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Agriculture

Natural  
Resources  
Conservation  
Service

In cooperation with  
Missouri Department of  
Natural Resources,  
Missouri Department of  
Conservation, Missouri  
Agricultural Experiment  
Station, and Morgan  
County Soil and Water  
Conservation District

# Soil Survey of Morgan County, Missouri



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# How To Use This Soil Survey

## General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

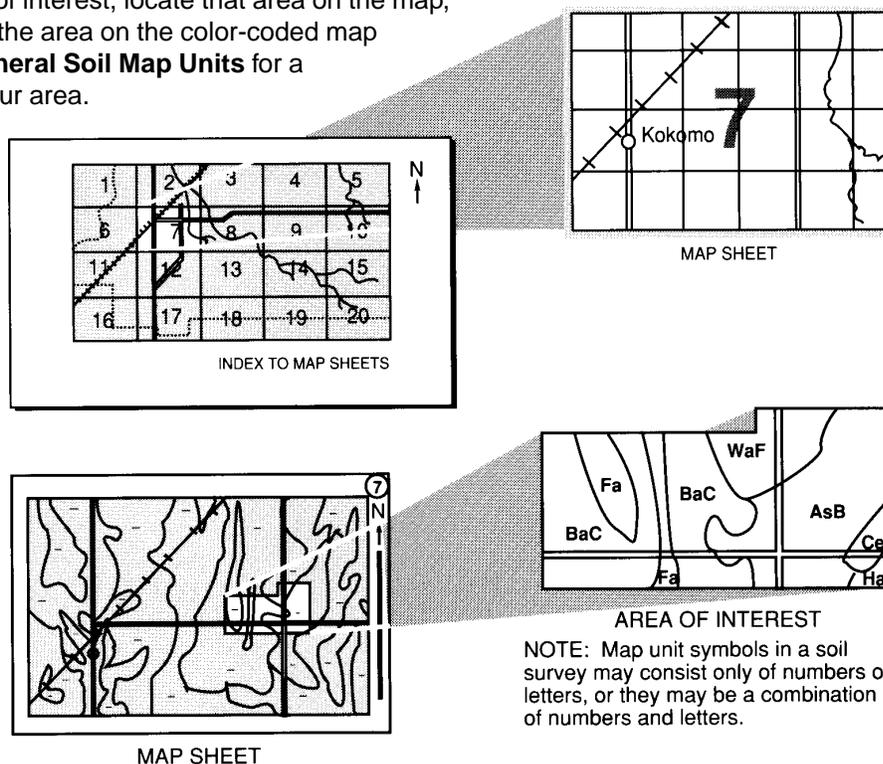
## Detailed Soil Maps

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

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

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

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



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This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1994. Soil names and descriptions were approved in 1995. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1994. This survey was made cooperatively by the Natural Resources Conservation Service and the Missouri Agricultural Experiment Station. The Missouri Department of Natural Resources provided soil scientists to assist with the fieldwork. The survey is part of the technical assistance furnished to the Morgan County Soil and Water Conservation District.

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

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**Cover: The historical Morgan County courthouse, located in Versailles, was built in 1889.**

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# Foreword

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This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, 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, ranchers, 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.

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

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

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

Roger A. Hansen  
State Conservationist  
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# Soil Survey of Morgan County, Missouri

By David W. Wolf, Natural Resources Conservation Service

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United States Department of Agriculture, Natural Resources Conservation Service  
in cooperation with  
Missouri Department of Natural Resources, Missouri Department of Conservation,  
Missouri Agricultural Experiment Station, and Morgan County Soil and Water  
Conservation District

MORGAN COUNTY is in the central part of Missouri, on the northern edge of the Ozark region (fig. 1). It has an area of 392,966 acres, or about 614 square miles. Versailles, the county seat, is in the east-central part of the county.

Morgan County is bordered on the north by Cooper and Moniteau Counties, on the east by Miller County, on the south by Camden County, and on the west by Benton and Pettis Counties.

Farming is the main enterprise in Morgan County. Beef cattle, dairy cattle, hogs, and poultry are raised in the county. Cool-season grasses and shallow rooted legumes, such as fescue and red clover, are the main forage crops grown for pasture and hay. Most of the pasture and hayland occur on the gently to moderately sloping uplands and bottomlands. A significant acreage of row crops and small grain crops are grown in the county. The main crops are soybeans, corn, winter wheat, and grain sorghum. These crops are grown in the northern part of the county on the gently to moderately sloping uplands and nearly level bottomlands. The deeply dissected uplands support most of the woodland in the county.

A portion of Lake of the Ozarks is in Morgan County. The lake is a major tourist attraction and retirement area. It contributes significantly to the economy of the county. The area around the Lake of the Ozarks has developed rapidly in recent years. This development has contributed to the increased construction of dwellings and new businesses.

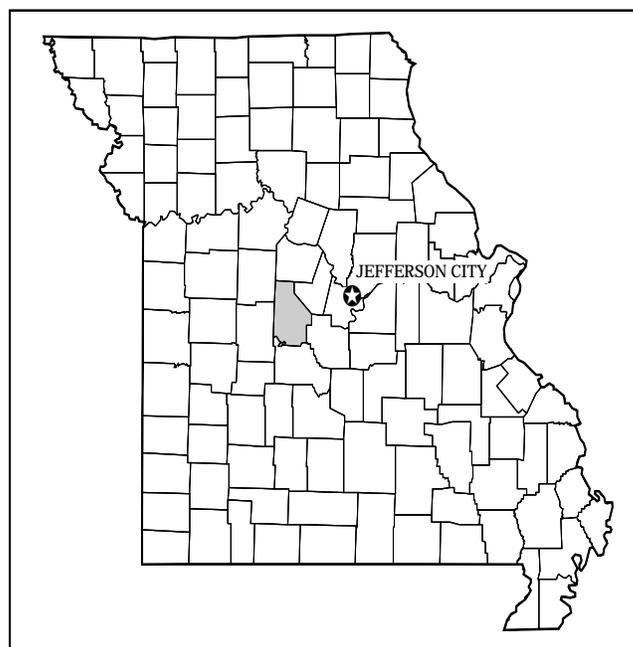


Figure 1.—Location of Morgan County in Missouri.

## General Nature of the County

This section describes climate and history and development.

### Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at

Versailles in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 33 degrees F and the average daily minimum temperature is 22 degrees. The lowest temperature on record, which occurred at Versailles on December 22, 1989, is -23 degrees. In summer, the average temperature is 75 degrees and the average daily maximum temperature is 86 degrees. The highest recorded temperature, which occurred at Versailles on July 14, 1954, is 115 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 41 inches. Of this, 28.5 inches, or 69 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 7.5 inches at Versailles on April 11, 1994. Thunderstorms occur on about 52 days each year, and most occur between May and August.

The average seasonal snowfall is 19 inches. The greatest snow depth at any one time during the period of record was 14 inches. On the average, 25 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 83 percent. The sun shines 66 percent of the time possible in summer and 48 percent in winter. The prevailing wind is from the south. Average windspeed is highest, about 12 miles per hour, in March.

## History and Development

The earliest inhabitants of this area were Native Americans. While several different tribes lived in or passed through what is now Morgan County, the Osage controlled and used the area most extensively. Spanish explorers and French trappers were the earliest foreigners in the area (Missouri Crop and Livestock Reporting Service, 1992).

By 1719, a well-marked trail, the Harmony Mission Trace, existed along the north bank of the Osage

River. This trail was named for the Harmony Mission that was established to convert the Osage who lived nearby. After the United States purchased the Louisiana Territory in the early 1800's, the Osage ceded a large area that included what is now Morgan County to the United States government.

A permanent white settlement was established on Gravois Creek near present day Gravois Mills by 1820. By 1835, Josiah S. Walton had established a combination saw and gristmill on Gravois Creek, and a community grew around the mill that was called Milltown (History, 1889).

Morgan County was organized by an act of state legislature in 1833. The name was in honor of Revolutionary War General David Morgan. The first county seat was Milltown. The county seat was moved to Versailles two years later after Versailles was platted. A courthouse was purchased in 1836. It was a private residence that stood on the northeast corner of the square. In 1844, a more substantial brick building was constructed in the middle of the square. This second courthouse burned in 1887, and the present courthouse was built in 1889 on the same site (History, 1889). Many other smaller towns were platted in the middle 1800's. Most of these towns had been in existence for a number of years before the plat was made.

Early economic activity in Morgan County was very limited. The earliest settlers hunted for their meat and had some small tilled plots for vegetables and grains. By the middle 1800's, coal and various minerals were mined. By 1879, the value of farm production was \$490,316, and the value of forest production was \$29,426 (History, 1889).

In 1931, Bagnell Dam was closed and the Lake of the Ozarks started filling the Osage River valley. The lake began a large tourism industry, which continues to increase. Tourism is the most important economic activity in the county. Farming is important, particularly in the northern part of the county, and forestry is also important, primarily in the southern part of the county.

