0.2	0.06-0.15	5.6-7.3	Low-----------	0.43	3	6	.5-2
	16-60	18-35	1.60-1.80	0.2-0.6	0.03-0.10	5.6-7.3	Moderate-----	0.32			
FcC, FcE--------- Fairpoint	0-3	27-35	1.45-1.65	0.2-0.6	0.06-0.15	5.6-7.3	Moderate-----	0.37	5	6	<.5
	3-60	18-35	1.60-1.80	0.2-0.6	0.03-0.10	5.6-7.3	Moderate-----	0.37			
FcG-------------- Fairpoint	0-3	18-27	1.40-1.55	0.6-2.0	0.09-0.18	5.6-7.3	Low-----------	0.37	5	6	<.5
	3-60	18-35	1.60-1.80	0.2-0.6	0.03-0.10	5.6-7.3	Moderate-----	0.37			
GcE2------------- Gilpin	0-8	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-7.3	Low-----------	0.32	3	6	.5-4
	8-22	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low-----------	0.24			
	22-34	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low-----------	0.24			
	34	---	---	---	---	---	-------------	-----			
GfF*:											
Gilpin-----------	0-8	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-7.3	Low-----------	0.32	3	6	.5-4
	8-22	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low-----------	0.24			
	22-34	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low-----------	0.24			
	34	---	---	---	---	---	-------------	-----			
Berks------------	0-3	5-23	1.20-1.50	0.6-6.0	0.12-0.17	3.6-6.5	Low-----------	0.24	3	5	.5-3
	3-23	5-27	1.20-1.60	0.6-6.0	0.04-0.10	3.6-6.5	Low-----------	0.17			
	23	---	---	---	---	---	-------------	-----			
GgE*:											
Gilpin-----------	0-8	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-7.3	Low-----------	0.32	3	6	.5-4
	8-22	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low-----------	0.24			
	22-42	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low-----------	0.24			
	42	---	---	---	---	---	-------------	-----			
Ebal-------------	0-6	20-27	1.35-1.50	0.6-2.0	0.22-0.24	4.5-6.5	Low-----------	0.37	3	5	.5-2
	6-19	20-30	1.40-1.60	0.6-2.0	0.12-0.22	4.5-6.0	Moderate-----	0.28			
	19-33	40-50	1.45-1.65	0.2-0.6	0.06-0.12	4.5-6.0	Moderate-----	0.28			
	33-54	40-70	1.55-1.75	<0.06	0.07-0.12	4.5-6.0	High----------	0.28			
	54-60	---	---	---	---	---	-------------	-----			
GmE*:											
Gilpin-----------	0-8	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-7.3	Low-----------	0.32	3	6	.5-4
	8-22	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low-----------	0.24			
	22-49	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low-----------	0.24			
	49	---	---	---	---	---	-------------	-----			
Wellston--------	0-5	13-27	1.30-1.50	0.6-2.0	0.18-0.22	5.1-7.3	Low-----------	0.37	4	6	1-3
	5-27	18-35	1.30-1.65	0.6-2.0	0.17-0.21	4.5-6.0	Low-----------	0.37			
	27-53	15-30	1.30-1.60	0.6-2.0	0.12-0.17	4.5-6.0	Low-----------	0.37			
	53	---	---	---	---	---	-------------	-----			

See footnote at end of table.

