United States

In cooperation with

HOW TO USE

THIS SOIL SURVEY

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The 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 1982. Soil names and descriptions were approved in 1984. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1982. This survey was made cooperatively by the Soil Conservation Service, the Forest 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 Martin County Soil and Water Conservation District. Financial assistance was made available by the Martin County Board of Commissioners and the Indiana Department of Natural Resources.

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: Corn in an area of Wakeland, Wilbur, and Haymond soils on bottom land and Zipp and McGary soils on terraces.

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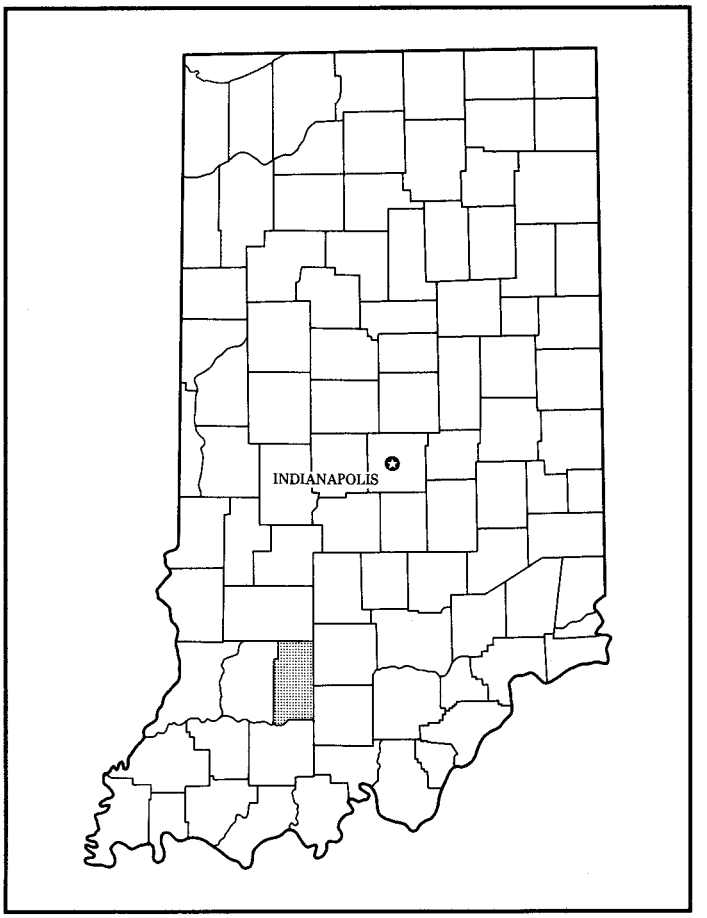
Foreword

This soil survey contains information that can be used in land-planning programs in Martin County, Indiana. 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.



Location of Martin County in Indiana.

Soil Survey of Martin County, Indiana

By George McElrath, Jr., Soil Conservation Service

Fieldwork by George McElrath, Jr., Soil Conservation Service, and David A. Tuszynski, Indiana Department of Natural Resources, Soil and Water Conservation Committee

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

MARTIN COUNTY is in the southwestern part of Indiana. It has a total area of 217,888 acres, or about 340 square miles. It extends about 28 miles from north to south and about 13 miles from west to east. Shoals is the county seat. The population of the county is about 11,000.

The county was established in 1820. The identity of the person after whom the county was named has never been ascertained (*4*).

The county is in the hilly part of Indiana. It lies almost entirely within the Crawford Upland, the most rugged and highly dissected part of Indiana. The streams flow southwesterly in narrow, deeply entrenched, meandering channels. The East Fork of the White River drains practically all of the county. It flows about 250 feet below the general level of the hilltops. A small area in the northwestern part of the county is drained by First Creek, a tributary of the West Fork of the White River. Land elevation in the county ranges from about 425 to 860 feet above sea level.

This survey updates the soil survey of Martin County published in 1946 (*6*). It provides additional information and larger maps, which show the soils in greater detail.

General Nature of the County

Farming

The chief farm products in Martin County are cattle, hogs, and poultry and corn, hay, soybeans, and wheat. Meadow crops provide forage for livestock. Most pastures support a mixture of fescue, timothy, red clover, and alfalfa. In 1978, about 74 percent of the local farm income came from the sale of livestock and poultry and their products. From 1974 to 1978, the number of cattle decreased and the number of hogs and poultry increased (*9*).

From 1974 to 1978, the number of farms decreased from 447 to 423, the average size of the farms decreased from 192 to 185 acres, the number of full owners of the farms decreased from 353 to 312, the number of part owners increased from 72 to 91, and the number of tenant farmers decreased from 22 to 20 (*9*). Some farmland has been converted to woodland.

Natural Resources

Soil is the most important natural resource in the county. It provides a growing medium for crops, for the plants grazed by livestock, and for timber.

Wisconsinan-age outwash fills the valley of the East Fork of the White River, which flows through the county. This outwash is an important source of moderate to large water supplies (*5*). The county has several lakes

Raw gypsum is mined in the county. Some of it is used as fertilizer, and much of it is used by the building industry. Coal is strip-mined in a few small areas, mainly in the southern part of the county.

Climate

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

Summers in Martin County are hot in the valleys and slightly cooler in the hills. Winters are moderately cold. Rainfall is fairly heavy and is well distributed throughout

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

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 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

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

1. Wellston-Berks-Gilpin

Deep and moderately deep, gently sloping to very steep, well drained soils formed in loess and material weathered from sandstone, siltstone, and shale on

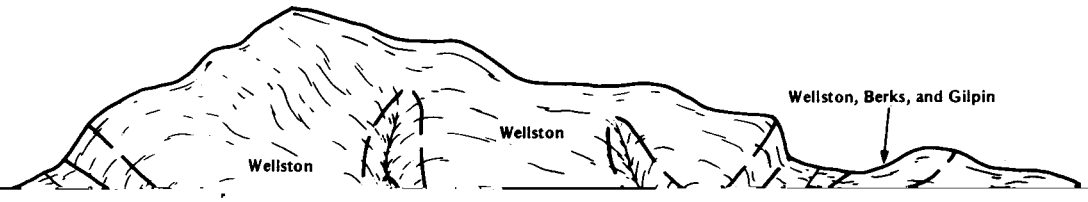
Berks soils are moderately deep and are moderately steep to very steep. Typically, they have a surface layer of brown channery silt loam. The subsoil is light yellowish brown channery and very channery loam. Rippable sandstone bedrock is at a depth of about 38 inches.

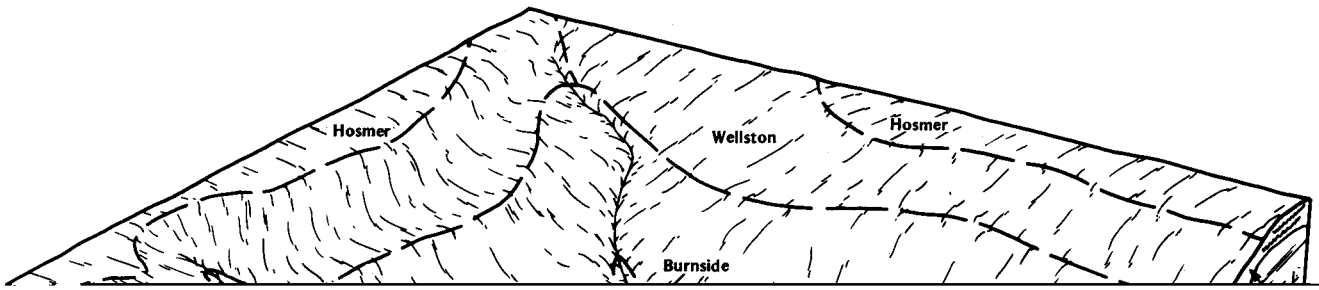
Gilpin soils are moderately deep and are strongly sloping to very steep. Typically, they have a surface layer of very dark grayish brown channery silt loam. The subsoil is yellowish brown channery silt loam and brown loam. The underlying material is yellowish brown channery loam. Bedrock is at a depth of about 39 inches.

The minor soils in this map unit are the well drained Burnside soils, the somewhat poorly drained Wakeland soils, the moderately well drained Wilbur soils, and the well drained and moderately well drained Zanesville soils. Burnside soils are deep and are on the lower end of drainageways that extend into the valley floors. Wakeland and Wilbur soils are along the streams that dissect the unit. Zanesville soils are deep, have a fragipan, and are on the ridgetops and side slopes.

This map unit is used mainly as woodland. Some of the less sloping areas are used as pasture or cropland. The soils are generally unsuited to cultivated crops. Because of the slope and the depth to bedrock, they are generally unsuitable as sites for dwellings and sanitary facilities. They are poorly suited to intensive recreational uses because of the slope.

2. Wellston-Gilpin


Wellston, Berks, and Gilpin
Wellston
Wellston


Hosmer
Wellston
Hosmer
Burnside

5. Newark-Wirt-Nolin

Deep, nearly level, somewhat poorly drained and well drained soils formed in alluvium on bottom land

This map unit is on broad bottom land, mainly along the White River. Areas generally vary in size and shape.

This map unit makes up about 3 percent of the county. It is about 30 percent Newark soils, 29 percent Wirt

brown. The subsoil is brown. The underlying material is dark yellowish brown.

The minor soils in this map unit are the well drained Abscota and Haymond soils and the somewhat poorly drained Wakeland soils. Abscota soils have more sand than the major soils and are along bends of the river. Haymond and Wakeland soils contain less clay than the Newark and Nolin soils and are along the streams that

somewhat poorly drained soils formed in loess or acid, silty material on uplands

This map unit is on ridgetops, terraces, and lake plains in the western part of the county. It makes up about 2

loam, sandy clay loam, and loamy fine sand. The underlying material is brown fine sand.

Chelsea soils are gently sloping to steep and are excessively drained. They are on uplands. Typically, the

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

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 Pits part of the Udorthents-Pits complex 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 fully join with those of the soils identified on the maps of adjoining counties published at an earlier

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 hay or pasture. A few are used for cultivated crops or woodland.

This soil is poorly suited to corn and soybeans. Flooding and drought are hazards. A system of conservation tillage that leaves protective amounts of crop residue on the surface conserves moisture. Cover crops and green manure crops improve or maintain tilth and the organic matter content.

This soil is suited to grasses and legumes for hay and pasture. The low available water capacity is a limitation. Proper stocking rates, pasture rotation, and timely deferment of grazing help to keep the pasture in good condition.

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

Because of the flooding, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields and is severely limited as a site for local roads and streets. Constructing the roads on

to a depth of 80 inches is very pale brown, calcareous fine sand. In some areas the soil has bands that total more than 6 inches thick within a depth of 60 inches. In other areas it does not have bands within a depth of 60 inches.

Included with these soils in mapping are small areas of the well drained Martinsville and Nolin soils. Martinsville soils have more clay in the subsoil than the Alvin and Chelsea soils. Also, they are lower on the landscape. Nolin soils have less sand in the subsoil than the Alvin and Chelsea soils. They are on bottom land. Included soils make up about 10 percent of the map unit.

Available water capacity is moderate in the Alvin soil and low in the Chelsea soil. Permeability is moderate or moderately rapid in the Alvin soil and rapid in the Chelsea soil. Surface runoff is medium on both soils. The organic matter content is low in the surface layer. This layer is very friable and can be easily tilled.

Most areas are used for hay and pasture. Some are used for cultivated crops or woodland. These soils generally are unsuited to corn, soybeans, and small grain because of droughtiness. If crops are grown to reestablish pastures, a conservation tillage system that leaves protective amounts of crop residue on the surface helps to control wind erosion and water erosion and

soils are on uplands. They are generally on side slopes. competing vegetation is controlled by cutting, girdling,

fieldwork is delayed. The soil is somewhat droughty during long dry periods in the summer. A system of conservation tillage that leaves protective amounts of crop residue on the surface, crop residue management, cover crops, and green manure crops help to maintain tilth and the organic matter content.

This soil is well suited to grasses and shallow-rooted legumes for hay and pasture. It is not well suited to deep-rooted legumes, such as alfalfa. Grazing during wet periods causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to prevent excessive compaction and maintain good tilth.