## How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock.

They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

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

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

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic

classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

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

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

Table 1.--Temperature and Precipitation  
(Recorded in the period 1961-90 at Versailles, Missouri)

Month	Temperature						Precipitation					
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have--		Average number of growing degree days*	Average	2 years in 10 will have--		Average number of days with 0.10 inch or more	Average snow- fall**	
				Maximum temperature higher than--	Minimum temperature lower than--			Less than--	More than--			
°F	°F	°F	°F	°F	Units	In	In	In	In	In		
January-----	40.5	19.0	29.8	70	-13	6	1.50	0.47	2.35	3	3.9	
February-----	45.7	23.2	34.5	74	-6	15	1.87	0.85	2.74	4	4.5	
March-----	57.4	33.5	45.4	83	5	83	3.56	2.10	4.87	6	2.6	
April-----	68.8	44.1	56.5	88	22	237	3.95	2.54	5.23	7	0.2	
May-----	75.9	53.0	64.5	89	33	449	5.01	2.95	6.85	7	0.0	
June-----	82.9	61.9	72.4	94	45	672	4.23	2.11	6.07	7	0.0	
July-----	88.8	66.9	77.8	102	43	858	3.51	1.44	5.26	5	0.0	
August-----	86.9	64.8	75.8	101	48	799	3.72	1.55	5.56	5	0.0	
September---	79.6	57.0	68.3	95	35	536	4.24	1.58	6.47	5	0.0	
October-----	69.9	45.5	57.7	89	25	269	3.88	2.00	5.77	5	0.0	
November----	56.4	34.8	45.6	79	11	75	3.05	1.27	4.56	5	1.3	
December----	43.9	24.0	33.9	71	-6	14	2.65	1.12	3.94	5	3.9	
Yearly: Average	66.4	44.0	55.2	---	---	---	---	---	---	---	---	
Extreme	109	-23	---	103	-14	---	---	---	---	---	---	
Total-----	---	---	---	---	---	4,012	41.17	33.44	47.31	64	16.4	

\* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

\*\* Average snowfall information recorded in the period 1961-90 at Eldon, Missouri.

Table 2.--Freeze Dates in Spring and Fall  
(Recorded in the period 1961-90 at Versailles, Missouri)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 9	April 21	May 3
2 years in 10 later than--	April 4	April 16	April 28
5 years in 10 later than--	March 26	April 6	April 18
First freezing temperature in fall			
1 year in 10 earlier than--	October 21	October 16	October 1
2 years in 10 earlier than--	October 27	October 21	October 5
5 years in 10 earlier than--	November 7	October 29	October 14

Table 3.--Growing Season  
(Recorded in the period 1961-90 at Versailles, Missouri)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	201	184	162
8 years in 10	209	191	167
5 years in 10	225	204	179
2 years in 10	241	217	190
1 year in 10	249	223	196



# General Soil Map Units

The general soil map in 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 or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map 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 descriptions, names, and delineations of the soils on the general soil map of this survey area do not fully agree with those on the general soil map of surveys of adjacent counties published at a different date. Differences may be the result of additional soil data, variations in the intensity of mapping, and correlation decisions that reflect local conditions.

## Soil Descriptions

### 1. Maplewood-Crestmeade-Friendly Association

#### *Extent of the association:*

2 percent of the survey area

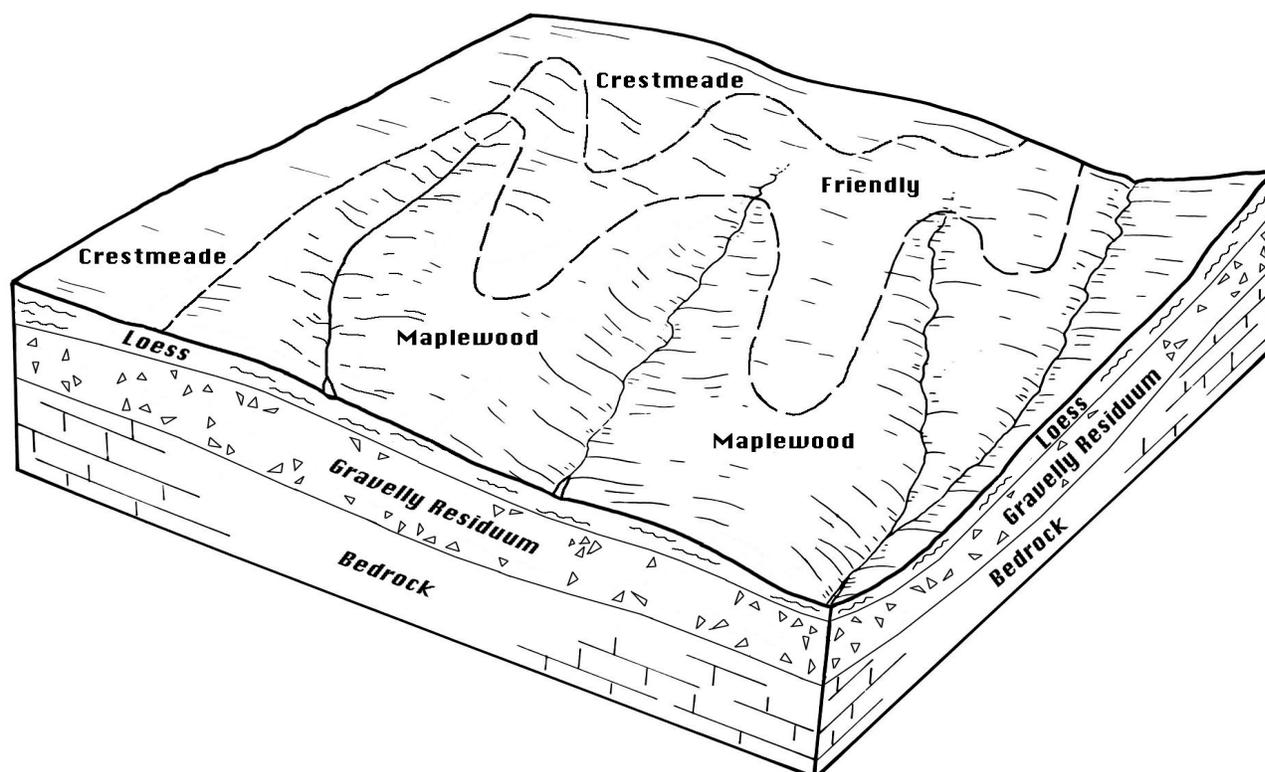


Figure 2.—Typical pattern of soils and parent material in the Maplewood-Crestmeade-Friendly association.

**Composition:**

Maplewood and similar soils—34 percent  
 Crestmeade and similar soils—31 percent  
 Friendly and similar soils—30 percent  
 Minor soils—5 percent (Eldon, Gravois, Speed,  
 and Willowfork)

**Landscape** (fig. 2):

Maplewood—narrow ridgetops and side slopes  
 Crestmeade—broad ridgetops  
 Friendly—ridgetops

**Parent materials:**

Loess and residuum

**Slope range:**

0 to 9 percent

**Slope configuration:**

Convex and complex

**2. Racket-Sturkie Association****Extent of the association:**

6 percent of the survey area

**Composition:**

Racket and similar soils—43 percent  
 Sturkie and similar soils—33 percent  
 Minor soils—24 percent (Gabriel, Hacreek,  
 Moniteau, and Winnipeg)