TABLE 17.--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	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
HaE2------------- Hagerstown	0-6	15-27	1.20-1.40	0.6-6.0	0.16-0.24	4.5-6.5	Low----------	0.32	4	6	1-5
	6-26	23-40	1.20-1.60	0.6-2.0	0.10-0.24	4.5-7.3	Moderate-----	0.28			
	26-58	40-60	1.20-1.60	0.6-2.0	0.08-0.24	4.5-7.3	Moderate-----	0.28			
	58	---	---	---	---	---	-------------	----			
Hb, Hc----------- Haymond	0-9	10-18	1.30-1.45	0.6-2.0	0.20-0.24	5.6-7.3	Low----------	0.37	5	5	1-3
	9-40	10-18	1.30-1.45	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.37			
	40-60	10-18	1.30-1.45	0.6-2.0	0.20-0.22	6.1-7.3	Low----------	0.37			
HdA-------------- Henshaw	0-11	12-27	1.20-1.40	0.6-2.0	0.18-0.23	5.6-7.3	Low----------	0.43	4	6	.5-2
	11-54	18-34	1.20-1.40	0.2-0.6	0.15-0.19	5.1-8.4	Low----------	0.43			
	54-60	15-34	1.20-1.40	0.2-0.6	0.17-0.22	6.6-8.4	Low----------	0.43			
HeD2, HeE, HeG--- Hickory	0-9	19-25	1.30-1.50	0.6-2.0	0.20-0.24	4.5-7.3	Low----------	0.37	5	6	1-2
	9-56	20-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate-----	0.37			
	56-80	15-32	1.50-1.70	0.6-2.0	0.11-0.19	5.1-8.4	Low----------	0.37			
MbB2------------- Markland	0-9	28-40	1.35-1.50	0.2-0.6	0.18-0.23	5.1-7.3	Moderate-----	0.43	2	7	1-3
	9-36	35-55	1.55-1.70	0.06-0.2	0.11-0.16	5.1-8.4	High---------	0.32			
	36-60	24-50	1.55-1.70	0.06-0.2	0.09-0.11	7.4-8.4	High---------	0.32			
MgA-------------- McGary	0-11	22-27	1.35-1.50	0.6-2.0	0.22-0.24	6.6-7.3	Low----------	0.43	3	5	1-4
	11-39	35-50	1.60-1.75	<0.2	0.11-0.13	5.6-7.8	High---------	0.32			
	39-60	35-50	1.60-1.75	<0.2	0.14-0.16	7.9-8.4	High---------	0.32			
Mo--------------- Montgomery	0-15	35-48	1.35-1.55	0.2-0.6	0.12-0.23	6.1-7.8	High---------	0.37	5	7	3-6
	15-38	35-55	1.45-1.65	0.06-0.2	0.11-0.18	6.1-8.4	High---------	0.37			
	38-60	35-48	1.50-1.70	0.06-0.2	0.18-0.20	7.4-8.4	Moderate-----	0.37			
Mu--------------- Muskego	0-19	2-4	0.10-0.21	0.6-6.0	0.35-0.45	5.6-7.3	-------------	----	2	2	>50
	19-60	18-35	0.30-1.10	0.06-0.2	0.18-0.24	6.6-8.4	Moderate-----	0.28			
Ne--------------- Newark	0-10	7-27	1.20-1.40	0.6-2.0	0.15-0.24	5.6-7.8	Low----------	0.43	5	5	1-4
	10-32	9-35	1.20-1.45	0.6-2.0	0.18-0.23	5.6-7.8	Low----------	0.43			
	32-60	8-40	1.30-1.50	0.6-2.0	0.15-0.22	5.6-7.8	Low----------	0.43			
No, Nr----------- Nolin	0-8	12-27	1.20-1.40	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.43	5	5	2-4
	8-48	18-35	1.25-1.50	0.6-2.0	0.18-0.23	5.6-8.4	Low----------	0.43			
	48-60	10-30	1.30-1.55	0.6-6.0	0.10-0.23	5.1-8.4	Low----------	0.43			
PbC2, PbD2------- Parke	0-8	18-27	1.25-1.40	0.6-2.0	0.22-0.24	5.1-6.5	Low----------	0.37	5	5	.5-2
	8-31	22-35	1.30-1.45	0.6-2.0	0.18-0.20	4.5-6.5	Moderate-----	0.37			
	31-80	18-30	1.55-1.65	0.6-2.0	0.16-0.18	4.5-5.5	Low----------	0.28			
Pc--------------- Patton	0-16	27-35	1.15-1.35	0.6-2.0	0.21-0.23	6.6-7.3	Moderate-----	0.28	5	7	3-5
	16-60	27-40	1.25-1.45	0.2-0.6	0.18-0.20	6.1-7.8	Moderate-----	0.28			
PdB2------------- Pekin	0-10	15-26	1.30-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.43	4	5	1-3
	10-24	25-35	1.40-1.60	0.6-2.0	0.20-0.22	4.5-5.5	Low----------	0.43			
	24-52	22-30	1.60-1.80	<0.06	0.06-0.08	4.5-5.5	Low----------	0.43			
	52-60	20-34	1.40-1.60	0.6-2.0	0.06-0.08	4.5-7.3	Low----------	0.43			
Pf--------------- Peoga	0-16	15-26	1.30-1.45	0.6-2.0	0.20-0.24	4.5-7.3	Low----------	0.43	4	5	1-3
	16-56	22-34	1.40-1.60	0.06-0.2	0.18-0.20	4.5-6.0	Moderate-----	0.43			
	56-60	20-34	1.40-1.60	0.06-0.2	0.19-0.21	4.5-6.5	Low----------	0.43			
Pg--------------- Piankeshaw	0-6	15-25	1.20-1.40	0.6-2.0	0.14-0.20	6.1-7.3	Low----------	0.37	5	5	1-2
	6-26	18-25	1.20-1.40	0.6-2.0	0.09-0.18	6.1-7.3	Low----------	0.37			
	26-60	15-20	1.40-1.60	0.6-2.0	0.04-0.15	6.1-7.3	Low----------	0.37			

See footnote at end of table.