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

If drained, this soil is suited to corn and soybeans. The high water table is a limitation, and the frequent flooding is a hazard. Establishing an adequate drainage system is difficult in areas where suitable outlets are not available. Flooding during the winter destroys most stands of small grain. A system of conservation tillage that leaves protective amounts of crop residue on the surface, cover crops, and green manure crops improve or maintain tilth and the organic matter content.

This soil is well suited to grasses and shallow-rooted legumes for hay and pasture. It is not suited to alfalfa.

Included with this soil in mapping are a few small areas of the somewhat poorly drained Wakeland soils. These soils are in the slightly higher positions on the

ditches, and installing culverts help to prevent the damage caused by ponding and flooding.

The land capability classification is IIIw. The woodland

because of the flooding and the wetness. It is severely limited as a site for local roads and streets because of the flooding. Constructing the roads on raised, well compacted fill material, establishing adequate roadside drainage ditches, and installing culverts help to prevent the damage caused by flooding.

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

CaB—Camden silt loam, 1 to 5 percent slopes. This nearly level and gently sloping, deep, well drained soil is on stream terraces. Individual areas are irregular in shape and are 5 to 20 acres in size.

In a typical profile, the surface layer is brown silt loam about 10 inches thick. The subsoil is about 52 inches thick. It is friable. It is yellowish brown silty clay loam in the upper part and strong brown loam in the lower part. The underlying material to a depth of 80 inches is yellowish brown, stratified loam and sandy loam. In some places the subsoil has more clay. In other places the subsoil and underlying material are more acid. In some areas the upper part of the subsoil is mottled. In other areas the slope is more than 5 percent.

Included with this soil in mapping are small areas of the well drained Wellston soils on toe slopes. These soils formed in loess and in material weathered from sandstone, siltstone, and shale. Also included are a few small areas that are severely eroded. Included soils make up about 10 percent of the map unit.

Available water capacity is high in the Camden soil. Permeability is moderate. Surface runoff is medium. The organic matter content is moderately low in the surface layer. This layer is friable and can be easily tilled throughout a wide range in moisture content.

Most areas of this soil are used for cultivated crops or

swelling. The soil is suitable as a site for septic tank absorption fields. It is severely limited as a site for local roads and streets because of frost action and low strength. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic and reduces the potential for frost action.

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

CnB—Cincinnati silt loam, 3 to 10 percent slopes. This gently sloping and moderately sloping, deep, well drained soil is on till plains. Individual areas are irregular in shape and are 5 to 50 acres in size.

In a typical profile, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil extends to a depth of 80 inches or more. The upper part is yellowish brown, friable and firm silt loam and silty clay loam, and the lower part is a fragipan of yellowish brown, mottled, firm, brittle silty clay loam. In places the slope is more than 10 percent. In some areas the soil has sandstone, siltstone, and shale residuum in the underlying material. In other areas it has more than 40 inches of loess.

Included with this soil in mapping are a few small areas of the somewhat poorly drained Bartle soils on the less sloping parts of the landscape. Also included are small severely eroded areas on the steeper slopes. Included soils make up about 10 percent of the map unit.

Available water capacity is moderate in the Cincinnati soil. Permeability is moderate above the fragipan and moderately slow or slow in the fragipan. Surface runoff is medium. The organic matter content is moderate in the surface layer. The water table is often at a depth of 2.5 to 4.0 feet during winter and early spring. The firm, brittle

the soil is too wet causes surface compaction, excessive runoff, and poor tilth and reduces plant density. 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 suited to trees. The root zone is limited mainly to the part of the profile above the fragipan. Plant competition is the major management concern. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the wetness, this soil is moderately limited as a site for dwellings with basements. It is suitable as a site for dwellings without basements. Buildings with basements can be constructed on raised, well compacted fill material, which helps to overcome the wetness. The soil is severely limited as a site for septic tank absorption fields because of the wetness and the moderately slow or slow permeability. Installing the absorption field in raised suitable fill material helps to

This soil is suited to corn, soybeans, and small grain. If cultivated crops are grown, measures that control erosion are needed. Crop rotations that include grasses and legumes, a system of conservation tillage that leaves protective amounts of crop residue on the surface, grade stabilization structures, and cover crops help to control erosion and improve or maintain tilth and the organic matter content.

This soil is well suited to grasses and legumes for hay and pasture. Proper stocking rates and pasture rotation 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 proper site preparation and by spraying, cutting, or girdling.

Because of the slope, this soil is moderately limited as a site for dwellings and septic tank absorption fields. Designing the buildings so that they conform to the natural slope of the land and installing the absorption

and water should be removed by water bars, culverts, mortality rate, special planting stock and overstocking

This soil is suited to grasses and legumes for hay and pasture. Overgrazing or grazing when the soil is too wet causes surface compaction, poor tilth, and excessive runoff and 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. The erosion hazard and the equipment limitation are the main management concerns. During wet periods, logging roads tend to be slippery and ruts form readily. The use of equipment is limited when the soil is wet and sticky. Establishing

manure crops improve or maintain tilth and the organic matter content.

This soil is well suited to grasses and legumes for hay and pasture. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth and reduces plant density. 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. Plant competition is the main management concern. Special harvest methods

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. If cultivated crops are grown, measures that control erosion are needed. Examples are a system of conservation tillage that leaves protective amounts of crop residue on the surface, contour farming, crop rotations that include grasses and legumes, terraces, and grassed waterways. Because the very slowly permeable fragipan restricts the downward movement of water, the soil is often saturated in winter and spring. As a result, fieldwork is delayed. The soil is somewhat droughty during long dry periods in the summer. Cover crops and green manure crops improve or maintain tilth and the organic matter content.

This soil is well suited to grasses and shallow-rooted legumes for hay and pasture. It is not suited to alfalfa and other deep-rooted legumes because root growth is restricted by the fragipan. Erosion and excessive runoff are hazards if the pasture is overgrazed. 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. The windthrow hazard

on the tops of ridges in the uplands. Individual areas are irregularly shaped and are 5 to 40 acres in size.

In a typical profile, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is dark yellowish brown silt loam about 5 inches thick. The subsoil is about 47 inches thick. The upper part is yellowish brown, mottled, friable silty clay loam; the next part is a fragipan of yellowish brown, mottled, firm, brittle silty clay loam; and the lower part is yellowish brown, mottled, friable silt loam. The underlying material to a depth of 70 inches is yellowish brown, mottled silt loam. In some depressional areas the soil is poorly drained, does not have a fragipan, and has more than 4 feet of loess. In places the slope is more than 2 percent.

Included with this soil in mapping are small areas of the well drained Wellston and Zanesville soils on the more sloping parts of the landscape. These soils make up about 10 percent of the map unit.

Available water capacity is moderate in the Johnsburg soil. Permeability is moderate above the fragipan and very slow in the fragipan. Surface runoff is slow. The organic matter content is moderate in the surface layer. The water table is at a depth of 1 to 3 feet during winter

competition can be controlled by proper site preparation or by cutting, girdling, or spraying.

Because of the wetness, this soil is severely limited as a site for dwellings. Subsurface drains help to lower the

are management concerns. Because of the seedling mortality rate, special planting stock and overstocking are needed. Carefully thinning the stands or not thinning

timely deferment of grazing help to keep the pasture in good condition.

This soil is suited to trees. Seedling mortality, the windthrow hazard, and plant competition are management concerns. Because of the seedling mortality rate, special planting stock and overstocking are needed. Carefully thinning the stands or not thinning them at all reduces the windthrow hazard. Plant competition can be controlled by proper site preparation or by cutting, girdling, or spraying.

Because of the shrink-swell potential, this soil is severely 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 septic tank absorption fields because of the wetness and the slow permeability. Filling or mounding the absorption field with suitable material helps to minimize the restricted permeability. Installing subsurface drains around the edges of the absorption field helps to lower the water table.

Low strength and the shrink-swell potential are severe

This soil is well suited to corn, soybeans, and small grain. A system of conservation tillage that leaves protective amounts of crop residue on the surface, cover crops, and green manure crops increase the organic matter content and help to maintain good tilth.

This soil is well suited to grasses and legumes 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 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 severely 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 suitable as a site for septic tank absorption fields. It is moderately limited as a site for local roads and streets because of low strength and frost action. Strengthening or replacing the base with better suited

surface, cover crops, and green manure crops help to maintain tilth and the organic matter content.

This soil is well suited to grasses and shallow-rooted legumes for hay and pasture. It is not well suited to deep-rooted legumes, such as alfalfa. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to prevent excessive compaction and maintain good tilth and plant density.

This soil is suited to trees. The main management concerns are seedling mortality, the windthrow hazard, and plant competition. Because of the seedling mortality rate, special planting stock and overstocking are needed. Harvest methods that do not isolate the remaining trees or leave them widely spaced help to prevent windthrow. Plant competition can be controlled by proper site preparation or by cutting, girdling, or spraying.

Because of the flooding, this soil is generally unsuitable as a site for dwellings. It is severely limited as a site for septic tank absorption fields because of the wetness and the restricted permeability. Subsurface drains help to lower the water table. Installing the absorption field in suitable fill material helps to minimize the restricted permeability. The 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 and streets to support vehicular traffic.

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

NeE—Negley silt loam, 18 to 35 percent slopes. This moderately steep and steep, deep, well drained soil

Most areas are used as woodland. A few small areas are pastured. This soil is generally unsuited to cultivated crops and is poorly suited to grasses and legumes for hay and pasture because of the moderately steep and steep slopes. Permanent pastures can be established in the less sloping areas.

This soil is well suited to trees. The equipment limitation, the erosion hazard, and plant competition are management concerns. The slope hinders the use of some logging equipment. Establishing logging roads, skid trails, and landings on gentle grades and removing water by water bars, culverts, and drop structures help to control erosion. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the slope, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields and is severely limited as a site for local roads. Constructing the roads on the contour and land shaping help to overcome the slope.

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

Nm—Newark silt loam, frequently flooded. This nearly level, deep, somewhat poorly drained soil is on flood plains. It is flooded for brief periods. Individual areas are long and irregular in shape and are 50 to 150 acres in size.

In a typical profile, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsurface layer also is dark grayish brown silt loam. It is about 6 inches thick. The subsoil is about 19 inches thick. It is mottled and friable. The upper part is grayish brown silt loam, and the lower part is light brownish gray silty clay loam. The underlying material to a depth of 60 inches is

This soil is well suited to grasses and shallow-rooted legumes for hay and pasture. It is not suited to alfalfa and other deep-rooted legumes because of the high water table, which causes frost heaving. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods and immediately after flooding help to keep the pasture in good condition. A drainage system is necessary. Subsurface drains can lower the water table if adequate outlets are available.

This soil is well suited to trees. The equipment limitation, the windthrow hazard, and plant competition are the main management concerns. The high water table can hinder harvesting, logging, and planting. Harvest methods that do not isolate the remaining trees or leave them widely spaced help to prevent windthrow. Plant competition can be controlled by proper site preparation or by cutting, spraying, or girdling.

crop residue on the surface, cover crops, and green manure crops improve or maintain tilth and the organic matter content.

This soil is well suited to grasses and legumes for hay and pasture. Overgrazing causes surface compaction and poor tilth and reduces plant density. 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. Plant competition and the equipment limitation are the main management concerns. Equipment should be used only when the hazard of flooding is at a minimum. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the flooding, this soil is generally unsuitable as a site for dwellings and septic tank

surface, crop rotations that include grasses and legumes, diversions, contour farming, grassed waterways, and grade stabilization structures help to control erosion and improve or maintain tilth and the

This soil is poorly suited to corn, soybeans, and small grain. Cultivated crops can be grown occasionally. Erosion is the major hazard. A system of conservation tillage that leaves all or part of the crop residue on the

control erosion are needed. Examples are a system of conservation tillage that leaves protective amounts of crop residue on the surface, contour farming, crop

This layer is friable and can be easily tilled throughout a fairly wide range in moisture content.

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

No land capability classification or woodland ordination symbol is assigned.