**Landscape** (fig. 3):

Racket—flood plains  
 Sturkie—flood plains

**Parent materials:**

Alluvium

**Slope range:**

0 to 3 percent

**Slope configuration:**

Linear

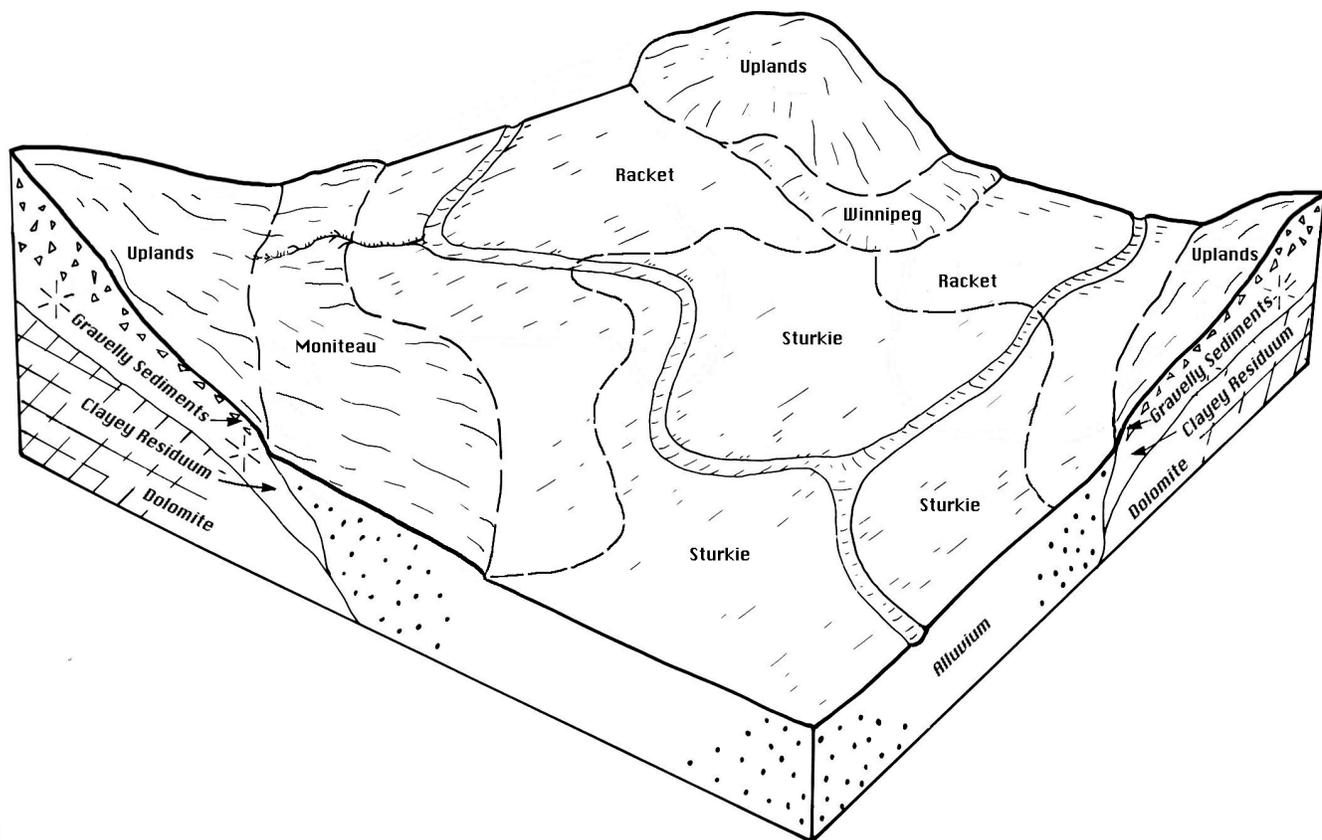


Figure 3.—Typical pattern of soils and parent material in the Racket-Sturkie association.

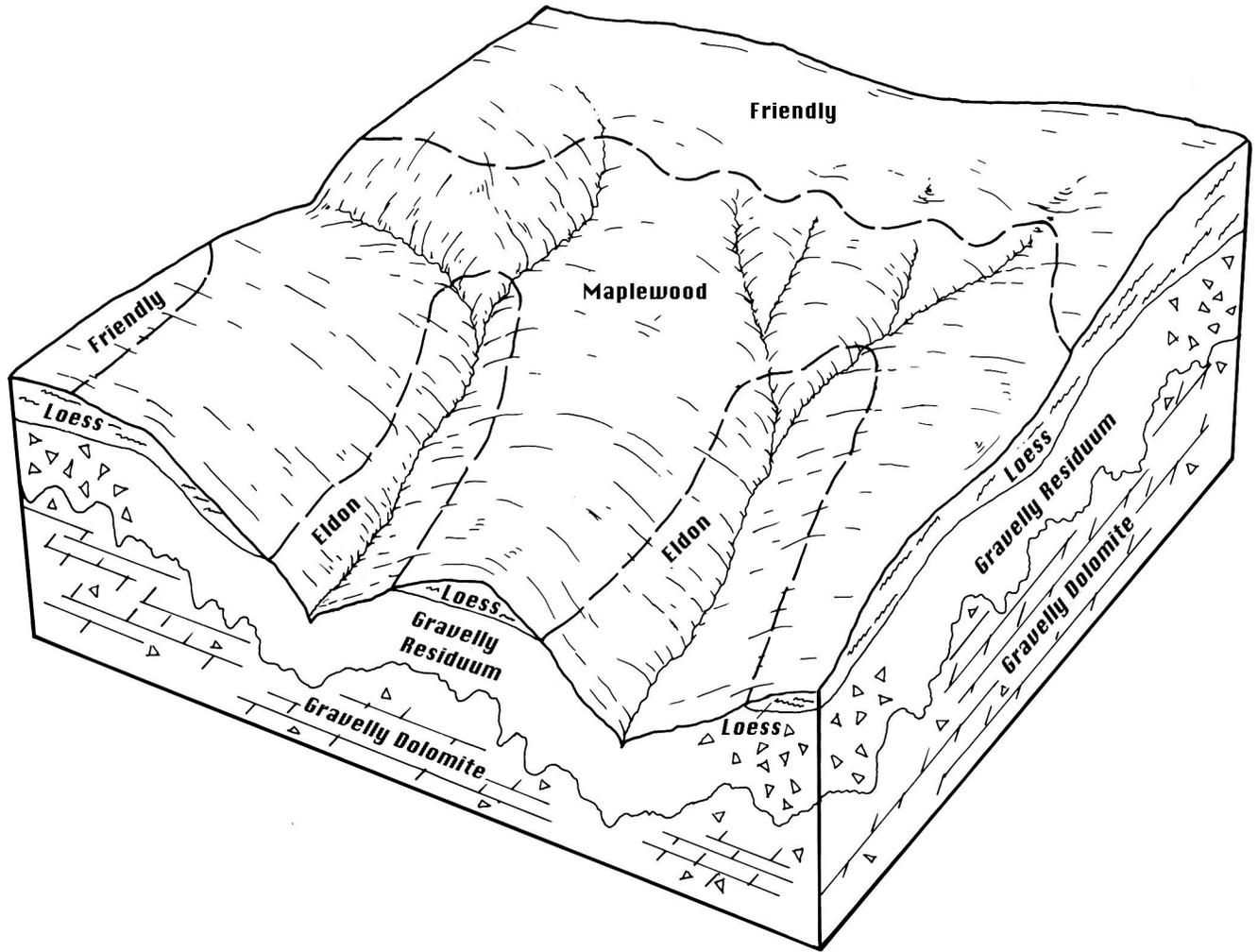


Figure 4.—Typical pattern of soils and parent material in the Maplewood-Friendly-Eldon association.

### 3. Maplewood-Friendly-Eldon Association

**Extent of the association:**

20 percent of the survey area

**Composition:**

Maplewood and similar soils—39 percent  
 Friendly and similar soils—36 percent  
 Eldon and similar soils—11 percent  
 Minor soils—14 percent (Gravois, McGirk, Sacville, Speed, and Willowfork)

**Landscape** (fig. 4):

Maplewood—narrow ridgetops and side slopes  
 Friendly—ridgetops  
 Eldon—side slopes

**Parent materials:**

Loess and residuum

**Slope range:**

1 to 8 percent

**Slope configuration:**

Convex and complex

#### 4. Goss-Gravois Association

**Extent of the association:**

50 percent of the survey area

**Composition:**

Goss and similar soils—50 percent  
 Gravois and similar soils—46 percent  
 Minor soils—4 percent (Cedargap, Hartville, Rueter, and Winnipeg)