TABLE 17.--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	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
PkB2, PkC2: Pike	0-9	18-27	1.25-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Low	0.37	5	5	.5-2
	9-44	22-35	1.30-1.45	0.6-2.0	0.18-0.22	4.5-6.0	Low	0.37			
	44-66	18-35	1.30-1.45	0.6-2.0	0.12-0.18	4.5-5.5	Low	0.37			
	66-80	10-22	1.45-1.65	2.0-6.0	0.05-0.17	4.5-8.4	Low	0.37			
PrB, PrC: Princeton	0-11	12-20	1.35-1.50	0.6-2.0	0.13-0.18	5.6-7.3	Low	0.24	5	3	.5-2
	11-51	18-25	1.40-1.55	0.6-2.0	0.16-0.18	5.1-6.5	Low	0.32			
	51-64	8-18	1.40-1.55	2.0-6.0	0.12-0.14	5.1-7.3	Low	0.32			
	64-70	4-10	1.45-1.60	2.0-6.0	0.06-0.08	5.6-8.4	Low	0.17			
RaA: Reesville	0-13	12-20	1.20-1.45	0.6-2.0	0.17-0.24	5.1-7.3	Low	0.37	5	5	2-4
	13-44	27-35	1.30-1.55	0.6-2.0	0.17-0.22	5.1-7.8	Moderate	0.37			
	44-60	20-25	1.30-1.60	0.6-2.0	0.15-0.20	7.4-8.4	Low	0.37			
Rb: Rensselaer	0-15	9-20	1.20-1.40	0.6-2.0	0.13-0.15	6.1-7.8	Low	0.24	5	3	2-8
	15-59	18-35	1.40-1.60	0.6-2.0	0.15-0.20	6.1-7.8	Moderate	0.32			
	59-70	8-20	1.50-1.70	0.6-2.0	0.10-0.18	7.4-8.4	Low	0.43			
Rd: Rensselaer	0-15	11-27	1.30-1.45	0.6-2.0	0.20-0.24	6.1-7.3	Low	0.32	5	5	2-8
	15-59	18-35	1.40-1.60	0.6-2.0	0.15-0.20	6.1-7.8	Moderate	0.32			
	59-70	8-20	1.50-1.70	0.6-2.0	0.10-0.18	7.4-8.4	Low	0.43			
RmA: Roby	0-10	5-15	1.20-1.40	0.6-2.0	0.10-0.15	4.5-6.0	Low	0.20	4	3	1-2
	10-64	10-22	1.40-1.70	0.6-2.0	0.12-0.19	5.6-7.8	Low	0.28			
	64-80	3-15	1.50-1.85	2.0-6.0	0.04-0.17	5.6-7.8	Low	0.10			
ScA: Shakamak	0-10	18-27	1.30-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low	0.43	4	5	1-2
	10-28	24-32	1.35-1.50	0.2-0.6	0.18-0.22	4.5-6.0	Moderate	0.43			
	28-57	18-22	1.60-1.80	<0.06	0.06-0.08	4.5-5.5	Low	0.43			
	57-80	12-30	1.40-1.60	0.2-0.6	0.06-0.19	4.5-5.5	Low	0.43			
So, Sr: Steff	0-10	12-25	1.30-1.50	0.6-2.0	0.15-0.24	4.5-7.3	Low	0.43	5	5	1-2
	10-27	12-34	1.30-1.55	0.6-2.0	0.18-0.23	4.5-5.5	Low	0.43			
	27-60	10-25	1.40-1.65	0.6-6.0	0.08-0.21	4.5-5.5	Low	0.43			
St: Stendal	0-8	18-27	1.30-1.45	0.6-2.0	0.22-0.24	4.5-6.5	Low	0.37	5	5	1-3
	8-60	18-35	1.45-1.65	0.6-2.0	0.20-0.22	4.5-6.0	Low	0.37			
Ud. Udorthents											
UnE: Uniontown	0-6	12-20	1.20-1.40	0.6-2.0	0.19-0.33	5.1-7.3	Low	0.43	4	5	.5-2