Up—Udorthents-Pits complex. This unit is in excavated areas on uplands. It occurs as areas of soil material left over from sandstone quarrying and a few areas of sand pits. Individual areas are 18 to 36 acres in size. They are generally elongated, but some are irregular in shape. The unit is about 55 percent Udorthents and 35 percent Pits. The Udorthents and Pits

No land capability classification or woodland ordination symbol is assigned.

Wa—Wakeland silt loam, frequently flooded. This nearly level, deep, somewhat poorly drained soil is on flood plains. It is flooded for brief periods. Individual areas are long and irregularly shaped and are 5 to 600 acres in size.

In a typical profile, the surface layer is brown silt loam about 7 inches thick. The underlying material to a depth

bedrock is at a depth of about 41 inches. In a few small areas, the slope is more than 6 percent.

Included with this soil in mapping are small areas of the moderately well drained and well drained Zanesville soils, which have a fragipan. These soils make up about 10 percent of the map unit.

Available water capacity is high in the Wellston soil. Permeability is moderate. Surface runoff is medium. 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 hay, pasture, or woodland. A few are used for cultivated crops.

This soil is well suited to corn, soybeans, and small grain. Erosion and runoff are the major hazards if cultivated crops are grown. A system of conservation tillage that leaves all or part of the crop residue on the surface, crop rotations that include grasses and legumes, contour farming, terraces, diversions, and

lower part is strong brown, firm and friable silt loam and silty clay loam. The underlying material to a depth of 60 inches is dark yellowish brown very channery loam in which the content of sandstone fragments is about 60 percent. In some areas the subsoil and underlying material are fine textured. In other areas the slope is less than 6 or more than 12 percent. In some places the upper part of the subsoil is mottled. In other places small gullies have formed.

Included with this soil in mapping are small areas of the moderately well drained and well drained Zanesville soils. These soils have a fragipan. They are mainly on the wider ridgetops. Also included are severely eroded areas, mainly near the top of the slopes. Included soils make up about 10 percent of the map unit.

Available water capacity is high in the Wellston soil. Permeability is moderate. Surface runoff is rapid. The organic matter content is moderate in the surface layer.

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

WeD2—Wellston silt loam, 12 to 18 percent slopes, eroded. This strongly sloping, deep, well drained soil is on side slopes along drainageways in the uplands. Individual areas are irregular in shape and are 10 to 30 acres in size.

In a typical profile, the surface layer is dark grayish brown silt loam about 5 inches thick. It is mixed with some strong brown subsoil material. The subsoil is firm silty clay loam about 35 inches thick. The upper part is strong brown, and the lower part is yellowish brown. The underlying material to a depth of 60 inches is yellowish brown, mottled channery clay loam in which the content of sandstone fragments is about 15 percent. In some areas the subsoil is coarser textured. In other areas the subsoil and underlying material are fine textured. In some places the slope is less than 12 or more than 18 percent. In other places small gullies have formed.

Included with this soil in mapping are small areas of the moderately well drained and well drained Zanesville soils. These soils have a fragipan. They are in the less sloping areas. Also included are small areas of alluvial soils along the drainageways. Included soils make up about 10 percent of the map unit.

Available water capacity is high in the Wellston soil. Permeability is moderate. Surface runoff is very rapid. The organic matter content is moderate in the surface

Building on the contour and land shaping help to overcome the slope. Replacing or covering the upper soil layers with suitable base material helps to prevent the damage caused by frost action.

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

WeD3—Wellston silt loam, 12 to 18 percent slopes, severely eroded. This strongly sloping, deep, well drained soil is on side slopes along drainageways in the uplands. Individual areas are irregular in shape and are 10 to 30 acres in size.

In a typical profile, the surface layer is mixed dark yellowish brown and strong brown silt loam about 5 inches thick. The subsoil is about 35 inches thick. The upper part is strong brown, firm silty clay loam and silt loam, and the lower part is brown, friable loam. The underlying material to a depth of 60 inches is yellowish brown gravelly loam. In some areas the subsoil is coarser textured. In other areas the subsoil and underlying material are fine textured. In some places the slope is less than 12 or more than 18 percent. In other places gullies have formed.

Included with this soil in mapping are small areas of the moderately well drained and well drained Zanesville soils. These soils have a fragipan. They are in the less sloping areas. Also included are small areas of alluvial soils along the drainageways. Included soils make up

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

WgG—Wellston-Berks-Gilpin complex, 18 to 70 percent slopes. These moderately steep to very steep, well drained soils are on side slopes in the uplands. The Wellston soil is deep, and the Berks and Gilpin soils are

in the less sloping areas, but access to these areas is limited.

These soils are fairly well suited to trees. The erosion hazard, the equipment limitation, and plant competition are management concerns. Seedling mortality also is a concern on the Berks soil. Special logging methods, such as yarding the logs uphill with a cable, may be

the wider ridgetops. Also included are severely eroded areas, mainly near the top of the slopes. Included soils make up about 10 percent of the map unit.

Available water capacity is high in the Wellston soil and moderate in the Ebal soil. Permeability is moderate in the Wellston soil. It is moderate in the upper part of the Ebal soil and very slow in the lower part. Surface runoff is rapid on both soils. The organic matter content is moderate in the surface layer. The Ebal soil has a water table at a depth of 3 to 6 feet during winter and early spring.

Most areas of these soils are used as woodland. A few are pastured.

These soils are poorly suited to cultivated crops. Row crops can be grown occasionally to establish hay or pasture species. Erosion is the major hazard. A system

WnE—Wellston-Gilpin complex, 12 to 30 percent slopes. These strongly sloping to steep, well drained soils are on hillsides in the uplands. The Wellston soil is deep, and the Gilpin soil is moderately deep. Individual areas are dominantly 45 to 300 acres in size. They are about 60 percent Wellston soil and 30 percent Gilpin soil. The two soils occur as areas so intricately mixed that mapping them separately is not practical.

In a typical profile of the Wellston soil, the surface layer is dark grayish brown silt loam about 2 inches thick. The subsurface layer is brown silt loam about 4 inches thick. The subsoil is silt loam about 43 inches thick. It is dark yellowish brown and friable in the upper part, strong brown and firm in the next part, and brown and friable in the lower part. The underlying material to a depth of 60 inches is yellowish brown silt loam. In places the content of sandstone fragments in the subsoil is more than 15

Because of the slope, these soils are generally unsuitable as sites for dwellings. They are unsuitable as sites for septic tank absorption fields because of the

hay and pasture. Because of past construction and excavation, they are subject to extensive erosion. A cover of grasses and legumes helps to control erosion

crop residue on the surface, cover crops, and green manure crops improve or maintain tilth and the organic matter content.

This soil is well suited to grasses and shallow-rooted legumes for hay and pasture. It is not suited to alfalfa and other deep-rooted legumes because of the high water table, which causes frost heaving. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth and reduces plant density. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition. A drainage system is necessary. Subsurface drains can lower the water table if adequate outlets are available.

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

This soil is well suited to grasses and legumes for hay and pasture. Overgrazing causes surface compaction and poor tilth 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 well suited to trees. Plant competition is the main management concern. Seedlings survive and grow well if competing vegetation is controlled by cutting, girdling, or spraying.

Because of the flooding, this soil is generally unsuitable as a site for dwellings and septic tank absorption fields and is severely limited as a site for local roads. Constructing the roads on raised, well compacted fill material, establishing adequate roadside drainage ditches, and installing culverts help to prevent the damage caused by flooding.

The land-capability classification is IIw. The woodland

Available water capacity is moderate in the Zanesville soil. Permeability is moderate above the fragipan and slow in the fragipan. Surface runoff is rapid. The organic matter content is moderate in the surface layer. The water table is at a depth of 2 to 3 feet during winter and early spring. The firm, brittle fragipan, which is at a depth of about 23 to 31 inches, restricts the penetration of roots. The surface layer is friable and can be easily tilled.

Most areas of this soil are used for hay and pasture. Many are used for cultivated crops, and some are wooded.

This soil is suited to corn, soybeans, and small grain. If cultivated crops are grown, measures that control erosion are needed. Examples are crop rotations that include grasses and legumes, a system of conservation tillage that leaves protective amounts of crop residue on the surface, terraces, diversions, grassed waterways, and grade stabilization structures. Because the slowly

ZaC3—Zanesville silt loam, 6 to 12 percent slopes, severely eroded. This moderately sloping, deep, well drained and moderately well drained soil is on ridgetops and the upper side slopes along natural drainageways in the uplands. Individual areas are long and irregularly shaped and are 3 to 30 acres in size.

In a typical profile, the surface layer is brown silt loam about 1 inch thick. The subsoil is about 38 inches of silt loam and silty clay loam. The upper part is strong brown and friable, and the lower part is a yellowish brown, firm, brittle fragipan. The underlying material to a depth of 70 inches is yellowish brown silty clay loam. In a few areas the soil is less eroded. In some places the slope is more than 12 percent. In other places the depth to the top of the fragipan is less than 23 inches. In some areas small gullies have formed.

Included with this soil in mapping are a few areas of the well drained Wellston soils. These soils do not have

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. The buildings should be designed so that they conform to the natural slope of the land. Constructing the buildings on raised, well compacted fill material helps to overcome the wetness. The soil is severely limited as a site for septic tank absorption fields because of the wetness and the slow permeability. Subsurface drains help to lower the water table. Installing the absorption field in suitable fill material helps to minimize the restricted permeability.

Low strength is a severe limitation on sites for local roads and streets. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic.

The land capability classification is IVe. The woodland ordination symbol is 3A.

ZnB—Zanesville-Udorthents complex, 2 to 6 percent slopes. These gently sloping, shallow to deep, well drained and moderately well drained soils are on the tops of ridges in the uplands. The Udorthents are in areas that have been affected by earth-moving activities. Individual areas are generally long and narrow and are 5 to 40 acres in size. They are about 48 percent Zanesville soil and 42 percent Udorthents. The Zanesville soil and Udorthents occur as areas so intricately mixed that mapping them separately is not practical.

In a typical profile of the Zanesville soil, the surface layer is very dark grayish brown silt loam about 1 inch thick. The subsoil is silty clay loam about 58 inches thick. The upper part is yellowish brown and friable; the next part is yellowish brown, mottled, and friable; and the lower part is a strong brown, mottled, firm, brittle fragipan. The underlying material to a depth of 65 inches is yellowish brown, mottled loam in which the content of sandstone fragments is about 10 percent. In areas affected by construction and earth moving, the surface layer has been removed. In some places small gullies have formed. In other places a thin surface layer is starting to form. In some areas the slope is less than 2 or more than 6 percent. In other areas the soil has more than 48 inches of loess.

In a typical profile of the Udorthents, the upper 45 inches is brown, mottled silt loam, silty clay loam, and loam. Bedrock is at a depth of about 45 inches. In some areas a thin surface layer is starting to form. These areas are at the Crane Naval Weapons Support Center, where a significant amount of construction and earth moving has altered the natural landscape.

Included with these soils in mapping are small areas of the somewhat poorly drained Johnsburg soils on the more nearly level parts of the ridgetops. Also included are small areas of the well drained Wellston soils, mainly on the narrower ridgetops. Included soils make up about 10 percent of the map unit.

The Zanesville soil has a moderate available water capacity. It is moderately permeable above the fragipan and slowly permeable in the fragipan. Permeability and available water capacity generally are moderate in the Udorthents. Surface runoff is medium on both soils. The organic matter content is low in the surface layer. The Zanesville soil has a water table at a depth of 2 to 3 feet during winter and early spring. The firm, brittle fragipan, which is at a depth of about 27 inches, restricts the penetration of roots.

Most areas of these soils are used as woodland. Some are used as grassland.

These soils are poorly suited to cultivated crops. Erosion and runoff are the major hazards if cultivated crops are grown. A system of conservation tillage that leaves protective amounts of crop residue on the surface, diversions, and grassed waterways help to control erosion and runoff, increase the organic matter content, and help to maintain good tilth. Because the slowly permeable fragipan restricts downward movement of water, the Zanesville soil is often saturated in winter and spring. As a result, tillage is delayed. The soils are somewhat droughty during long dry periods in the summer.

These soils are well suited to grasses and shallow-rooted legumes for hay and pasture. The Zanesville soil is not suited to deep-rooted legumes because root growth is restricted by the fragipan. Because of past construction and excavation, the soils are subject to extensive erosion. Planting grasses and shallow-rooted legumes helps to prevent excessive soil loss.