**Parent materials:**

Loess and residuum

**Slope range:**

3 to 35 percent

**Slope configuration:**

Convex and complex

**Landscape (fig. 5):**

Goss—narrow ridgetops and side slopes  
 Gravois—ridgetops and side slopes

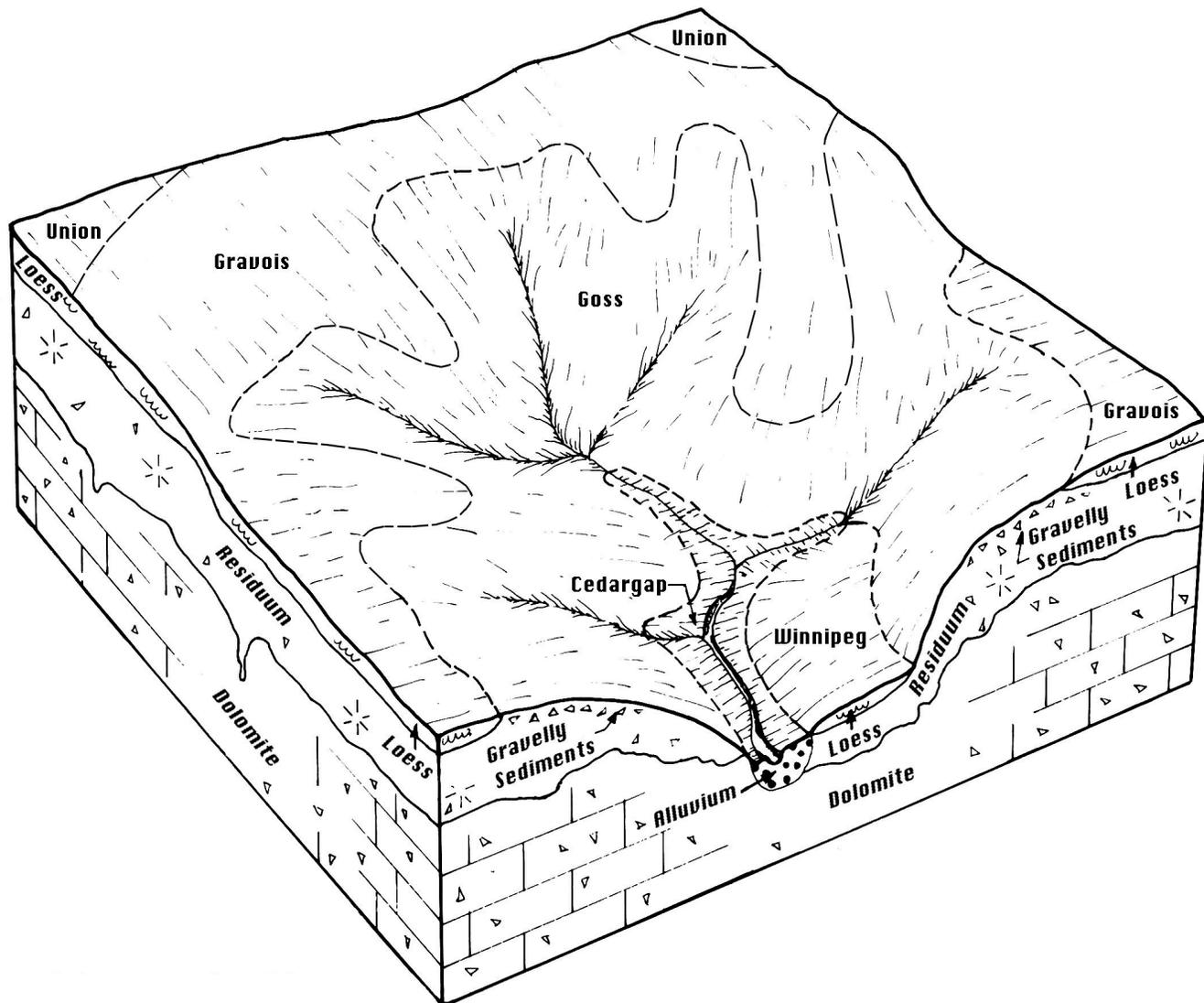


Figure 5.—Typical pattern of soils and parent material in the Goss-Gravois association.

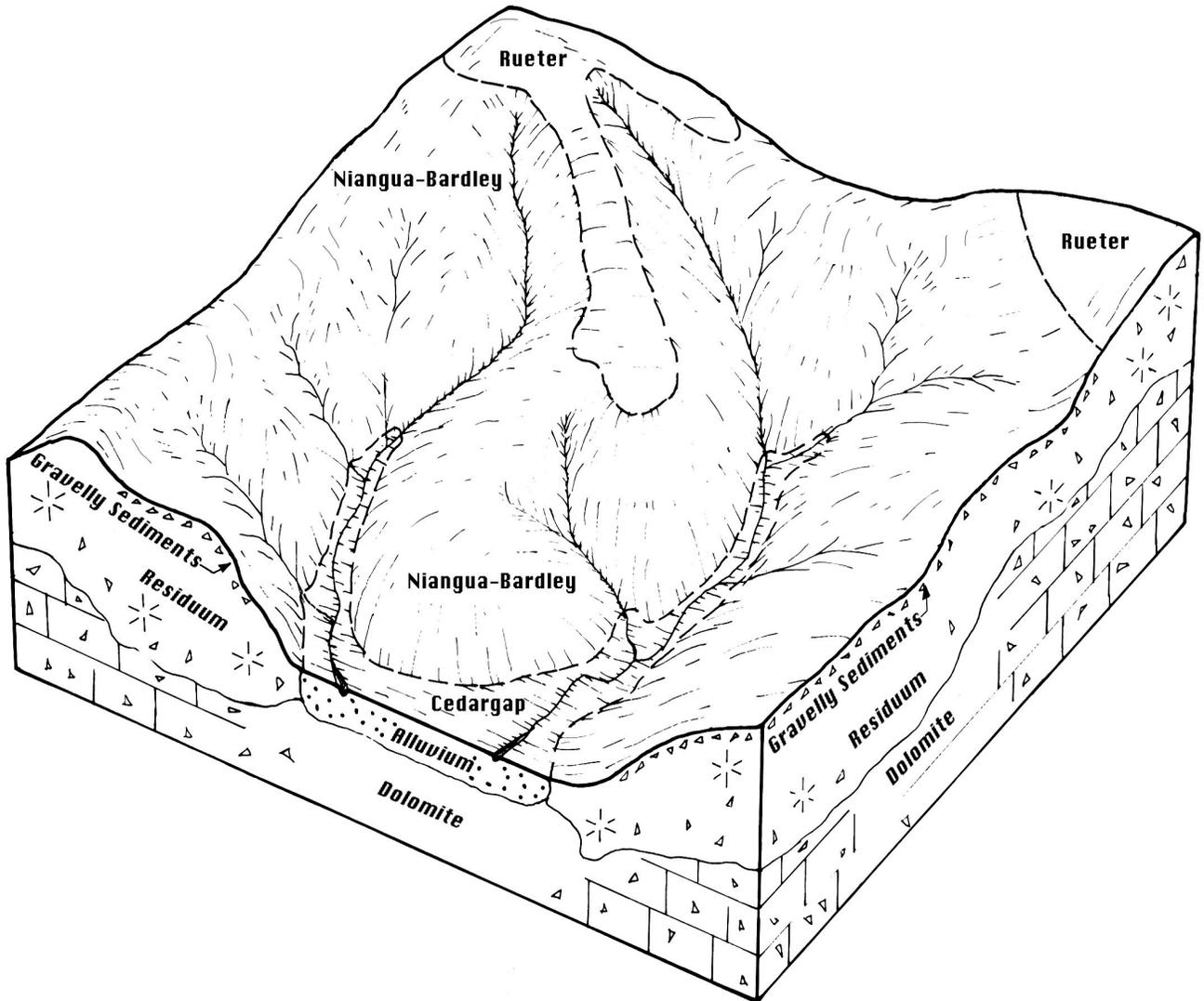


Figure 6.—Typical pattern of soils and parent material in the Niangua-Bardley association.

## 5. Niangua-Bardley Association

### **Extent of the association:**

22 percent of the survey area

### **Composition:**

Niangua and similar soils—47 percent  
 Bardley and similar soils—31 percent  
 Minor soils—22 percent (Cedargap, Moko,  
 Rueter, and Winnipeg)

### **Landscape (fig. 6):**

Niangua—side slopes  
 Bardley—narrow ridgetops and side slopes

### **Parent materials:**

Loess and residuum

### **Slope range:**

3 to 99 percent

### **Slope configuration:**

Convex and complex



## Detailed Soil Map Units

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

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

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

impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

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

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

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Union silt loam, 1 to 3 percent slopes, is a phase of the Union series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are called complexes.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Bardley-Moko complex, 3 to 15 percent slopes, extremely stony, is an example.

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

Table 4 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

## Soil Descriptions

### 15002—McGirk silt loam, 1 to 3 percent slopes

#### Setting

*Landform:* Hillside  
*Position on the landform:* Toeslope  
*Parent material:* Clayey alluvium or clayey colluvium

#### Composition

McGirk and similar soils—90 percent  
Minor components—10 percent  
Hartville  
Sacville

#### Typical Profile

A—0 to 8 inches; silt loam  
Btg1—8 to 15 inches; silty clay loam  
Btg2—15 to 45 inches; silty clay  
Cg—45 to 80 inches; silty clay

#### Soil Properties and Qualities

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Available water capacity:* High (9 to 12 inches)  
*Organic matter content:* Moderately low (1 to 2 percent)  
*Flooding:* None  
*Water table:* 6 to 24 inches

### 66000—Moniteau silt loam, 0 to 2 percent slopes, occasionally flooded

#### Setting

*Landform:* Stream terrace  
*Position on the landform:* Stream terrace  
*Parent material:* Fine-silty alluvium

#### Composition

Moniteau and similar soils—85 percent  
Minor components—15 percent  
Hartville  
Sturkie

#### Typical Profile

Ap—0 to 7 inches; silt loam  
E—7 to 14 inches; silt loam  
Btg—14 to 80 inches; silty clay loam

#### Soil Properties and Qualities

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Available water capacity:* High (9 to 12 inches)  
*Organic matter content:* Moderately low (1 to 2 percent)  
*Flooding:* Occasional (5 to 50 percent chance in any year)  
*Water table:* 0 to 12 inches

### 70008—Goss gravelly silt loam, 3 to 8 percent slopes

#### Setting

*Landform:* Hillside and ridge  
*Position on the landform:* Backslope and summit  
*Parent material:* Gravelly colluvium over clayey residuum weathered from cherty dolostone

#### Composition

Goss and similar soils—90 percent  
Minor components—10 percent  
Gunlock  
Niangua

#### Typical Profile

A—0 to 6 inches; gravelly silt loam  
E—6 to 19 inches; extremely gravelly silt loam  
Bt1—19 to 60 inches; extremely gravelly silty clay  
2Bt2—60 to 80 inches; clay