	6-45	18-35	1.20-1.40	0.6-2.0	0.18-0.22	5.1-7.8	Low	0.37			
	45-60	10-30	1.20-1.40	0.2-2.0	0.18-0.22	6.6-8.4	Low	0.37			
VgA: Vigo	0-8	10-16	1.30-1.45	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.43	3	5	.5-2
	8-18	12-24	1.35-1.50	0.6-2.0	0.20-0.22	4.5-5.5	Low	0.43			
	18-80	24-35	1.40-1.55	<0.06	0.18-0.22	4.5-5.5	Moderate	0.43			
WcA: Waupecan	0-11	15-27	1.15-1.30	0.6-2.0	0.22-0.24	5.6-7.3	Low	0.32	4	6	4-5
	11-28	25-35	1.30-1.50	0.6-2.0	0.18-0.22	5.1-7.3	Moderate	0.43			
	28-48	10-30	1.55-1.75	2.0-6.0	0.08-0.18	5.1-7.3	Low	0.10			
	48-80	3-10	1.60-1.80	>20	0.02-0.04	5.1-8.4	Low	0.10			
WeD2, WeD3, WgD2: Wellston	0-5	13-27	1.30-1.50	0.6-2.0	0.18-0.22	5.1-7.3	Low	0.37	4	6	1-3
	5-27	18-35	1.30-1.65	0.6-2.0	0.17-0.21	4.5-6.0	Low	0.37			
	27-53	15-30	1.30-1.60	0.6-2.0	0.12-0.17	4.5-6.0	Low	0.37			
	53	---	---	---	---	---	-------------	----			

See footnote at end of table.

TABLE 17.--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	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
Wm---------------- Wilhite	0-10	40-50	1.40-1.45	0.2-0.6	0.12-0.14	5.1-7.3	High---------	0.32	5	4	1-3
	10-32	35-45	1.40-1.65	<0.06	0.08-0.18	5.1-6.5	Moderate-----	0.32			
	32-60	35-50	1.40-1.65	<0.06	0.08-0.20	5.1-7.3	High---------	0.32			
Wt---------------- Wirt	0-10	8-18	1.25-1.50	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.37	5	5	.5-3
	10-27	8-18	1.20-1.55	0.6-2.0	0.15-0.20	5.6-7.3	Low----------	0.24			
	27-60	5-18	1.20-1.60	2.0-6.0	0.07-0.17	5.6-7.3	Low----------	0.24			
ZaA, ZaB2, ZaC2, ZaC3------------ Zanesville	0-8	12-27	1.35-1.40	0.6-2.0	0.19-0.23	4.5-7.3	Low----------	0.43	3	5	1-2
	8-23	18-35	1.35-1.45	0.6-2.0	0.17-0.22	4.5-5.5	Low----------	0.37			
	23-54	18-33	1.50-1.75	0.06-0.6	0.08-0.12	4.5-5.5	Low----------	0.37			
	54-60	20-40	1.50-1.70	0.2-2.0	0.08-0.12	4.5-5.5	Low----------	0.28			
Zp---------------- Zipp	0-7	40-50	1.40-1.55	0.2-2.0	0.12-0.21	6.1-7.3	High---------	0.28	5	4	1-3
	7-47	35-55	1.55-1.70	<0.2	0.11-0.13	4.5-6.0	High---------	0.28			
	47-60	35-50	1.55-1.70	<0.2	0.08-0.10	6.6-8.4	High---------	0.28			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
AlB2, AlC2--------- Alford	B	None---------	---	---	>6.0	---	---	>60	---	High------	Moderate	High.