These soils are well suited to trees. Some small areas support stands of native hardwoods. Plant competition is the main management concern. It can be controlled by proper site preparation and by spraying, cutting, or girdling.

Because of the wetness, the Zanesville soil is moderately limited as a site for dwellings without basements and is severely limited as a site for dwellings with basements. Subsurface drains help to lower the water table. This soil is severely limited as a site for septic tank absorption fields because of the wetness and the slow permeability. The slowly permeable material should be replaced with better suited material. Installing subsurface drains around the outer edges of the absorption field reduces the wetness.

Low strength is a severe limitation if the Zanesville soil is used as a site for local roads and streets. Strengthening or replacing the base with better suited material improves the ability of the roads and streets to support vehicular traffic.

The Zanesville soil is assigned to land capability classification IIIe and woodland ordination symbol 4A. The Udorthents are not assigned to interpretive groups.

ZnC—Zanesville-Udorthents complex, 6 to 12 percent slopes. These moderately sloping, shallow to

deep, well drained and moderately well drained soils are on the tops of ridges in the uplands. The Udorthents are in areas that have been affected by earth-moving activities. Individual areas are generally irregular in shape and are 5 to 25 acres in size. They are about 50 percent Zanesville soil and 40 percent Udorthents. The Zanesville soil and Udorthents occur as areas so intricately mixed that mapping them separately is not practical.

In a typical profile of the Zanesville soil, the surface layer is dark grayish brown silt loam about 1 inch thick. The subsoil is about 47 inches thick. The upper part is brown, friable silt loam; the next part is yellowish red, firm silty clay loam; and the lower part is a fragipan of yellowish brown, firm, brittle silty clay loam. The underlying material is yellowish brown channery clay loam about 7 inches thick. Bedrock is at a depth of

in winter and spring. As a result, tillage is delayed. The soils are somewhat droughty during long dry periods in the summer.

These soils are suited to grasses and shallow-rooted legumes for hay and pasture. The Zanesville soil is not suited to deep-rooted legumes because root growth is restricted by the fragipan. Because of past construction and excavation, the soils are subject to extensive erosion. Planting grasses and shallow-rooted legumes helps to prevent excessive soil loss.

These soils are suited to trees. Many areas support stands of native hardwoods. The root zone in the Zanesville soil is limited to the part of the profile above the fragipan. Seedling mortality and plant competition are the main management concerns. Because of the seedling mortality rate, special planting stock and

Available water capacity is moderate in the Zipp soil. Permeability is slow. Surface runoff is very slow. The organic matter content is moderate in the surface layer. The water table is near or above the surface during winter and early spring.

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

This soil is suited to corn, soybeans, and small grain. The wetness is the major limitation. Excess water can be removed by surface drains if adequate outlets are available. A system of conservation tillage that leaves protective amounts of crop residue on the surface, cover

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

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

Fred L. Woods, soil conservation technician, 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.

About 68,075 acres in Martin County was used for crops and pasture in 1967. Of this total, 30,075 acres was permanent pasture and 38,000 acres was cropland. Of the acreage used as cropland, 18,489 acres was used for row crops (fig. 7); 2,269 acres for close-grown crops, mainly wheat; 6,000 acres for rotation hay and pasture; 1,890 acres for hay; 6,118 acres for conservation purposes; and 20 acres for orchards. About 3,025 acres was temporarily idle cropland, and 189 acres was other formerly cropped land (*3*).

The potential of the soils in Martin County for increased food production is fair. About 10,401 acres of potentially good cropland is currently used as woodland and 10,728 acres as pasture. 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 cropland in the county. This soil survey can greatly facilitate 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 water erosion, drainage, fertility, and tilth.

Water erosion is the major management concern on about 92 percent of the cropland and pasture in the county. It is a hazard on soils that have a slope of more than 2 percent. Parke, Wellston, and Zanesville soils are examples.

Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on the moderately deep Berks and Gilpin soils and on soils having a layer in the subsoil that limits the depth of the root zone. Such layers include the fragipan in Bartle, Hosmer, and Zanesville soils. Erosion also reduces the productivity of soils that tend to be droughty, such as Alvin and Chelsea soils. Second, erosion results in sedimentation in streams.

organic matter. Generally, the structure of these soils is moderate or weak. During periods of heavy rainfall, a crust can form at the surface. In some areas the crust is hard and impervious to water when dry. As a result, it reduces the rate of water infiltration and increases the

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.

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

Upland oak-hickory is the dominant timber type in the county. It grows on a large acreage of the moderately well drained and well drained soils in the uplands. The tree species include white, black, red, scarlet, and chinkapin oaks and shagbark, bitternut, pignut, and mockernut hickories. Other common species are ash, maple, and yellow-poplar.

Beech-maple is another important timber type on the well drained soils in the uplands. It generally grows on the middle parts of north- and northeast-facing slopes. The dominant trees are American beech, red maple, and

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

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. It 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

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

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

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, sorghum, and sunflowers.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, timothy, lovegrass, bromegrass, bluegrass, clover, and alfalfa.

stoniness, slope, and permeability. Examples of shallow water areas are marshes, 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, pheasant, meadowlark, field sparrow, cottontail, red fox, and woodchuck.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous

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.

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

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. 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 [illegible]

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 [illegible]

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

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

Water Management

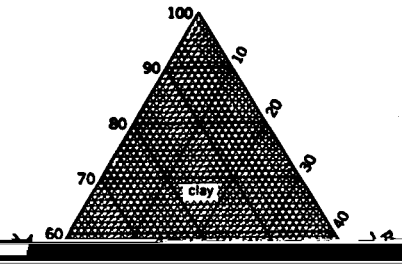
Table 15 gives information on the soil properties and

A high water table affects the amount of usable material. It also affects trafficability.

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



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

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

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

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 wind erosion.

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

If a soil is assigned to two hydrologic groups in table

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*8*). 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. 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-loamy, 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 underlying material 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* (*7*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*8*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon

Typical pedon of Abscota loamy sand, frequently flooded, in a hayfield; 2,600 feet east and 660 feet south of the northwest corner of sec. 5, T. 3 N., R. 3 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loamy sand, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

Bw1—8 to 13 inches; dark grayish brown (10YR 4/2) loamy fine sand; weak medium subangular blocky structure; friable; many fine roots; slightly acid; clear wavy boundary.

Bw2—13 to 24 inches; brown (10YR 4/3) sand; weak coarse subangular blocky structure; friable; many fine roots; slightly acid; gradual wavy boundary.

C1—24 to 49 inches; yellowish brown (10YR 5/4) sand; single grain; loose; many fine roots; few fine brown (10YR 4/3) streaks; slightly acid; abrupt wavy boundary.

C2—49 to 55 inches; brown (10YR 4/3) sand; single grain; loose; common fine roots; slightly acid; abrupt wavy boundary.

C3—55 to 60 inches; dark yellowish brown (10YR 4/4) sand; single grain; loose; slightly acid.

The Ap horizon has hue of 10YR, value of 3 or 4, and

E—5 to 12 inches; dark grayish brown (10YR 4/2) loamy fine sand; moderate fine granular structure; friable; many fine roots; medium acid; clear wavy boundary.

Bt1—12 to 17 inches; brown (7.5YR 5/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; thin discontinuous brown (7.5YR 4/4) clay films on faces of peds; slightly acid; clear irregular boundary.

Bt2—17 to 42 inches; strong brown (7.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; firm; few fine roots; thin continuous brown (7.5YR 4/4) clay films on faces of peds; medium acid; clear wavy boundary.

BC—42 to 72 inches; strong brown (7.5YR 4/6) loamy fine sand; weak medium subangular blocky structure; friable; thin discontinuous brown (7.5YR 4/4) clay films on faces of peds; slightly acid; gradual irregular boundary.

C—72 to 80 inches; brown (10YR 5/3) fine sand; single grain; loose; mildly alkaline.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 2. The Bt and BC horizons have hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 to 6. The C horizon is stratified fine sand and sandy loam, or it is fine sand.

blocky structure; friable; few fine roots; thin discontinuous light brownish gray (10YR 6/2) clay films on faces of peds; few light gray (10YR 7/2) silt coatings on faces of peds; very strongly acid; gradual smooth boundary.

Btx1—24 to 35 inches; grayish brown (10YR 5/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak very coarse prismatic structure; firm; brittle; thin discontinuous light brownish gray (10YR 6/2) clay films on faces of peds; many medium black (10YR 2/1) iron and manganese oxide accumulations; very strongly acid;

Bw1—2 to 11 inches; light yellowish brown (10YR 6/4) channery loam; weak medium subangular blocky structure; friable; common medium roots; about 25 percent sandstone fragments; strongly acid; clear smooth boundary.

Bw2—11 to 38 inches; light yellowish brown (10YR 6/4) very channery loam; weak medium subangular blocky structure; friable; few medium roots; about 40 percent sandstone fragments; strongly acid; abrupt smooth boundary.

R—38 inches; rippable sandstone bedrock.

The thickness of the colluvium and the depth to bedrock

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. The Cg horizon has hue of 10YR, value of 5 or 6, and chroma of 2 or less. It has mottles with higher chroma.

Bonnie Series

The Bonnie series consists of deep, poorly drained

These soils are less acid in the underlying material than is definitive for the Burnside series. This difference, however, does not alter the usefulness or behavior of the soils.

Burnside soils are adjacent to Wakeland soils. The adjacent soils are grayer than the Burnside soils and do not have coarse fragments in the control section. They are on the wider, lower lying bottom land.

Camden soils are similar to Markland soils and are adjacent to Wellston soils. Markland soils have more

35 percent slopes; 1,320 feet north and 400 feet west of the southeast corner of sec. 34, T. 4 N., R. 3 W.

Bt—12 to 23 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; thin continuous dark yellowish brown (10YR 4/6) clay films on faces of peds; slightly acid; clear wavy boundary.

Btx1—23 to 39 inches; yellowish brown (10YR 5/6) silty clay loam; few fine prominent light brownish gray (10YR 6/2) mottles; moderate very coarse prismatic structure; firm; brittle; thin continuous dark yellowish brown (10YR 4/4) clay films on faces of peds; thin discontinuous light gray (10YR 7/2) silt coatings on faces of prisms; strongly acid; gradual wavy boundary.

2Btx2—39 to 80 inches; yellowish brown (10YR 5/6) silty clay loam; few fine prominent light brownish gray (10YR 6/2) mottles; moderate very coarse prismatic structure; firm; brittle; thin discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; thin discontinuous light gray (10YR 7/2) silt coatings on faces of prisms; strongly acid.

The thickness of the solum ranges from 49 to 100 inches. The A horizon has hue of 10YR, value of 4, and chroma of 2 to 4. The Bt and Btx horizons have hue of 10YR, value of 4 or 5, and chroma of 4 to 6. They are silty clay loam or loam. Some pedons have a 2BC horizon. This horizon has hue of 10YR, value of 4 or 5, and chroma of 4. It is silty clay loam, loam, or clay loam.

Crider Series

The Crider 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 3 to 10 percent.

Crider soils are similar to Pike soils and are adjacent to Wellston soils. Pike soils have less clay and more sand in the underlying material than the Crider soils. They formed in loess and outwash. Wellston soils have less clay in the underlying material than the Crider soils. They formed in loess and in material weathered from sandstone, siltstone, or shale. They are in the higher lying areas.

Typical pedon of Crider silt loam, 3 to 10 percent slopes, in a cultivated field; 2,480 feet west and 2,240 feet north of the southeast corner of sec. 36, T. 5 N., R. 3 W.

Bt2—18 to 37 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; thin discontinuous brown (7.5YR 5/4) clay films on faces of peds; strongly acid; gradual smooth boundary.

2Bt3—37 to 50 inches; red (2.5YR 4/6) silty clay loam; moderate medium angular blocky structure; friable; thin discontinuous reddish brown (2.5YR 4/4) clay films on faces of peds; thin discontinuous brown (7.5YR 5/2) silt coatings on faces of peds; strongly acid; gradual smooth boundary.