#### Soil Properties and Qualities

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Available water capacity:* Low (3 to 6 inches)  
*Organic matter content:* Moderate (2 to 4 percent)  
*Flooding:* None  
*Water table:* None

### 70009—Goss gravelly silt loam, 8 to 15 percent slopes

#### Setting

*Landform:* Hillside

*Position on the landform:* Backslope

*Parent material:* Gravelly colluvium over clayey residuum weathered from cherty dolostone

#### Composition

Goss and similar soils—85 percent

Minor components—15 percent

Goss, dark surface

Gunlock

#### Typical Profile

A—0 to 6 inches; gravelly silt loam

E—6 to 19 inches; extremely gravelly silt loam

Bt1—19 to 60 inches; extremely gravelly silty clay

2Bt2—60 to 80 inches; clay

#### Soil Properties and Qualities

*Depth to bedrock:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Available water capacity:* Low (3 to 6 inches)

*Organic matter content:* Moderate (2 to 4 percent)

*Flooding:* None

*Water table:* None

### 70023—Eldon silt loam, 3 to 8 percent slopes

#### Setting

*Landform:* Hillside and ridge

*Position on the landform:* Summit and backslope

*Parent material:* Clayey residuum weathered from cherty dolostone with shale and sandstone

#### Composition

Eldon and similar soils—90 percent

Minor components—10 percent

Eldon, deep phase

Maplewood

#### Typical Profile

A—0 to 9 inches; silt loam

BA—9 to 17 inches; very gravelly silt loam

Bt1—17 to 45 inches; gravelly silty clay, extremely gravelly clay, and very gravelly silty clay

2Bt2—45 to 60 inches; very gravelly silty clay

#### Soil Properties and Qualities

*Depth to bedrock:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Available water capacity:* Moderate (6 to 9 inches)

*Organic matter content:* Moderate (2 to 4 percent)

*Flooding:* None

*Water table:* None

### 70024—Goss very gravelly silt loam, 15 to 35 percent slopes, very stony

#### Setting

*Landform:* Hillside

*Position on the landform:* Backslope

*Parent material:* Gravelly colluvium over clayey residuum weathered from cherty dolostone

#### Composition

Goss and similar soils—90 percent

Minor components—10 percent

Goss silt loam

Gravois

#### Typical Profile

A—0 to 6 inches; very gravelly silt loam

E—6 to 19 inches; extremely gravelly silt loam

Bt1—19 to 60 inches; extremely gravelly silty clay

2Bt2—60 to 80 inches; clay

#### Soil Properties and Qualities

*Depth to bedrock:* Very deep (more than 60 inches)

*Drainage class:* Well drained

*Available water capacity:* Low (3 to 6 inches)

*Organic matter content:* Moderate (2 to 4 percent)

*Flooding:* None

*Water table:* None

### 70028—Moko-Rock outcrop complex, 3 to 15 percent slopes, very stony

#### Setting

*Landform:* Hillside and ridge

*Position on the landform:* Backslope and summit

*Parent material:* Moko—gravelly residuum weathered from cherty dolostone; Rock outcrop—dolostone bedrock

**Composition**

Moko and similar soils—80 percent  
 Rock outcrop—15 percent  
 Minor components—5 percent  
 Bardley

**Typical Profile****Moko**

A1—0 to 3 inches; gravelly loam  
 A2—3 to 8 inches; very gravelly loam  
 R—8 inches; unweathered bedrock

**Soil Properties and Qualities**

*Depth to bedrock:* Moko—very shallow and shallow (4 to 20 inches); Rock outcrop—(0 inches)  
*Drainage class:* Moko—well drained; Rock outcrop—no data  
*Available water capacity:* Moko—very low (0 to 3 inches); Rock outcrop—no data  
*Organic matter content:* Moko—high (4 to 8 percent); Rock outcrop—no data  
*Flooding:* None  
*Water table:* None

**70046—Sacville silt loam, 2 to 5 percent slopes****Setting**

*Landform:* Hillside  
*Position on the landform:* Toeslope  
*Parent material:* Clayey colluvium derived from dolostone

**Composition**

Sacville and similar soils—90 percent  
 Minor components—10 percent  
 Gunlock  
 Hartville  
 McGirk  
 Sacville, eroded

**Typical Profile**

Ap—0 to 7 inches; silt loam  
 AB—7 to 13 inches; silt loam  
 Bt1—13 to 27 inches; silty clay loam  
 Bt2—27 to 60 inches; silty clay

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Available water capacity:* High (9 to 12 inches)

*Organic matter content:* High (4 to 8 percent)  
*Flooding:* None  
*Water table:* 0 to 12 inches

**73012—Gravois silt loam, 3 to 8 percent slopes****Setting**

*Landform:* Ridge  
*Position on the landform:* Summit and shoulder  
*Parent material:* Loess over gravelly residuum weathered from cherty dolostone

**Composition**

Gravois and similar soils—90 percent  
 Minor components—10 percent  
 Goss  
 Union

**Typical Profile**

Ap—0 to 6 inches; silt loam  
 Bt—6 to 25 inches; silty clay loam  
 2Btx—25 to 35 inches; silty clay loam  
 3Bt1—35 to 50 inches; very gravelly silty clay loam  
 4Bt2—50 to 80 inches; very cobbly clay

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Moderately well drained  
*Available water capacity:* Moderate (6 to 9 inches)  
*Organic matter content:* Moderately low (1 to 2 percent)  
*Flooding:* None  
*Water table:* 18 to 36 inches

**73034—Gravois silt loam, 3 to 8 percent slopes, eroded****Setting**

*Landform:* Hillside  
*Position on the landform:* Backslope and shoulder  
*Parent material:* Loess over gravelly residuum weathered from cherty dolostone

**Composition**

Gravois and similar soils—90 percent  
 Minor components—10 percent  
 Goss  
 Winnipeg

**Typical Profile**

Ap—0 to 6 inches; silt loam  
 Bt—6 to 25 inches; silty clay loam  
 2Btx—25 to 35 inches; silty clay loam  
 3Bt1—35 to 50 inches; very gravelly silty clay loam  
 4Bt2—50 to 80 inches; very cobbly clay

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Moderately well drained  
*Available water capacity:* Moderate (6 to 9 inches)  
*Organic matter content:* Moderately low (1 to 2 percent)  
*Flooding:* None  
*Water table:* 18 to 36 inches

**73035—Gravois silt loam, 8 to 15 percent slopes****Setting**

*Landform:* Hillside  
*Position on the landform:* Backslope  
*Parent material:* Loess over gravelly residuum weathered from cherty dolostone

**Composition**

Gravois and similar soils—90 percent  
 Minor components—10 percent  
     Goss  
     Gravois, eroded  
     Soils less than 60 inches to bedrock

**Typical Profile**

Ap—0 to 6 inches; silt loam  
 Bt—6 to 25 inches; silty clay loam  
 2Btx—25 to 35 inches; silty clay loam  
 3Bt1—35 to 50 inches; very gravelly silty clay loam  
 4Bt2—50 to 80 inches; very cobbly clay

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Moderately well drained  
*Available water capacity:* Moderate (6 to 9 inches)  
*Organic matter content:* Moderately low (1 to 2 percent)  
*Flooding:* None  
*Water table:* 18 to 36 inches

**73036—Willowfork silt loam, 0 to 3 percent slopes****Setting**

*Landform:* Hillside  
*Position on the landform:* Toeslope  
*Parent material:* Loess over alluvium

**Composition**

Willowfork and similar soils—90 percent  
 Minor components—10 percent  
     Racket  
     Speed

**Typical Profile**

Ap—0 to 12 inches; silt loam  
 Eg—12 to 26 inches; silt loam  
 Btg1—26 to 54 inches; silty clay loam  
 2Btg2—54 to 80 inches; silty clay loam

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Available water capacity:* High (9 to 12 inches)  
*Organic matter content:* Moderate (2 to 4 percent)  
*Flooding:* None  
*Water table:* 6 to 18 inches

**73037—Friendly silt loam, 1 to 3 percent slopes****Setting**

*Landform:* Ridge  
*Position on the landform:* Summit and shoulder  
*Parent material:* Loess over clayey residuum weathered from cherty dolostone

**Composition**

Friendly and similar soils—90 percent  
 Minor components—10 percent  
     Friendly, eroded  
     Glensted  
     Union

**Typical Profile**

Ap—0 to 6 inches; silt loam  
 Bt1—6 to 13 inches; silty clay  
 Bt2—13 to 31 inches; silty clay loam  
 2Btx—31 to 54 inches; extremely gravelly silty clay loam  
 3Bt—54 to 80 inches; clay

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Available water capacity:* Moderate (6 to 9 inches)  
*Organic matter content:* Moderately low (1 to 2 percent)  
*Flooding:* None  
*Water table:* 12 to 24 inches

**73038—Glensted silt loam, 0 to 1 percent slopes****Setting**

*Landform:* Ridge  
*Position on the landform:* Summit  
*Parent material:* Loess over clayey residuum weathered from cherty limestone