AnB*, AnC*:												
Alvin------------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Low-------	High.
Bloomfield--------	A	None---------	---	---	>6.0	---	---	>60	---	Low-------	Low-------	High.
Ao---------------- Ambraw	B/D	Rare---------	---	---	+.5-2.0	Apparent	Mar-Jun	>60	---	High------	High------	Moderate.
Ar---------------- Armiesburg	B	Occasional	Brief-----	Oct-Jun	>6.0	---	---	>60	---	High------	Moderate	Low.
AvB2-------------- Ava	C	None---------	---	---	2.0-4.0	Perched	Mar-Jun	>60	---	High------	Moderate	High.
Ay---------------- Ayrshire	C	None---------	---	---	1.0-3.0	Apparent	Jan-Apr	>60	---	High------	High------	Moderate.
Bb---------------- Bartle	D	None---------	---	---	1.0-2.0	Perched	Jan-Apr	>60	---	High------	High------	High.
BcF*:												
Berks------------	C	None---------	---	---	>6.0	---	---	20-40	Soft	Low-------	Low-------	High.
Ebal-------------	B	None---------	---	---	3.0-6.0	Perched	Nov-Mar	50-80	Soft	Moderate	High------	High.
BfG*:												
Berks------------	C	None---------	---	---	>6.0	---	---	20-40	Soft	Low-------	Low-------	High.
Rock outcrop.												
BlE, BlG---------- Bloomfield	A	None---------	---	---	>6.0	---	---	>60	---	Low-------	Low-------	High.
Bo---------------- Bonnie	C/D	Frequent----	Brief to long.	Jan-Jun	+.5-1.0	Apparent	Jan-Jun	>60	---	High------	High------	High.
Br, Bs------------ Booker	D	None---------	---	---	+.5-3.0	Perched	Nov-May	>60	---	Moderate	High------	Moderate.
CcE2, CcF--------- Chetwynd	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Low-------	High.

See footnote at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic 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				
CfC2, CfC3, CfD2, CfD3, ChC2: Cincinnati	C	None	---	---	2.5-4.0	Perched	Jan-Apr	>60	---	High	Moderate	High.
Cu: Cuba	B	Frequent	Brief	Jan-May	>6.0	---	---	>60	---	High	Low	High.
EcD*:												
Ebal	B	None	---	---	3.0-6.0	Perched	Nov-Mar	50-80	Soft	Moderate	High	High.
Gilpin	C	None	---	---	>6.0	---	---	40-60	Soft	Moderate	Low	High.
EfD2*:												
Ebal	B	None	---	---	3.0-6.0	Perched	Nov-Mar	50-80	Soft	Moderate	High	High.
Wellston	B	None	---	---	>6.0	---	---	>40	Hard	High	Moderate	High.
EnA: Elston	B	None	---	---	>6.0	---	---	>60	---	Low	Low	Moderate.
Ev: Evansville	B/D	Rare	---	---	+.5-1.0	Apparent	Jan-May	>60	---	High	High	Low.
FaB, FcC, FcE, FcG: Fairpoint	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
GcE2: Gilpin	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Low	High.
GfF*:												
Gilpin	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Low	High.
Berks	C	None	---	---	>6.0	---	---	20-40	Soft	Low	Low	High.
GgE*:												
Gilpin	C	None	---	---	>6.0	---	---	40-60	Soft	Moderate	Low	High.
Ebal	B	None	---	---	3.0-6.0	Perched	Nov-Mar	50-80	Soft	Moderate	High	High.
GmE*:												
Gilpin	C	None	---	---	>6.0	---	---	40-60	Soft	Moderate	Low	High.
Wellston	B	None	---	---	>6.0	---	---	>40	Hard	High	Moderate	High.
HaE2: Hagerstown	C	None	---	---	>6.0	---	---	40-60	Hard	Moderate	Moderate	Low.

See footnote at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic 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				
Hb---------------- Haymond	B	Frequent----	Brief-----	Jan-May	>6.0	---	---	>60	---	High-----	Low------	Low.