2Bt4—50 to 70 inches; red (2.5YR 4/8) silty clay; strong medium angular blocky structure; firm; thin discontinuous red (2.5YR 4/6) clay films on faces of peds; common black (10YR 2/1) iron and manganese oxide concretions; medium acid; gradual smooth boundary.

2Bt5—70 to 80 inches; red (2.5YR 4/8) clay; strong medium angular blocky structure; firm; thin discontinuous red (2.5YR 4/6) clay films on faces of peds; about 5 percent chert fragments; medium acid.

The solum ranges from 60 to 100 inches in thickness. The A horizon has hue of 7.5YR or 10YR, value of 4, and chroma of 2 to 4. The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. The 2Bt horizon has hue of 10R to 5YR, value of 3 to 5, and chroma of 4 to 8.

Ebal Series

The Ebal series consists of deep, moderately well drained soils on convex side slopes along drainageways that dissect the uplands. These soils are moderately permeable in the upper part and very slowly permeable in the lower part. They formed in colluvium and residuum derived from interbedded shale and thin layers of sandstone. Slopes range from 10 to 18 percent.

Ebal soils are similar to Hagerstown soils and are adjacent to Zanesville soils. Hagerstown soils formed in loess and in the underlying limestone residuum. Zanesville soils have a fragipan and formed in loess and in the underlying material weathered from sandstone and siltstone. They are on the less sloping side slopes and ridgetops.

Typical pedon of Ebal silt loam, in a pastured area of

structure; firm; few fine roots; about 20 percent sandstone fragments; thin continuous brown (7.5YR 5/4) clay films on faces of peds; strongly acid; clear wavy boundary.

Bt2—15 to 24 inches; strong brown (7.5YR 5/6) channery clay; common fine prominent light brownish gray (10YR 6/2) mottles; strong medium subangular blocky structure; very firm; few fine roots; about 20 percent sandstone fragments; thin continuous brown (10YR 5/4) clay films on faces of peds; strongly acid; gradual wavy boundary.

2Bt3—24 to 48 inches; yellowish brown (10YR 5/6) clay; common fine prominent light brownish gray (10YR 6/2) mottles; strong medium subangular blocky structure; very firm; yellowish brown (10YR 5/4) slickensides; strongly acid; gradual wavy boundary.

2Bt4—48 to 60 inches; yellowish brown (10YR 5/6) clay; common fine prominent light brownish gray (10YR 6/2) mottles; strong medium subangular blocky structure; very firm; grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) slickensides; strongly acid; gradual wavy boundary.

2C—60 to 70 inches; yellowish brown (10YR 5/6) shaly clay; common fine prominent light brownish gray (10YR 6/2) mottles; massive; firm; about 20 percent partly weathered shale fragments; strongly acid.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The Bt horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 6. The 2Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 to 8.

Fairpoint Series

The Fairpoint series consists of deep, well drained, moderately slowly permeable soils in surface-mined areas on uplands. These soils formed in a mixture of fine earth and fragments of siltstone, shale, and some sandstone. Slopes range from 4 to 45 percent.

Fairpoint soils are adjacent to Wellston and Zanesville soils. The adjacent soils formed in loess and in material weathered from sandstone, siltstone, and shale. They are in areas that have not been mined.

Typical pedon of Fairpoint shaly silty clay loam, 4 to 16 percent slopes, in a pasture; 1,000 feet west and 500 feet north of the southeast corner of sec. 17, T. 2 N., R. 4 W.

A—0 to 6 inches; strong brown (7.5YR 5/6), yellowish brown (10YR 5/6), and light brownish gray (10YR 6/2) shaly silty clay loam, reddish yellow (7.5YR 7/6), yellow (10YR 7/6), and light gray (10YR 7/1) dry; massive; firm; common fine roots; about 30 percent shale fragments; neutral; abrupt wavy boundary.

C1—6 to 14 inches; yellowish brown (10YR 5/6) shaly silty clay loam; massive; firm; few fine roots; about 30 percent shale fragments; about 20 percent grayish brown (10YR 5/2) soil material; medium acid; clear wavy boundary.

C2—14 to 25 inches; dark gray (N 4/0) shaly silt loam; massive; very firm; few fine roots; about 30 percent shale fragments; neutral; gradual wavy boundary.

C3—25 to 60 inches; dark gray (N 4/0) very shaly silt loam; massive; very firm; about 80 percent shale fragments; neutral.

The A horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 6. It is silt loam, silty clay loam, or the channery or shaly analogs of these textures. It is medium acid to neutral. The C horizon has hue of 10YR to 2.5YR, value of 3 to 6, and chroma of 1 to 6 or is neutral in hue and has value of 3 to 6.

Gilpin Series

The Gilpin series consists of moderately deep, well drained, moderately permeable soils on uplands. These soils formed in material weathered from sandstone, siltstone, and shale bedrock. Slopes range from 12 to 70 percent.

Gilpin soils are adjacent to Berks, Wellston, and Zanesville soils. Berks soils have less clay in the subsoil than the Gilpin soils. The deep Wellston soils contain more sand and less silt in the subsoil than the Gilpin soils. The deep Zanesville soils are on ridgetops. They have a firm fragipan in the subsoil.

Typical pedon of Gilpin channery silt loam, in a wooded area of Wellston-Gilpin complex, 12 to 30 percent slopes; 2,500 feet east and 1,590 feet north of the southwest corner of sec. 5, T. 3 N., R. 4 W.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) channery silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; many fine roots; about 15 percent sandstone fragments; very strongly acid; abrupt smooth boundary.

BE—4 to 15 inches; yellowish brown (10YR 5/4) channery silt loam; weak medium and coarse subangular blocky structure; friable; many fine roots; few very dark grayish brown (10YR 3/2) organic coatings on faces of peds; about 20 percent sandstone fragments; very strongly acid; clear wavy boundary.

Bt1—15 to 25 inches; brown (7.5YR 5/4) loam; moderate medium subangular blocky structure; friable; few fine roots; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; about 10 percent sandstone fragments; very strongly acid; gradual wavy boundary.

Bt2—25 to 31 inches; brown (7.5YR 5/4) loam; common medium distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; thin discontinuous

dark brown (7.5YR 4/4) clay films on faces of peds; about 10 percent sandstone fragments; very strongly acid; gradual wavy boundary.

C—31 to 39 inches; yellowish brown (10YR 5/4) channery loam; common medium distinct light brownish gray (10YR 6/2) and common medium prominent brownish yellow (10YR 6/8) mottles; massive; firm; few black (10YR 2/1) iron and manganese oxide concretions; about 30 percent sandstone fragments; very strongly acid; clear wavy boundary.

2Bt2—19 to 43 inches; reddish brown (2.5YR 4/4) silty clay; moderate medium subangular blocky structure; firm; thin discontinuous red (2.5YR 4/6) clay films; few black (10YR 2/1) iron and manganese oxide accumulations; about 10 percent chert fragments; slightly acid; gradual smooth boundary.

2Bt3—43 to 52 inches; reddish brown (2.5YR 4/4) silty clay; moderate medium subangular blocky structure; firm; thin discontinuous red (2.5YR 4/6) clay films on faces of peds; about 10 percent chert fragments; slightly acid; gradual smooth boundary.

structure; friable; few fine roots; thin discontinuous brown (10YR 4/3) organic coatings on faces of peds; neutral; gradual wavy boundary.

Bw4—46 to 59 inches; dark yellowish brown (10YR 4/4) silt loam; few fine faint grayish brown (10YR 5/2) mottles; weak coarse subangular blocky structure; friable; few fine roots; thin discontinuous brown (10YR 4/3) organic coatings on faces of peds; neutral; gradual wavy boundary.

C—59 to 70 inches; dark yellowish brown (10YR 4/4) silt

Bt2—15 to 23 inches; yellowish brown (10YR 5/6) silt loam; weak coarse subangular blocky structure parting to moderate medium subangular blocky; firm; common fine roots; few fine pores; thin discontinuous dark brown (7.5YR 4/4) clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt3—23 to 26 inches; yellowish brown (10YR 5/6) silt loam; moderate medium subangular blocky structure; firm; few fine roots; few fine pores; thin

Martinsville Series

The Martinsville series consists of deep, well drained, moderately permeable soils on terraces. These soils formed in stratified, loamy sediments. Slopes range from 0 to 2 percent.

Martinsville soils are similar to Neglev soils and are

has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6.

McGary Series

The McGary series consists of deep, somewhat poorly

layer of loess and in the underlying outwash material. Slopes range from 18 to 35 percent.

These soils contain more sand and less clay than is definitive for the Negley series. This difference, however, does not alter the usefulness or behavior of the soils.

Negley soils are similar to Martinsville soils and are adjacent to Parke and Pike soils. Martinsville soils have less gravel in the subsoil and underlying material than the Negley soils. Parke and Pike soils are in the less sloping areas on ridgetops and side slopes. Parke soils

The solum ranges from 80 to 150 inches in thickness. It is medium acid to very strongly acid. The loess is less than 20 inches thick.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 2 to 4. It is silt loam or loam. The Bt horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 3 to 8. It is loam, sandy clay loam, clay loam, or the gravelly analogs of these textures.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 to 4. The C horizon has hue of 10YR, value of 4 to 6, and chroma of 1 to 4. It is silt loam or silty clay loam.

Nolin Series

The Nolin series consists of deep, well drained, moderately permeable soils on bottom land. These soils

terraces. These soils formed in loess and in the underlying outwash. Slopes range from 6 to 18 percent.

Parke soils are similar to Pike soils and are adjacent to Negley soils. Pike soils have a loess mantle that is thicker than that of the Parke soils. Negley soils have more sand in the subsoil than the Parke soils. They are on side slopes along drainageways.

Typical pedon of Parke silt loam, 6 to 12 percent slopes, eroded, in a cultivated field: 260 feet west and

fragipan. They are moderately permeable above the fragipan and very slowly permeable in the fragipan. They formed in a thin layer of loess and in the underlying strongly acid alluvium of mixed origin. Slopes range from 2 to 6 percent.

Pekin soils are adjacent to Bartle, Wakeland, and Wellston soils. Bartle and Wakeland soils are somewhat poorly drained. Bartle soils are in the less sloping areas. Wakeland soils are on flood plains. Wellston soils are well drained and are on the steeper slopes. They do not have a fragipan.

Typical pedon of Pekin silt loam, 2 to 6 percent slopes, in a cultivated field; 1,450 feet west and 920 feet north of the southeast corner of sec. 30, T. 2 N., R. 3 W.

Ap—0 to 12 inches; dark grayish brown (10YR 4/2) silt loam, very pale brown (10YR 7/3) dry; moderate fine granular structure; friable; medium acid; abrupt smooth boundary.

Bt—12 to 24 inches; yellowish brown (10YR 5/6) silt loam; few fine prominent light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; thin discontinuous yellowish brown (10YR 5/4) clay films on faces of peds; strongly

terraces. These soils formed in loess and in the underlying outwash. Slopes range from 2 to 6 percent.

These soils have a lower base saturation than is definitive for the Pike series. This difference, however, does not alter the usefulness or behavior of the soils.

Pike soils are similar to Parke soils and are adjacent to Negley soils. Parke soils have less than 40 inches of loess. Negley soils have less than 20 inches of loess and contain more sand in the subsoil than the Pike soils. They are on the steeper slopes.

Typical pedon of Pike silt loam, 2 to 6 percent slopes, in a pasture; 600 feet south and 350 feet west of the northeast corner of sec. 4, T. 2 N., R. 4 W.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak medium subangular blocky structure parting to weak medium granular; friable; common fine roots; strongly acid; abrupt smooth boundary.

E—7 to 14 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; friable; common fine roots; strongly acid; clear smooth boundary.

5YR, value of 4 or 5, and chroma of 4 to 6. It is strongly acid or very strongly acid.

Wakeland Series

The Wakeland series consists of deep, somewhat poorly drained, moderately permeable soils on bottom land. These soils formed in silty alluvium derived from

formed in loess and in material weathered from interbedded sandstone, siltstone, or shale. Slopes range from 2 to 70 percent.