**Composition**

Glensted and similar soils—95 percent  
 Minor components—5 percent  
 Friendly  
 Willowfork

**Typical Profile**

Ap—0 to 9 inches; silt loam  
 Btg1—9 to 14 inches; silty clay  
 2Btg2—14 to 33 inches; silty clay  
 2Cg—33 to 60 inches; silty clay loam

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Available water capacity:* High (9 to 12 inches)  
*Organic matter content:* Moderate (2 to 4 percent)  
*Flooding:* None  
*Water table:* 6 to 18 inches

**73039—Glensted silt loam, 1 to 3 percent slopes****Setting**

*Landform:* Ridge  
*Position on the landform:* Summit and shoulder  
*Parent material:* Loess over clayey residuum weathered from cherty limestone

**Composition**

Glensted and similar soils—90 percent  
 Minor components—10 percent  
 Friendly  
 Glensted silty clay loam  
 Maplewood  
 Willowfork

**Typical Profile**

Ap—0 to 9 inches; silt loam  
 Btg1—9 to 14 inches; silty clay  
 2Btg2—14 to 33 inches; silty clay  
 2Cg—33 to 60 inches; silty clay loam

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Available water capacity:* High (9 to 12 inches)  
*Organic matter content:* Moderate (2 to 4 percent)  
*Flooding:* None  
*Water table:* 6 to 18 inches

**73040—Maplewood silt loam, 2 to 5 percent slopes, eroded****Setting**

*Landform:* Ridge  
*Position on the landform:* Summit and shoulder  
*Parent material:* Loess over clayey residuum weathered from cherty dolostone

**Composition**

Maplewood and similar soils—95 percent  
 Minor components—5 percent  
 Eldon  
 Gravois  
 Maplewood silty clay loam

**Typical Profile**

Ap—0 to 8 inches; silt loam  
 Bt—8 to 17 inches; silty clay loam  
 2Btx—17 to 32 inches; silty clay loam  
 3Bt—32 to 60 inches; very cobbly silty clay, very cobbly clay, and clay

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Available water capacity:* Moderate (6 to 9 inches)  
*Organic matter content:* Moderate (2 to 4 percent)  
*Flooding:* None  
*Water table:* 12 to 24 inches

### 73041—Maplewood silt loam, 5 to 9 percent slopes, eroded

#### Setting

*Landform:* Hillside

*Position on the landform:* Backslope and shoulder

*Parent material:* Loess over clayey residuum weathered from cherty dolostone

#### Composition

Maplewood and similar soils—85 percent

Minor components—15 percent

Eldon

Gravois

Maplewood, uneroded

#### Typical Profile

Ap—0 to 6 inches; silt loam

Bt—6 to 17 inches; silty clay loam

2Btx—17 to 32 inches; silty clay loam

3Bt—32 to 60 inches; very cobbly silty clay, very cobbly clay, and clay

#### Soil Properties and Qualities

*Depth to bedrock:* Very deep (more than 60 inches)

*Drainage class:* Somewhat poorly drained

*Available water capacity:* Moderate (6 to 9 inches)

*Organic matter content:* Moderate (2 to 4 percent)

*Flooding:* None

*Water table:* 12 to 24 inches

### 73042—Niangua-Bardley complex, 15 to 50 percent slopes, extremely stony

#### Setting

*Landform:* Hillside

*Position on the landform:* Backslope

*Parent material:* Gravelly colluvium over clayey residuum weathered from dolostone

#### Composition

Niangua and similar soils—60 percent

Bardley and similar soils—30 percent

Minor components—10 percent

Goss

Moko

Rock outcrop

### Typical Profile

#### Niangua

A—0 to 3 inches; very gravelly silt loam

E—3 to 14 inches; very gravelly silt loam

2Bt—14 to 52 inches; gravelly clay

2R—52 inches; unweathered bedrock

#### Bardley

A—0 to 4 inches; very gravelly silt loam

E—4 to 8 inches; extremely gravelly silt loam

2Bt—8 to 27 inches; clay

2R—27 inches; unweathered bedrock

#### Soil Properties and Qualities

*Depth to bedrock:* Niangua—deep (40 to 60 inches);

Bardley—moderately deep (20 to 40 inches)

*Drainage class:* Well drained

*Available water capacity:* Niangua—low (3 to 6 inches); Bardley—very low (0 to 3 inches)

*Organic matter content:* Moderate (2 to 4 percent)

*Flooding:* None

*Water table:* None

### 73043—Hartville silt loam, 3 to 8 percent slopes, eroded

#### Setting

*Landform:* Hillside

*Position on the landform:* Footslope

*Parent material:* Clayey colluvium

#### Composition

Hartville and similar soils—90 percent

Minor components—10 percent

Goss

McGirk

Winnipeg

#### Typical Profile

Ap—0 to 6 inches; silt loam

Bt1—6 to 19 inches; silty clay loam

Bt2—19 to 60 inches; silty clay

#### Soil Properties and Qualities

*Depth to bedrock:* Very deep (more than 60 inches)

*Drainage class:* Somewhat poorly drained

*Available water capacity:* Moderate (6 to 9 inches)

*Organic matter content:* Moderate (2 to 4 percent)

*Flooding:* None

*Water table:* 12 to 24 inches

**73044—Crestmeade silt loam, 0 to 2 percent slopes****Setting**

*Landform:* Ridge  
*Position on the landform:* Summit  
*Parent material:* Loess

**Composition**

Crestmeade and similar soils—90 percent  
 Minor components—10 percent  
     Crestmeade, eroded  
     Friendly

**Typical Profile**

Ap—0 to 8 inches; silt loam  
 E—8 to 12 inches; silt loam  
 Btg—12 to 50 inches; silty clay  
 Cg—50 to 60 inches; silty clay loam

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Available water capacity:* High (9 to 12 inches)  
*Organic matter content:* Moderate (2 to 4 percent)  
*Flooding:* None  
*Water table:* 6 to 18 inches

**73045—Crestmeade silty clay loam, 1 to 3 percent slopes, eroded****Setting**

*Landform:* Ridge  
*Position on the landform:* Summit and shoulder  
*Parent material:* Loess

**Composition**

Crestmeade—90 percent  
 Minor components—10 percent  
     Crestmeade, severely eroded  
     Friendly  
     Willowfork

**Typical Profile**

Ap—0 to 8 inches; silty clay loam  
 Btg—8 to 50 inches; silty clay  
 Cg—50 to 60 inches; silty clay loam

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained

*Available water capacity:* High (9 to 12 inches)  
*Organic matter content:* Moderate (2 to 4 percent)  
*Flooding:* None  
*Water table:* 6 to 18 inches

**73046—Wrengart silt loam, 3 to 8 percent slopes, eroded****Setting**

*Landform:* Ridge  
*Position on the landform:* Summit and shoulder  
*Parent material:* Loess over gravelly residuum weathered from dolostone

**Composition**

Wrengart and similar soils—90 percent  
 Minor components—10 percent  
     Goss  
     Rueter

**Typical Profile**

Ap—0 to 6 inches; silt loam  
 Bt—6 to 26 inches; silty clay loam  
 2Btx—26 to 45 inches; silt loam  
 3Bt1—45 to 60 inches; extremely gravelly silty clay loam  
 4Bt2—60 to 80 inches; gravelly silty clay

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Moderately well drained  
*Available water capacity:* Moderate (6 to 9 inches)  
*Organic matter content:* Moderately low (1 to 2 percent)  
*Flooding:* None  
*Water table:* 24 to 42 inches

**73047—Bardley-Moko complex, 3 to 15 percent slopes, extremely stony****Setting**

*Landform:* Hillside and ridge  
*Position on the landform:* Shoulder and summit  
*Parent material:* Bardley—gravelly colluvium over clayey residuum weathered from dolostone;  
 Moko—gravelly residuum weathered from dolostone

**Composition**

Bardley and similar soils—70 percent

Moko and similar soils—20 percent

Minor components—10 percent

Gravois

Niangua

Rock outcrop

Steeper areas

**Typical Profile****Bardley**

A—0 to 4 inches; very gravelly silt loam

E—4 to 8 inches; extremely gravelly silt loam

2Bt—8 to 27 inches; clay

2R—27 inches; unweathered bedrock

**Moko**

A1—0 to 3 inches; gravelly loam

A2—3 inches; very gravelly loam

R—8 inches; unweathered bedrock

**Soil Properties and Qualities**

*Depth to bedrock:* Bardley—moderately deep (20 to 40 inches); Moko—very shallow and shallow (4 to 20 inches)

*Drainage class:* Well drained

*Available water capacity:* Very low (0 to 3 inches)

*Organic matter content:* Bardley—moderate (2 to 4 percent); Moko—high (4 to 8 percent)

*Flooding:* None

*Water table:* None

**73048—Rueter gravelly silt loam, 3 to 8 percent slopes****Setting**

*Landform:* Ridge

*Position on the landform:* Summit and shoulder

*Parent material:* Gravelly colluvium over gravelly residuum weathered from dolostone