Hc---------------- Haymond	B	Rare--------	---	---	>6.0	---	---	>60	---	High-----	Low------	Low.
HdA--------------- Henshaw	C	None--------	---	---	1.0-2.0	Apparent	Nov-Mar	>60	---	High-----	High-----	Moderate.
HeD2, HeE, HeG---- Hickory	C	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
MbB2-------------- Markland	C	None--------	---	---	3.0-6.0	Perched	Mar-Apr	>60	---	Moderate	High-----	Moderate.
MgA--------------- McGary	C	None--------	---	---	1.0-3.0	Apparent	Jan-Apr	>60	---	Moderate	High-----	Low.
Mo---------------- Montgomery	D	None--------	---	---	+1-1.0	Apparent	Dec-May	>60	---	Moderate	High-----	Low.
Mu---------------- Muskego	A/D	None--------	---	---	+1-1.0	Apparent	Nov-Aug	>60	---	High-----	Moderate	Moderate.
Ne---------------- Newark	C	Frequent----	Brief-----	Jan-Apr	0.5-1.5	Apparent	Dec-May	>60	---	High-----	High-----	Low.
No---------------- Nolin	B	Occasional	Brief to long.	Feb-May	3.0-6.0	Apparent	Feb-Mar	>60	---	High-----	Low------	Moderate.
Nr---------------- Nolin	B	Rare--------	---	---	3.0-6.0	Apparent	Feb-Mar	>60	---	High-----	Low------	Moderate.
PbC2, PbD2-------- Parke	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	High.
Pc---------------- Patton	B/D	None--------	---	---	+.5-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
PdB2-------------- Pekin	C	None--------	---	---	2.0-6.0	Apparent	Mar-Apr	>60	---	High-----	Moderate	High.
Pf---------------- Peoga	C	None--------	---	---	0-1.0	Apparent	Jan-May	>60	---	High-----	High-----	High.
Pg---------------- Piankeshaw	B	Frequent----	Very brief	Mar-Jun	>6.0	---	---	>60	---	Moderate	Low------	Moderate.

See footnote at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
PkB2, PkC2-------- Pike	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Low------	High.
PrB, PrC---------- Princeton	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
RaA--------------- Reesville	C	None--------	---	---	1.0-2.5	Perched	Jan-Apr	>60	---	High-----	High-----	Moderate.
Rb, Rd------------ Rensselaer	B/D	None--------	---	---	+.5-1.0	Apparent	Dec-May	>60	---	High-----	Moderate	Low.
RmA--------------- Roby	C	None--------	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	Moderate	High.
ScA--------------- Shakamak	C	None--------	---	---	1.5-2.0	Perched	Nov-May	>60	---	High-----	Moderate	High.
So---------------- Steff	C	Rare--------	---	---	1.5-3.0	Apparent	Dec-Apr	>60	---	High-----	Moderate	High.
Sr---------------- Steff	C	Frequent----	Brief-----	Dec-Apr	1.5-3.0	Apparent	Dec-Apr	>60	---	High-----	Moderate	High.
St---------------- Stendal	C	Frequent----	Brief-----	Jan-May	1.0-3.0	Apparent	Jan-Apr	>60	---	High-----	High-----	High.
Ud. Udorthents												
UnE--------------- Uniontown	B	None--------	---	---	2.5-6.0	Apparent	Nov-May	>60	---	High-----	Low------	Moderate.
VgA--------------- Vigo	D	None--------	---	---	0.5-2.5	Apparent	Jan-Apr	>60	---	High-----	High-----	High.
WcA--------------- Waupecan	B	Rare--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
WeD2, WeD3, WgD2-- Wellston	B	None--------	---	---	>6.0	---	---	>40	Hard	High-----	Moderate	High.
Wm---------------- Wilhite	C/D	Frequent----	Brief-----	Dec-Jun	+.5-1.0	Apparent	Dec-May	>60	---	Moderate	High-----	Moderate.
Wt---------------- Wirt	B	Frequent----	Brief-----	Nov-Jun	>6.0	---	---	>60	---	Moderate	Low------	Moderate.

See footnote at end of table.