Wellston soils are adjacent to Berks, Ebal, Gilpin, and Zanesville soils. Berks and Gilpin soils are lower on the landscape than the Wellston soils. Also, Berks soils have less silt and more rock material in the subsoil, and the

clay films on faces of peds; brown (10YR 4/3) streaks; very strongly acid; gradual wavy boundary.

Bt—11 to 30 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.

2Btx—30 to 44 inches; strong brown (7.5YR 5/6) silt loam; few fine prominent grayish brown (10YR 5/2) mottles; moderate very coarse prismatic structure; firm; brittle; thin discontinuous brown (10YR 5/3) clay films on faces of peds; thin discontinuous light gray (10YR 7/2) silt coatings on faces of prisms; extremely acid; gradual wavy boundary.

2C—44 to 60 inches; yellowish brown (10YR 5/6) channery loam; common medium distinct grayish brown (10YR 5/2) mottles; massive; friable; about 40 percent sandstone fragments; extremely acid.

The thickness of the solum ranges from 43 to 54 inches. The depth to bedrock is more than 60 inches.

The Ap horizon has hue of 10YR, value of 4, and chroma of 2 to 4. The Bt and 2Btx horizons have hue of 7.5YR, value of 4 or 5, and chroma of 4 to 6. The 2Btx horizon is silty clay loam, silt loam, or loam. The 2C horizon is loam or channery loam.

Zipp Series

The Zipp series consists of deep, very poorly drained, slowly permeable soils on low terraces. These soils formed in lacustrine sediments. Slopes range from 0 to 2 percent.

Zipp soils are adjacent to McGary soils. The adjacent soils are on small rises. They are brighter colored in the subsoil than the Zipp soils.

Typical pedon of Zipp silty clay loam, rarely flooded, in a cultivated field; 1,500 feet east and 200 feet south of the northwest corner of sec. 36, T. 2 N., R. 4 W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silty clay loam, light brownish gray (10YR 6/2) dry; moderate coarse granular structure; firm; slightly acid; abrupt smooth boundary.

Bg1—10 to 28 inches; gray (10YR 5/1) silty clay; many medium distinct yellowish brown (10YR 5/6) mottles; moderate coarse angular blocky structure; firm; slightly acid; clear wavy boundary.

Bg2—28 to 47 inches; gray (10YR 5/1) silty clay; many medium distinct dark yellowish brown (10YR 4/4) mottles; weak coarse prismatic structure parting to weak medium angular blocky; firm; neutral; gradual wavy boundary.

Cg—47 to 60 inches; gray (10YR 6/1) silty clay; many medium prominent red (2.5YR 5/6) mottles; weak coarse angular blocky structure; firm; few light gray (10YR 7/1) lime nodules; neutral.

The thickness of the solum ranges from 30 to 48 inches. The Ap horizon has hue of 10YR, value of 4, and chroma of 1 or 2. The Bg horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or less. It is 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

Soil forms through processes that act on deposited or

shale. Hagerstown and Crider soils formed in loess and the underlying limestone residuum.

Glacial till is material laid down directly by glaciers with a minimum of water action. It consists of particles of different sizes that are mixed together. Most small pebbles in glacial till have sharp corners, indicating that they have not been worn by water. Cincinnati soils are

Floodwater has recently deposited alluvial material along streams. This material varies in texture, depending on the speed of the water from which it was deposited.

Natural soil drainage in the county ranges from excessively drained on the ridgetops to very poorly drained in the depressions. Through its effect on

horizon differentiation in the county. Wellston soils are an example of soils in which translocated silicate clay minerals 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

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 iron, either from upper horizons to lower ones or completely out of the profile. Mottles, which are in some horizons, indicate the

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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

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.

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.

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.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the

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

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

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.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

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.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

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.

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

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.

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

of the particles, density can be increased only slightly by compaction.

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

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose

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

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

Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-74 at Shoals, 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----	39.4	19.8	29.6	65	-6	0	3.43	1.95	4.74	7	4.9
February---	43.9	22.0	33.0	69	-5	9	2.55	1.05	3.81	6	3.6
March------	52.6	29.8	41.2	81	9	51	4.43	2.14	6.41	8	3.5
April------	66.9	41.8	54.4	86	22	173	3.84	2.32	5.20	8	.1
May--------	75.8	49.2	62.5	92	30	396	4.48	2.70	6.06	8	.0

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-74 at Shoals, 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. 10	Apr. 24	May 15
2 years in 10 later than--	Apr. 6	Apr. 19	May 9

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

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
Ba	Bartle silt loam (where drained)
Bk	Birds silt loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
Bo	Bonnie silt loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
Bu	Burnside loam, occasionally flooded
CaB	Camden silt loam, 1 to 5 percent slopes
Hd	Haymond silt loam, frequently flooded (where protected from flooding or not frequently flooded during the growing season)
HoB	Hosmer silt loam, 2 to 6 percent slopes
JoA	Johnsburg silt loam, 0 to 2 percent slopes
MaB	Markland silt loam, 1 to 5 percent slopes
MdA	Martinsville loam, 0 to 2 percent slopes

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

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-red clover hay	Tall fescue
		Bu	Bu	Bu	Tons	AUM*
MgA---------- McGary	IIw	100	35	40	2.3	4.6
NeE----------	VIe	---	---	---	---	---

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-red clover	Tall fescue

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]

		Management concerns		Potential productivity

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
CnB---------- 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-------	---	
CrC----------	8A	Slight	Slight	Slight	Slight	Yellow-poplar-------	102	Eastern white pine

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
NeE---------- Negley	7R	Moderate	Moderate	Slight	Slight	Yellow-poplar------- Northern red oak---- White oak---------- Black cherry-------- Sugar maple--------- White ash---------- Black walnut--------	99 94 --- --- --- --- ---	Eastern white pine, yellow-poplar, red pine, white ash, white oak, northern red oak.
Nm---------- Newark	5W	Slight	Moderate	Slight	Moderate	Pin oak---------- Eastern cottonwood-- Sweetgum---------- Green ash---------- Cherrybark oak------ Shumard oak--------- Overcup oak---------	96 89 85 --- --- --- ---	Eastern cottonwood, sweetgum, American sycamore.
No---------- Nolin	8W	Slight	Moderate	Slight	Slight	Sweetgum---------- Cherrybark oak------ Eastern cottonwood-- River birch--------- Black willow-------- American sycamore---	92 97 --- --- --- ---	Sweetgum.
PaC2, PaD2--------- Parke	5A	Slight	Slight	Slight	Slight	White oak---------- Yellow-poplar-------	90 98	Eastern white pine, red pine, black walnut, yellow-poplar, white ash, northern red oak, green ash, black cherry, American sycamore, eastern cottonwood, white oak.
PeB---------- 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.
PkB---------- Pike	5A	Slight	Slight	Slight	Slight	White oak---------- Yellow-poplar------- Sweetgum----------	90 98 76	Eastern white pine, red pine, black walnut, yellow-poplar, white ash.
Wa---------- Wakeland	5A	Slight	Slight	Slight	Slight	Pin oak---------- Sweetgum---------- Yellow-poplar------- Virginia pine-------	90 88 90 85	Eastern white pine, baldcypress, American sycamore, red maple, white ash.
WeB, WeC2, WeD2, WeD3---------- Wellston	4A	Slight	Slight	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 ash, red pine, green ash, black cherry, American sycamore.

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
WgG*:								
Wellston----------	4R	Severe	Severe	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, red pine, green ash, black cherry, American sycamore.
Berks----------	4R	Moderate	Severe	Moderate	Slight	Northern red oak---- Black oak---------- Virginia pine-------	70 70 70	Virginia pine, eastern white pine, Japanese larch, red pine.
Gilpin----------	4R	Severe	Severe	Slight	Slight	Northern red oak---- Yellow-poplar-------	80 95	Japanese larch, Virginia pine, eastern white pine, black cherry, yellow-poplar.
WlD*:								
Wellston----------	4A	Slight	Slight	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, Scotch pine, white ash, red pine, green ash, black cherry, American sycamore.
Ebal----------	4C	Slight	Slight	Moderate	Moderate	Black oak---------- Northern red oak----	80 ---	Yellow-poplar, eastern cottonwood, American

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
WpD*: Udorthents.								
Wr---------- Wilbur	8A	Slight	Slight	Slight	Slight	Yellow-poplar--------	100	Eastern white pine, black walnut, yellow-poplar.
Wt---------- Wirt	7A	Slight	Slight	Slight	Slight	Yellow-poplar--------	95	Eastern white pine, black walnut, yellow-poplar.
ZaB, ZaC2---------- Zanesville	4A	Slight	Slight	Slight	Slight	Northern red oak---- Virginia pine--------	68 70	Virginia pine, eastern white pine, shortleaf pine.
ZaC3---------- Zanesville	3A	Slight	Slight	Moderate	Slight	Northern red oak---- Virginia pine--------	60 70	Virginia pine, shortleaf pine, eastern white pine.
ZnB*, ZnC*: Zanesville---------	4A	Slight	Slight	Slight	Slight	Northern red oak---- Virginia pine--------	68 70	Virginia pine, shortleaf pine, eastern white pine.
Udorthents.								
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	86	Eastern white pine, [illegible]

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

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
Bk---------- Birds	---	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Washington hawthorn, white fir, blue spruce, northern white-cedar, Austrian pine, Norway spruce.	Eastern white pine	Pin oak.
Bo----------	---	Silky dogwood,	White fir, blue	Eastern white pine	Pin oak.

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
Hd---------- 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.
HoB---------- Hosmer	---	Eastern redcedar, arrowwood, Washington hawthorn, Tatarian honeysuckle, Amur privet, American cranberrybush, Amur honeysuckle.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
JoA---------- Johnsburg	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
MaB, McC3--------- Markland	---	Arrowwood, Washington hawthorn, eastern redcedar, Amur honeysuckle, American cranberrybush, Tatarian honeysuckle, Amur privet.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
MdA---------- Martinsville	---	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.
MgA---------- McGary	---	Eastern redcedar, arrowwood.	Green ash, Austrian pine.	Eastern white pine, pin oak.	---

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
Nm---------- Newark	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn.	Eastern white pine.	Pin oak.
No---------- Nolin	---	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern white-cedar, Washington hawthorn, Austrian pine.	Norway spruce-----	Eastern white pine, pin oak.
PaC2, PaD2-------- 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.
PeB---------- Pekin	---	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
PkB---------- 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.
UhD*. Udorthents					
Up*: Udorthents.					
Pits.					
Wa---------- Wakeland	---	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush, silky dogwood.	Northern white-cedar, Austrian pine, white fir, blue spruce, Washington hawthorn.	---	Eastern white pine, pin oak.
WeB, WeC2, WeD2, WeD3---------- 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.

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
WgG*:					
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.
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.	---	---
Gilpin	Siberian peashrub	Tatarian honeysuckle, Amur honeysuckle,	Jack pine, Austrian pine, red pine, eastern	---	---

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
WpD*:					
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.
Udorthents.					
Wr Wilbur	---	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.
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.
ZaB, 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.	---
ZnB*, ZnC*:					
Zanesville	---	American cranberrybush, Amur honeysuckle, Tatarian honeysuckle, Amur privet, arrowwood, Washington hawthorn, eastern	Hackberry, osageorange, Austrian pine.	Pin oak, eastern white pine.	---

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
Ab---------- Abscota	Severe: flooding, too sandy.	Severe: too sandy.	Severe: too sandy, flooding.	Severe: too sandy.	Severe: flooding.
AvC2*:					
Alvin----------	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
Chelsea----------	Slight----------	Slight----------	Severe: slope.	Slight----------	Moderate: droughty.
AvE*:					
Alvin----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Chelsea----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ba---------- Bartle	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Bk---------- Birds	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
Bo---------- Bonnie	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
Bu---------- Burnside	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: large stones, flooding.
CaB---------- Camden	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
CnB---------- Cincinnati	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Slight.
CrC---------- Crider	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
FbD---------- Fairpoint	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, erodes easily.	Severe: small stones, droughty, slope.
FcC---------- Fairpoint	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Severe: droughty.
HaD---------- Hagerstown	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
Hd---------- Haymond	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
HoB---------- Hosmer	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Severe: erodes easily.	Slight.
JoA---------- Johnsburg	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
MaB---------- Markland	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Slight.
McC3---------- [illegible]	Moderate: [illegible]	Moderate: [illegible]	Severe: [illegible]	Severe: [illegible]	Moderate: [illegible]

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
WeB---------- Wellston	Slight----------	Slight----------	Moderate: slope.	Severe: erodes easily.	Slight.
WeC2, WeD2, WeD3------ Wellston	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
WgG*:					
Wellston----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Berks----------	Severe: slope, small stones.	Severe: small stones, slope.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
Gilpin----------	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.	Severe: slope.
WlD*:					
Wellston----------	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Ebal----------	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Severe: erodes easily.	Moderate: slope.
WnE*:					
Wellston----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Gilpin----------	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Moderate: slope, large stones.	Severe: slope.
WpD*:					
Wellston----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Udorthents.					
Wr---------- Wilbur	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
Wt---------- Wirt	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
ZaB---------- 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.