**Composition**

Rueter and similar soils—90 percent

Minor components—10 percent

Goss

Gravois

**Typical Profile**

A—0 to 3 inches; gravelly silt loam

E—3 to 14 inches; very gravelly silt loam

Bt1—14 to 45 inches; very gravelly and extremely cobbly loam

2Bt2—45 to 86 inches; extremely cobbly clay

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)

*Drainage class:* Somewhat excessively drained

*Available water capacity:* Low (3 to 6 inches)

*Organic matter content:* Moderately low (1 to 2 percent)

*Flooding:* None

*Water table:* None

**73050—Rock outcrop-Bardley complex, 35 to 99 percent slopes, extremely stony****Setting**

*Landform:* Hillside

*Position on the landform:* Backslope

*Parent material:* Rock outcrop—no data; Bardley—gravelly colluvium over clayey residuum weathered from dolostone

**Composition**

Rock outcrop—55 percent

Bardley and similar soils—35 percent

Minor components—10 percent

Moko

**Typical Profile****Bardley**

A—0 to 4 inches; very gravelly silt loam

E—4 to 8 inches; extremely gravelly silt loam

2Bt—8 to 27 inches; clay

2R—27 inches; unweathered bedrock

**Soil Properties and Qualities**

*Depth to bedrock:* Rock outcrop—(0 inches); Bardley—moderately deep (20 to 40 inches)

*Drainage class:* Rock outcrop—no data, Bardley—well drained

*Available water capacity:* Rock outcrop—no data; Bardley—very low (0 to 3 inches)

*Organic matter content:* Rock outcrop—no data; Bardley—moderately low (1 to 2 percent)

*Flooding:* None

*Water table:* None

### 73112—Gunlock silt loam, 3 to 8 percent slopes

#### Setting

*Landform:* Hillside  
*Position on the landform:* Backslope  
*Parent material:* Loess over gravelly residuum weathered from dolostone

#### Composition

Gunlock and similar soils—90 percent  
 Minor components—10 percent  
 Cedargap  
 Gravois  
 Hartville  
 Soils less than 60 inches to bedrock

#### Typical Profile

Ap—0 to 5 inches; silt loam  
 Bt—5 to 25 inches; silty clay loam  
 2Btx—25 to 43 inches; silty clay loam  
 3Bt1—43 to 55 inches; extremely gravelly silty clay  
 3Bt2—55 to 80 inches; gravelly silty clay, silty clay, and clay

#### Soil Properties and Qualities

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Moderately well drained  
*Available water capacity:* Moderate (6 to 9 inches)  
*Organic matter content:* Moderately low (1 to 2 percent)  
*Flooding:* None  
*Water table:* 18 to 36 inches

### 73136—Union silt loam, 1 to 3 percent slopes

#### Setting

*Landform:* Ridge  
*Position on the landform:* Summit  
*Parent material:* Loess over gravelly residuum weathered from cherty dolostone

#### Composition

Union and similar soils—90 percent  
 Minor components—10 percent  
 Gravois  
 Maplewood

#### Typical Profile

Ap—0 to 9 inches; silt loam  
 Bt—9 to 30 inches; silty clay loam

2Btx—30 to 53 inches; extremely cobbly loam and extremely gravelly silt loam  
 3Bt—53 to 80 inches; clay

#### Soil Properties and Qualities

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Moderately well drained  
*Available water capacity:* Low (3 to 6 inches)  
*Organic matter content:* Moderately low (1 to 2 percent)  
*Flooding:* None  
*Water table:* 18 to 36 inches

### 73137—Clafork silt loam, 2 to 5 percent slopes, eroded

#### Setting

*Landform:* Ridge  
*Position on the landform:* Summit and shoulder  
*Parent material:* Loess over gravelly residuum weathered from cherty limestone

#### Composition

Clafork and similar soils—90 percent  
 Minor components—10 percent  
 Glensted

#### Typical Profile

Ap—0 to 8 inches; silt loam  
 Btg—8 to 36 inches; silty clay  
 2Btx1—36 to 56 inches; silt loam  
 3Btx2—56 to 69 inches; very gravelly silt loam  
 4Bt—69 to 80 inches; very gravelly silty clay

#### Soil Properties and Qualities

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Available water capacity:* Moderate (6 to 9 inches)  
*Organic matter content:* Moderate (2 to 4 percent)  
*Flooding:* None  
*Water table:* 12 to 24 inches

### 73138—Clafork silt loam, 2 to 5 percent slopes

#### Setting

*Landform:* Ridge  
*Position on the landform:* Summit and shoulder  
*Parent material:* Loess over gravelly residuum weathered from cherty limestone

**Composition**

Clafork and similar soils—90 percent  
 Minor components—10 percent  
   Clafork eroded  
   Crestmeade  
   Glensted

**Typical Profile**

Ap—0 to 8 inches; silt loam  
 E—8 to 11 inches; silt loam  
 Btg—11 to 39 inches; silty clay and silty clay loam  
 2Btx1—39 to 59 inches; silt loam and silty clay loam  
 3Btx2—59 to 72 inches; very gravelly silt loam  
 4Bt—72 to 80 inches; very gravelly silty clay

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Available water capacity:* Moderate (6 to 9 inches)  
*Organic matter content:* Moderate (2 to 4 percent)  
*Flooding:* None  
*Water table:* 12 to 24 inches

**73190—Winnipeg silt loam, 3 to 8 percent slopes, eroded****Setting**

*Landform:* Hillside  
*Position on the landform:* Footslope  
*Parent material:* Loess over silty colluvium

**Composition**

Winnipeg and similar soils—95 percent  
 Minor components—5 percent  
   Gunlock  
   Hartville

**Typical Profile**

Ap—0 to 6 inches; silt loam  
 Bt1—6 to 28 inches; silt loam  
 2Bt2—28 to 48 inches; gravelly silt loam and very gravelly loam  
 2Bt3—48 to 60 inches; extremely gravelly sandy clay loam

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Available water capacity:* High (9 to 12 inches)  
*Organic matter content:* Moderately low (1 to 2 percent)  
*Flooding:* None  
*Water table:* None

**75376—Cedargap gravelly silt loam, 0 to 3 percent slopes, frequently flooded****Setting**

*Landform:* Flood plain  
*Position on the landform:* Flood plain  
*Parent material:* Gravelly alluvium

**Composition**

Cedargap and similar soils—90 percent  
 Minor components—10 percent  
   Jemerson  
   Winnipeg

**Typical Profile**

Ap—0 to 9 inches; gravelly silt loam  
 A—9 to 49 inches; very gravelly loam and very gravelly sandy clay loam  
 2C—49 to 60 inches; clay

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Available water capacity:* Low (3 to 6 inches)  
*Organic matter content:* Moderate (2 to 4 percent)  
*Flooding:* Frequent (more than a 50 percent chance in any year)  
*Water table:* None

**75378—Sturkie silt loam, 0 to 2 percent slopes, frequently flooded****Setting**

*Landform:* Flood plain  
*Position on the landform:* Flood plain  
*Parent material:* Silty alluvium

**Composition**

Sturkie and similar soils—90 percent  
 Minor components—10 percent  
   Moniteau  
   Racket

**Typical Profile**

Ap—0 to 9 inches; silt loam  
 A—9 to 19 inches; silt loam  
 Bw—19 to 60 inches; silt loam

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Available water capacity:* High (9 to 12 inches)

*Organic matter content:* Moderate (2 to 4 percent)  
*Flooding:* Frequent (more than a 50 percent chance in any year)  
*Water table:* None

**75384—Healing silt loam, 0 to 3 percent slopes, occasionally flooded**

**Setting**

*Landform:* Stream terrace  
*Position on the landform:* Stream terrace  
*Parent material:* Fine-silty alluvium

**Composition**

Healing and similar soils—90 percent  
 Minor components—10 percent  
     Gabriel  
     Racket

**Typical Profile**

A—0 to 15 inches; silt loam  
 Bt1—15 to 50 inches; silt loam and silty clay loam  
 Bt2—50 to 60 inches; silty clay loam

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Available water capacity:* High (9 to 12 inches)  
*Organic matter content:* Moderate (2 to 4 percent)  
*Flooding:* Occasional (5 to 50 percent chance in any year)  
*Water table:* None

**75385—Gabriel silt loam, 0 to 2 percent slopes, occasionally flooded**

**Setting**

*Landform:* Stream terrace  
*Position on the landform:* Stream terrace  
*Parent material:* Fine-silty alluvium

**Composition**

Gabriel and similar soils—90 percent  
 Minor components—10 percent  
     Moniteau  
     Racket  
     Sacville  
     Sturkie

**Typical Profile**

A—0 to 14 inches; silt loam  
 Btg1—14 to 29 inches; silty clay loam  
 Btg2—29 to 80 inches; silty clay loam

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Poorly drained  
*Available water capacity:* High (9 to 12 inches)  
*Organic matter content:* Moderate (2 to 4 percent)  
*Flooding:* Occasional (5 to 50 percent chance in any year)  
*Water table:* 12 to 30 inches