TABLE 18.--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				
ZaA, ZaB2, ZaC2, ZaC3 Zanesville	C	None	---	---	2.0-3.0	Perched	Dec-Apr	>40	Hard	High	Moderate	High.
Zp Zipp	D	None	---	---	+.5-1.0	Apparent	Dec-May	>60	---	Moderate	High	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 19.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
*Alford	Fine-silty, mixed, mesic Typic Hapludalfs
Alvin	Coarse-loamy, mixed, mesic Typic Hapludalfs
Ambraw	Fine-loamy, mixed, mesic Fluvaquentic Haplaquolls
Armiesburg	Fine-silty, mixed, mesic Fluventic Hapludolls
Ava	Fine-silty, mixed, mesic Typic Fragiudalfs
Ayrshire	Fine-loamy, mixed, mesic Aeric Ochraqualfs
Bartle	Fine-silty, mixed, mesic Aeric Fragiaqualfs
Berks	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Bloomfield	Sandy, mixed, mesic Psammentic Hapludalfs
Bonnie	Fine-silty, mixed, acid, mesic Typic Fluvaquents
Booker	Very fine, montmorillonitic, mesic Vertic Haplaquolls
*Chetwynd	Fine-loamy, mixed, mesic Typic Hapludults
Cincinnati	Fine-silty, mixed, mesic Typic Fragiudalfs
*Cuba	Fine-silty, mixed, mesic Fluventic Dystrochrepts
Ebal	Fine, mixed, mesic Ultic Hapludalfs
Elston	Coarse-loamy, mixed, mesic Typic Argiudolls
*Evansville	Fine-silty, mixed, nonacid, mesic Typic Haplaquepts
Fairpoint	Loamy-skeletal, mixed, nonacid, mesic Typic Udorthents
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Hagerstown	Fine, mixed, mesic Typic Hapludalfs
Haymond	Coarse-silty, mixed, nonacid, mesic Typic Udifluvents
Henshaw	Fine-silty, mixed, mesic Aquic Hapludalfs
Hickory	Fine-loamy, mixed, mesic Typic Hapludalfs
Markland	Fine, mixed, mesic Typic Hapludalfs
McGary	Fine, mixed, mesic Aeric Ochraqualfs
Montgomery	Fine, mixed, mesic Typic Haplaquolls
Muskego	Coprogenous, euic, mesic Limnic Medisaprists
Newark	Fine-silty, mixed, nonacid, mesic Aeric Fluvaquents
Nolin	Fine-silty, mixed, mesic Dystric Fluventic Eutrochrepts
Parke	Fine-silty, mixed, mesic Ultic Hapludalfs
*Patton	Fine-silty, mixed, mesic Typic Haplaquolls
Pekin	Fine-silty, mixed, mesic Aquic Fragiudalfs
Peoga	Fine-silty, mixed, mesic Typic Ochraqualfs
Piankeshaw	Fine-loamy, mixed, nonacid, mesic Typic Udifluvents
Pike	Fine-silty, mixed, mesic Ultic Hapludalfs
Princeton	Fine-loamy, mixed, mesic Typic Hapludalfs
Reesville	Fine-silty, mixed, mesic Aeric Ochraqualfs
Rensselaer	Fine-loamy, mixed, mesic Typic Argiaquolls
*Roby	Coarse-loamy, mixed, mesic Aquic Hapludalfs
Shakamak	Fine-silty, mixed, mesic Aquic Fragiudalfs
*Steff	Fine-silty, mixed, mesic Fluvaquentic Dystrochrepts
*Stendal	Fine-silty, mixed, acid, mesic Aeric Fluvaquents
Udorthents	Loamy, mesic Udorthents
Uniontown	Fine-silty, mixed, mesic Typic Hapludalfs
Vigo	Fine-silty, mixed, mesic Typic Glossaqualfs
Waupecan	Fine-silty, mixed, mesic Typic Argiudolls
Wellston	Fine-silty, mixed, mesic Ultic Hapludalfs
Wilhite	Fine, mixed, nonacid, mesic Typic Fluvaquents
Wirt	Coarse-loamy, mixed, nonacid, mesic Typic Udifluvents
Zanesville	Fine-silty, mixed, mesic Typic Fragiudalfs
*Zipp	Fine, mixed, nonacid, mesic Typic Haplaquepts

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