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
ZnB*:					
Zanesville	Moderate: percs slowly, wetness.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: erodes easily.	Slight.

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
Ab---------- Abscota	Poor	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
AvC2*:										
Alvin----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Chelsea----------	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
AvE*:										
Alvin----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

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
MaB---------- Markland	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
McC3---------- Markland	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MdA---------- Martinsville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MgA---------- McGary	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
NeE---------- Negley	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Nm---------- Newark	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
No---------- Nolin	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Fair	Very poor.
PaC2---------- Parke	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
PaD2---------- Parke	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
PeB---------- Pekin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
PkB---------- Pike	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
UhD*. Udorthents										
Up*: Udorthents.										
Pits.										
Wa---------- Wakeland	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
WeB---------- Wellston	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WeC2, WeD2, WeD3--- Wellston	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WgG*:										
Wellston----------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Berks----------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Gilpin----------	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	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
WlD*:										
Wellston	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Ebal	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
WnE*:										
Wellston	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.
WpD*:										
Wellston	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Udorthents.										
Wr Wilbur	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Wt Wirt	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
ZaB 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.
ZnB*:										
Zanesville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Udorthents.										
ZnC*:										
Zanesville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Udorthents.										
Zp Zipp	Poor	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

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
FcC---------- Fairpoint	Moderate: slope, large stones.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell, large stones.	Severe: slope.	Moderate: slope, frost action, shrink-swell.	Severe: droughty.
HaD---------- Hagerstown	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Hd---------- Haymond	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.	Severe: flooding.

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
PeB---------- Pekin	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: low strength, frost action.	Slight.
PkB---------- Pike	Slight---------	Slight---------	Slight---------	Moderate: slope.	Severe: low strength, frost action.	Slight.
UhD*. Udorthents						
Up*: Udorthents.						
Pits.						
Wa---------- Wakeland	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.
WeB---------- Wellston	Moderate: depth to rock.	Slight---------	Moderate: depth to rock.	Moderate: slope.	Severe: frost action.	Slight.
WeC2---------- Wellston	Moderate: depth to rock, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Severe: frost action.	Moderate: slope.
WeD2, WeD3-------- Wellston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
WgG*:						

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
WpD*:						
Wellston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
Udorthents.						
Wr Wilbur	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action.	Severe: flooding.
Wt Wirt	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
ZaB Zanesville	Moderate: depth to rock, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Severe: low strength.	Slight.
ZaC2, ZaC3 Zanesville	Moderate: slope, wetness, depth to rock.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: slope.
ZnB*:						
Zanesville	Moderate: depth to rock, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Severe: low strength.	Slight.
Udorthents.						
ZnC*:						
Zanesville	Moderate: slope, wetness, depth to rock.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: slope.
Udorthents.						

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
Ab---------- Abscota	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy.
AvC2*:					
Alvin----------	Slight----------	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: thin layer.
Chelsea----------	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy, seepage.
AvE*:					
Alvin----------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Chelsea----------	Severe:	Severe:	Severe:	Severe:	Poor:

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
FbD---------- Fairpoint	Severe: percs slowly, slope, slippage.	Severe: slope.	Severe: slope, slippage.	Severe: slope.	Poor: small stones, slope.
FcC---------- Fairpoint	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey, large stones.	Moderate: slope.	Poor: small stones.
HaD---------- Hagerstown	Severe: slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Hd---------- Haymond	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
HoB---------- Hosmer	Severe: wetness, percs slowly.	Moderate: slope.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
JoA---------- Johnsburg	Severe: wetness, percs slowly.	Slight----------	Severe: depth to rock, wetness.	Severe: wetness.	Poor: wetness.
MaB---------- Markland	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey.	Slight----------	Poor: too clayey, hard to pack.
McC3---------- Markland	Severe: wetness, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
MdA---------- Martinsville	Slight----------	Severe: seepage.	Severe: seepage.	Slight----------	Fair: thin layer.
MgA---------- McGary	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
NeE---------- Negley	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Nm---------- 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.
PaC2---------- Parke	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
PaD2---------- Parke	Severe: slope.	Severe: slope.	Severe: 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
PeB---------- Pekin	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
PkB---------- Pike	Slight----------	Moderate: seepage, slope.	Severe: seepage.	Slight----------	Fair: too clayey.
UhD*. Udorthents					
Up*: Udorthents.					
Pits.					
Wa----------	Severe:	Severe:	Severe:	Severe:	Poor:

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
WnE*:					
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, area reclaim, thin layer.
WpD*:					
Wellston	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Udorthents.					
Wr Wilbur	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: wetness.

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
Ab: Abscota	Good	Probable	Improbable: too sandy.	Poor: too sandy.
AvC2*:				
Alvin	Good	Probable	Improbable: too sandy.	Fair: too sandy.
Chelsea	Good	Probable	Improbable: too sandy.	Fair: too sandy.
AvE*:				
Alvin	Poor: slope.	Probable	Improbable: too sandy.	Poor: slope.
Chelsea	Poor: slope.	Probable	Improbable: too sandy.	Poor: slope.
Ba: Bartle	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Bk: Birds	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Bo: Bonnie	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Bu: Burnside	Fair: depth to rock, thin layer, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: small stones, area reclaim.
CaB: Camden	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
CnB: Cincinnati	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
CrC: Crider	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
HaD---------- Hagerstown	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Hd---------- Haymond	Good----------	Improbable: excess fines.	Improbable: excess fines.	Good.
HoB---------- Hosmer	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
JoA---------- Johnsburg	Fair: area reclaim, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
MaB, McC3---------- Markland	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
MdA---------- Martinsville	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
MgA---------- McGary	Poor: low strength,	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Wa----------	Fair:	Improbable:	Improbable:	Good.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
ZnB*, ZnC*: Udorthents.				
Zp---------- Zipp	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: 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--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
FcC---------- Fairpoint	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, large stones, erodes easily.	Large stones, slope, erodes easily.
HaD---------- Hagerstown	Severe: slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope.
Hd---------- Haymond	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
HoB---------- Hosmer	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, rooting depth.
JoA---------- Johnsburg	Moderate: seepage, depth to rock.	Severe: piping.	Severe: no water.	Percs slowly, frost action.	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
MaB---------- Markland	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Erodes easily, percs slowly.	Erodes easily, percs slowly.
McC3---------- Markland	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
MdA---------- Martinsville	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
MgA---------- McGary	Slight---------	Severe: wetness.	Severe: slow refill.	Percs slowly---	Erodes easily, wetness, percs slowly.	Wetness, erodes easily.
NeE---------- [illegible]	Severe: seepage	Moderate: thin layer	Severe: no water.	Deep to water	Slope----------	Slope.

TABLE 15.--WATER MANAGEMENT--Continued

Limitations for--	Features affecting--

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
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.
ZnB*:						
Zanesville	Moderate: depth to rock, seepage.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth.
Udorthents.						
ZnC*:						
Zanesville	Moderate: depth to rock, seepage.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
Udorthents.						
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	
Ab---------- Abscota	0-8	Loamy sand-------	SM	A-2-4, A-3	0	95-100	95-100	50-75	15-30	<20	NP-4
	8-60	Loamy sand, loamy fine sand, sand.	SP, SM, SP-SM	A-2-4, A-1, A-3	0	95-100	95-100	45-75	3-30	<20	NP-4
AvC2*:											
Alvin----------	0-12	Loamy fine sand	SM	A-2	0	100	100	50-75	15-30	<20	NP-4
	12-70	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
	70-80	Stratified sandy loam to fine sand.	SM, SP, SP-SM	A-2, A-3	0-5	95-100	90-100	70-95	4-35	<20	NP-4

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	
CaB---------- Camden	0-10	Silt loam--------	CL, ML, CL-ML	A-4, A-6	0	100	100	95-100	90-100	20-35	3-15
	10-33	Silt loam, silty clay loam.	CL	A-6	0	100	100	95-100	90-100	25-40	15-25
	33-62	Clay loam, loam, silt loam.	ML, CL	A-4, A-6	0-5	90-100	85-100	60-95	50-90	20-40	3-15
	62-80	Stratified sandy loam to silt loam.	SM, SC, ML, CL	A-2, A-4	0-5	90-100	80-100	50-80	20-60	<25	3-10
CnB---------- Cincinnati	0-7	Silt loam--------	ML, CL	A-4, A-6	0	100	100	90-100	80-100	25-40	3-16
	7-23	Silty clay loam, loam, silt loam.	CL	A-6, A-4	0	95-100	90-100	90-100	70-100	25-40	8-15
	23-80	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
CrC---------- Crider	0-8	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	90-100	85-100	25-35	4-12
	8-37	Silt loam, silty clay loam.	CL, ML, CL-ML	A-7, A-6, A-4	0	100	95-100	90-100	85-100	25-42	4-20
	37-80	Silty clay, clay, silty clay loam.	CL, CH	A-7, A-6	0-5	85-100	75-100	70-100	60-100	35-65	15-40
FbD---------- Fairpoint	0-6	Shaly silt 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

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	
MaB----------	0-5	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-35	5-15
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

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	
PkB---------- Pike	0-14	Silt loam--------	CL	A-4, A-6	0	100	100	90-100	80-95	25-35	8-15
	14-42	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	95-100	85-100	80-90	30-45	10-25
	42-80	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
UhD*. Udorthents											
Up*: Udorthents.											
Pits.											
Wa---------- Wakeland	0-7	Silt loam--------	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	7-60	Silt loam--------	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
WeB, WeC2, WeD2-- Wellston	0-6	Silt loam--------	ML	A-4	0	95-100	90-100	85-100	70-95	25-35	3-10
	6-48	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

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	
W1D*:											
Wellston--------	0-12	Silt loam--------	ML	A-4	0	95-100	90-100	85-100	70-95	25-35	3-10
	12-36	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
	36-60	Silt loam, loam, channery 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
[illegible]	0-5	Silt loam--------	CL-ML, CL	A-4, A-6	0	95-100	95-100	85-100	70-90	25-35	5-15

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
Ab---------- Abscota	0-8	0-10	1.20-1.60	6.0-20	0.07-0.09	6.1-7.8	Low----------	0.17	5	1	.5-3
	8-60	0-10	1.25-1.60	6.0-20	0.05-0.11	6.1-8.4	Low----------	0.17			
AvC2*:											
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
	12-70	15-18	1.45-1.65	0.6-6.0	0.12-0.20	4.5-6.5	Low----------	0.24			
	70-80	3-10	1.55-1.75	2.0-6.0	0.05-0.13	5.1-7.8	Low----------	0.24			
Chelsea---------	0-30	8-15	1.50-1.55	6.0-20	0.10-0.15	5.6-7.3	Low----------	0.17	5	2	.5-1
	30-80	5-10	1.55-1.70	6.0-20	0.06-0.08	5.1-7.3	Low----------	0.17			
AvE*:											
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
	12-42	5-18	1.45-1.65	0.6-6.0	0.12-0.20	4.5-6.5	Low----------	0.24			
	42-80	3-10	1.55-1.75	2.0-6.0	0.05-0.13	5.1-7.8	Low----------	0.24			
Chelsea---------	0-29	8-15	1.50-1.55	6.0-20	0.10-0.15	5.6-7.3	Low----------	0.17	5	2	.5-1
	29-80	5-10	1.55-1.70	6.0-20	0.06-0.08	5.1-7.3	Low----------	0.17			
Ba---------- Bartle	0-10	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
	10-24	22-35	1.40-1.60	0.6-2.0	0.20-0.22	4.5-5.5	Low----------	0.43			
	24-53	22-35	1.60-1.80	<0.06	0.06-0.08	4.5-5.5	Low----------	0.43			
	53-80	22-35	1.40-1.60	0.2-0.6	0.15-0.18	5.1-7.3	Low----------	0.43			
Bk---------- Birds	0-6	15-25	1.20-1.40	0.2-0.6	0.22-0.24	5.6-7.8	Low----------	0.43	5	6	1-3
	6-60	18-27	1.40-1.60	0.2-0.6	0.20-0.22	5.1-7.8	Low----------	0.43			
Bo---------- Bonnie	0-9	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
	9-60	18-27	1.40-1.60	0.2-0.6	0.20-0.22	4.5-5.5	Low----------	0.43			
Bu---------- Burnside	0-16	20-27	1.20-1.40	0.6-2.0	0.22-0.24	4.5-6.0	Low----------	0.37	4	5	1-2
	16-42	15-25	1.40-1.60	0.6-2.0	0.06-0.12	5.6-7.3	Low----------	0.37			
	42	---	---	---	---	---	----------	----			
CaB---------- Camden	0-10	14-27	1.15-1.35	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.37	5	6	1-2
	10-33	22-35	1.35-1.55	0.6-2.0	0.16-0.20	5.1-7.3	Moderate-----	0.37			
	33-62	18-30	1.45-1.65	0.6-2.0	0.11-0.22	5.6-7.3	Low----------	0.37			
	62-80	5-20	1.55-1.75	0.6-6.0	0.11-0.22	5.6-8.4	Low----------	0.37			
CnB---------- Cincinnati	0-7	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
	7-23	22-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-7.3	Low----------	0.37			
	23-80	24-35	1.60-1.85	0.06-0.6	0.08-0.12	4.5-6.5	Moderate-----	0.37			
CrC---------- Crider	0-8	15-27	1.20-1.40	0.6-2.0	0.19-0.23	5.1-7.3	Low----------	0.32	5	6	2-4
	8-37	18-35	1.20-1.45	0.6-2.0	0.18-0.23	5.1-7.3	Low----------	0.28			
	37-80	30-60	1.20-1.55	0.6-2.0	0.12-0.18	4.5-6.5	Moderate-----	0.28			
FbD---------- Fairpoint	0-6	18-27	1.40-1.55	0.6-2.0	0.09-0.18	5.6-7.3	Low----------	0.37	5	6	<.5
	6-60	18-35	1.60-1.80	0.2-0.6	0.03-0.10	5.6-7.3	Moderate-----	0.37			
FcC---------- Fairpoint	0-6	27-40	1.40-1.65	0.2-0.6	0.12-0.18	5.6-7.3	Moderate-----	0.43	3	6	.5-2
	6-60	18-35	1.60-1.80	0.2-0.6	0.03-0.10	5.6-7.3	Moderate-----	0.32			
HaD---------- Hagerstown	0-13	15-27	1.20-1.40	0.6-6.0	0.16-0.24	4.5-7.3	Low----------	0.32	4	6	1-5
	13-60	23-60	1.20-1.60	0.6-2.0	0.10-0.24	5.1-7.3	Moderate-----	0.28			

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
Hd---------- Haymond	0-9	10-18	1.30-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low----------	0.37	5	5	1-3
	9-59	10-18	1.30-1.45	0.6-2.0	0.20-0.22	5.6-7.3	Low----------	0.37			
	59-70	10-18	1.30-1.45	0.6-2.0	0.20-0.22	6.1-7.8	Low----------	0.37			
HoB---------- Hosmer	0-8	10-17	1.20-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low----------	0.43	4	5	1-3
	8-26	24-30	1.30-1.50	0.6-2.0	0.18-0.22	4.5-5.5	Moderate------	0.43			
	26-80	16-42	1.60-1.70	<0.06	0.06-0.08	4.0-6.0	Low----------	0.43			
JoA---------- Johnsburg	0-13	12-20	1.30-1.45	0.6-2.0	0.20-0.24	4.5-7.3	Low----------	0.43	3	5	1-3
	13-23	24-32	1.40-1.55	0.6-2.0	0.18-0.22	3.6-5.5	Moderate------	0.43			
	23-42	22-30	1.60-1.80	<0.06	0.06-0.08	3.6-5.5	Low----------	0.43			
	42-70	14-20	1.40-1.55	0.6-2.0	0.12-0.14	3.6-5.5	Low----------	0.43			
MaB---------- Markland	0-5	20-27	1.30-1.45	0.6-2.0	0.22-0.24	5.1-7.3	Low----------	0.43	3	5	1-3
	5-35	40-55	1.55-1.70	0.06-0.2	0.11-0.13	5.1-8.4	High----------	0.32			
	35-60	35-50	1.55-1.70	0.06-0.2	0.09-0.11	7.4-8.4	High----------	0.32			
McC3---------- Markland	0-3	28-40	1.35-1.50	0.2-0.6	0.18-0.20	5.1-7.3	Moderate------	0.43	2	7	1-3
	3-27	40-55	1.55-1.70	0.06-0.2	0.11-0.13	5.1-7.3	High----------	0.32			

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and	Depth	Clay	Moist	Permeability	Available	Soil	Shrink-swell	Erosion factors	Wind erodi-	Organic

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
ZaC3---------- Zanesville	0-1	12-27	1.35-1.40	0.6-2.0	0.19-0.23	4.5-5.5	Low----------	0.43	3	5	.5-1
	1-20	18-35	1.35-1.45	0.6-2.0	0.17-0.22	4.5-5.5	Low----------	0.37			
	20-39	18-33	1.50-1.75	0.06-0.2	0.08-0.12	4.5-5.5	Low----------	0.37			
	39-70	20-40	1.50-1.70	0.2-2.0	0.08-0.12	4.5-5.5	Low----------	0.28			
ZnB*, ZnC*:											
Zanesville------	0-1	12-27	1.35-1.40	0.6-2.0	0.19-0.23	4.5-5.5	Low----------	0.43	3	5	1-3
	1-30	18-35	1.35-1.45	0.6-2.0	0.17-0.22	4.5-5.5	Low----------	0.37			
	30-48	18-33	1.50-1.75	0.06-0.2	0.08-0.12	4.5-5.5	Low----------	0.37			
	48-55	20-40	1.50-1.70	0.2-2.0	0.08-0.12	4.5-5.5	Low----------	0.28			
	55	---	---	---	---	---	----------	----			
Udorthents.											
Zp---------- Zipp	0-10	27-40	1.40-1.60	0.2-0.6	0.20-0.22	6.1-7.3	Moderate-----	0.28	5	7	1-3
	10-47	40-55	1.45-1.70	0.06-0.2	0.11-0.13	6.1-7.3	High---------	0.28			
	47-60	36-55	1.50-1.70	0.06-0.2	0.08-0.10	6.1-7.8	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				
Ab---------- Abscota	A	Frequent----	Brief-----	Mar-Jun	>6.0	---	---	>60	---	Low------	Low------	Low.
AvC2*, AvE*:												
Alvin----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
Chelsea----------	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	Low.
Ba---------- Bartle	D	None--------	---	---	1.0-2.0	Perched	Jan-Apr	>60	---	High-----	High-----	High.
Bk---------- Birds	C/D	Frequent----	Long------	Mar-Jun	+.5-1.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
Bo---------- Bonnie	C/D	Frequent----	Brief to long.	Jan-Jun	+.5-1.0	Apparent	Jan-Jun	>60	---	High-----	High-----	High.
Bu---------- Burnside	B	Occasional	Brief-----	Mar-Jun	3.0-5.0	Apparent	Feb-Jun	40-65	Hard	Moderate	Low------	High.
CaB---------- Camden	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Low------	Moderate.
CnB---------- Cincinnati	C	None--------	---	---	2.5-4.0	Perched	Jan-Apr	>60	---	High-----	Moderate	High.
CrC---------- Crider	B	None--------	---	---	>6.0	---	---	>60	---	---	Moderate	Moderate.
FbD, FcC---------- Fairpoint	C	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Moderate.
HaD---------- Hagerstown	C	None--------	---	---	>6.0	---	---	>60	Hard	Moderate	Moderate	Low.
Hd---------- Haymond	B	Frequent----	Brief-----	Jan-May	>6.0	---	---	>60	---	High-----	Low------	Low.
HoB---------- Hosmer	C	None--------	---	---	2.5-3.0	Perched	Mar-Apr	>60	---	High-----	Moderate	High.
JoA---------- Johnsburg	D	None--------	---	---	1.0-3.0	Perched	Jan-Apr	48-72	Soft	High-----	High-----	High.

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				
MaB, McC3: Markland	C	None	---	---	3.0-6.0	Perched	Mar-Apr	>60	---	Moderate	High	Moderate.
MdA: Martinsville	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
MgA: McGary	C	Rare	---	---	1.0-3.0	Apparent	Jan-Apr	>60	---	Moderate	High	Low.
NeE: Negley	B	None	---	---	>6.0	---	---	>60	---	Moderate	Low	High.
Nm: Newark	C	Frequent	Brief	Jan-Apr	0.5-1.5	Apparent	Dec-May	>60	---	High	High	Low.
No: Nolin	B	Frequent	Brief to long.	Feb-May	3.0-6.0	Apparent	Feb-Mar	>60	---	---	Low	Moderate.
PaC2, PaD2: Parke	B	None	---	---	>6.0	---	---	>60	---	High	Moderate	High.
PeB: Pekin	C	None	---	---	2.0-6.0	Apparent	Mar-Apr	>60	---	High	Moderate	High.
PkB: Pike	B	None	---	---	>6.0	---	---	>60	---	High	Low	High.
UhD*. Udorthents												
Up*: Udorthents.												
Pits.												
Wa: Wakeland	C	Frequent	Brief	Jan-May	1.0-3.0	Apparent	Jan-Apr	>60	---	High	High	Low.
WeB, WeC2, WeD2, WeD3: Wellston	B	None	---	---	>6.0	---	---	>40	Hard	High	Moderate	High.
WgG*:												
Wellston	B	None	---	---	>6.0	---	---	>40	Hard	High	Moderate	High.
Berks	C	None	---	---	>6.0	---	---	20-40	Soft	Low	Low	High.
Gilpin	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	Low	High.

See footnote at end of table.

ABLE 18.--SOIL AND WATER FEATURES--Continued

ing		High water table			Bedrock		Potential frost action	Risk of corrosion	
ation	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
		Ft			In				
--	---	>6.0	---	---	>40	Hard	High-----	Moderate	High.
--	---	3.0-6.0	Perched	Nov-Mar	50-80	Soft	Moderate	High-----	High.
--	---	>6.0	---	---	>40	Hard	High-----	Moderate	High.
--	---	>6.0	---	---	20-40	Soft	Moderate	Low------	High.
--	---	>6.0	---	---	>40	Hard	High-----	Moderate	High.
-----	Oct-Jun	1.5-3.0	Apparent	Mar-Apr	>60	---	High-----	Moderate	Moderate.
-----	Nov-Jun	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
--	---	2.0-3.0	Perched	Dec-Apr	>40	Hard	---	Moderate	High.
--	---	2.0-3.0	Perched	Dec-Apr	>40	Hard	---	Moderate	High.
--	---	+.5-1.0	Apparent	Dec-May	>60	---	Moderate	High-----	Low.

mposition 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 that are outside the range of the series]

Soil name	Family or higher taxonomic class
Abscota	Mixed, mesic Typic Udipsamments
Alvin	Coarse-loamy, mixed, mesic Typic Hapludalfs
Bartle	Fine-silty, mixed, mesic Aeric Fragiaqualfs
Berks	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Birds	Fine-silty, mixed, nonacid, mesic Typic Fluvaquents
*Bonnie	Fine-silty, mixed, acid, mesic Typic Fluvaquents
[illegible]	Loamy-skeletal, mixed, acid, mesic Typic Udifluvents