**75386—Speed silt loam, 0 to 3 percent slopes, rarely flooded**

**Setting**

*Landform:* Stream terrace  
*Position on the landform:* Stream terrace  
*Parent material:* Fine-silty alluvium

**Composition**

Speed and similar soils—95 percent  
 Minor components—5 percent  
     Sacville  
     Speed, gravelly subsoil

**Typical Profile**

A—0 to 14 inches; silt loam  
 E—14 to 25 inches; silt loam  
 Btg1—25 to 35 inches; silt loam  
 Btg2—35 to 60 inches; silty clay loam

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Available water capacity:* Very high (more than 12 inches)  
*Organic matter content:* Moderate (2 to 4 percent)  
*Flooding:* Rare (1 to 5 percent chance in any year)  
*Water table:* 12 to 30 inches

**75387—Hacreek silt loam, 0 to 2 percent slopes, occasionally flooded**

**Setting**

*Landform:* Stream terrace  
*Position on the landform:* Stream terrace  
*Parent material:* Fine-silty alluvium

**Composition**

Hacreek and similar soils—90 percent  
 Minor components—10 percent  
     Sacville  
     Sturkie

**Typical Profile**

Ap—0 to 9 inches; silt loam  
 Bt—9 to 21 inches; silty clay loam  
 Btg1—21 to 28 inches; silty clay loam  
 Btg2—28 to 70 inches; silty clay loam  
 Btg3—70 to 80 inches; silty clay loam

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Somewhat poorly drained  
*Available water capacity:* High (9 to 12 inches)  
*Organic matter content:* Moderate (2 to 4 percent)  
*Flooding:* Occasional (5 to 50 percent chance in any year)  
*Water table:* 12 to 24 inches

**75415—Jemerson silt loam, 0 to 3 percent slopes, occasionally flooded****Setting**

*Landform:* Stream terrace  
*Position on the landform:* Stream terrace  
*Parent material:* Fine-silty alluvium

**Composition**

Jemerson and similar soils—90 percent  
 Minor components—10 percent  
     Cedargap  
     Jemerson, gravelly subsoil  
     Winnipeg

**Typical Profile**

Ap—0 to 9 inches; silt loam  
 Bt—9 to 50 inches; silt loam  
 2C—50 to 60 inches; gravelly loam

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Available water capacity:* Very high (more than 12 inches)  
*Organic matter content:* Moderately low (1 to 2 percent)  
*Flooding:* Occasional (5 to 50 percent chance in any year)  
*Water table:* 42 to 60 inches

**75421—Racket silt loam, 0 to 3 percent slopes, occasionally flooded****Setting**

*Landform:* Flood plain  
*Position on the landform:* Flood plain  
*Parent material:* Loamy alluvium

**Composition**

Racket and similar soils—90 percent  
 Minor components—10 percent  
     Gabriel  
     Healing

**Typical Profile**

Ap—0 to 10 inches; silt loam  
 Bw—10 to 38 inches; silt loam  
 2C—38 to 60 inches; stratified extremely gravelly sand to gravelly loamy sand

**Soil Properties and Qualities**

*Depth to bedrock:* Very deep (more than 60 inches)  
*Drainage class:* Well drained  
*Available water capacity:* Moderate (6 to 9 inches)  
*Organic matter content:* Moderately low (1 to 2 percent)  
*Flooding:* Occasional (5 to 50 percent chance in any year)  
*Water table:* 42 to 72 inches

**99000—Pits, quarries****Setting**

*Landform:* None assigned  
*Position on the landform:* None assigned  
*Parent material:* No data

**Composition**

Pits, quarries—100 percent  
 Minor components—0 percent

**99001—Water****Setting**

*Landform:* None assigned  
*Position on the landform:* None assigned  
*Parent material:* No data

**Composition**

Water—100 percent  
 Minor components—0 percent

**99003—Miscellaneous water*****Setting***

*Landform:* None assigned

*Position on the landform:* None assigned

*Parent material:* No data

***Composition***

Waste stabilization lagoons—100 percent

Minor components—0 percent

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
15002	McGirk silt loam, 1 to 3 percent slopes-----	2,279	0.6
66000	Moniteau silt loam, 0 to 2 percent slopes, occasionally flooded-----	2,539	0.6
70008	Goss gravelly silt loam, 3 to 8 percent slopes-----	10,405	2.6
70009	Goss gravelly silt loam, 8 to 15 percent slopes-----	26,363	6.7
70023	Eldon silt loam, 3 to 8 percent slopes-----	8,171	2.1
70024	Goss very gravelly silt loam, 15 to 35 percent slopes, very stony-----	48,200	12.3
70028	Moko-Rock outcrop complex, 3 to 15 percent slopes, very stony-----	818	0.2
70046	Sacville silt loam, 2 to 5 percent slopes-----	6,455	1.6
73012	Gravois silt loam, 3 to 8 percent slopes-----	42,310	10.8
73034	Gravois silt loam, 3 to 8 percent slopes, eroded-----	20,731	5.3
73035	Gravois silt loam, 8 to 15 percent slopes-----	6,370	1.6
73036	Willowfork silt loam, 0 to 3 percent slopes-----	2,238	0.6
73037	Friendly silt loam, 1 to 3 percent slopes-----	22,224	5.7
73038	Glensted silt loam, 0 to 1 percent slopes-----	2,484	0.6
73039	Glensted silt loam, 1 to 3 percent slopes-----	5,938	1.5
73040	Maplewood silt loam, 2 to 5 percent slopes, eroded-----	28,378	7.2
73041	Maplewood silt loam, 5 to 9 percent slopes, eroded-----	4,467	1.1
73042	Niangua-Bardley complex, 15 to 50 percent slopes, extremely stony-----	61,926	15.8
73043	Hartville silt loam, 3 to 8 percent slopes, eroded-----	4,407	1.1
73044	Crestmeade silt loam, 0 to 2 percent slopes-----	1,203	0.3
73045	Crestmeade silty clay loam, 1 to 3 percent slopes, eroded-----	1,003	0.3
73046	Wrengart silt loam, 3 to 8 percent slopes, eroded-----	134	*
73047	Bardley-Moko complex, 3 to 15 percent slopes, extremely stony-----	6,423	1.6
73048	Rueter gravelly silt loam, 3 to 8 percent slopes-----	12,068	3.1
73050	Rock outcrop-Bardley complex, 35 to 99 percent slopes, extremely stony---	387	*
73112	Gunlock silt loam, 3 to 8 percent slopes-----	4,263	1.1
73136	Union silt loam, 1 to 3 percent slopes-----	8,573	2.2
73137	Clafork silt loam, 2 to 5 percent slopes, eroded-----	574	0.1
73138	Clafork silt loam, 2 to 5 percent slopes-----	176	*
73190	Winnipeg silt loam, 3 to 8 percent slopes, eroded-----	4,670	1.2
75376	Cedargap gravelly silt loam, 0 to 3 percent slopes, frequently flooded---	9,478	2.4
75378	Sturkie silt loam, 0 to 2 percent slopes, frequently flooded-----	6,504	1.7
75384	Healing silt loam, 0 to 3 percent slopes, occasionally flooded-----	1,143	0.3
75385	Gabriel silt loam, 0 to 2 percent slopes, occasionally flooded-----	1,229	0.3
75386	Speed silt loam, 0 to 3 percent slopes, rarely flooded-----	1,967	0.5
75387	Hacreek silt loam, 0 to 2 percent slopes, occasionally flooded-----	1,403	0.4
75415	Jemerson silt loam, 0 to 3 percent slopes, occasionally flooded-----	849	0.2
75421	Racket silt loam, 0 to 3 percent slopes, occasionally flooded-----	10,668	2.7
99000	Pits, quarries-----	83	*
99001	Water-----	12,864	3.3
99003	Miscellaneous water-----	601	0.2
	Total-----	392,966	100.0

\* Less than 0.1 percent.



# Prime Farmland

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

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 84,670 acres in the survey area, or nearly 22 percent of the total acreage, meets the soil requirements for prime farmland. This land is mainly on the flood plains and broad uplands of soil associations 1, 2, and 3, which are described under the heading "General Soil Map Units." Most of the prime farmland is used for cultivated crops. The main crops grown on this land are corn, soybeans, grain sorghum and wheat (fig. 7).

A recent trend in land use in some parts of the survey area has been the loss of some prime

farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed below. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table and all soils that are frequently flooded during the growing season qualify as prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. The need for these measures is indicated after the map unit name below. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures.

The soils identified as prime farmland in Morgan County are:

- 15002 McGirk silt loam, 1 to 3 percent slopes (where drained)
- 66000 Moniteau silt loam, 0 to 2 percent slopes, occasionally flooded (where drained)
- 73036 Willowfork silt loam, 0 to 3 percent slopes (where drained)
- 73037 Friendly silt loam, 1 to 3 percent slopes
- 73038 Glensted silt loam, 0 to 1 percent slopes (where drained)
- 73039 Glensted silt loam, 1 to 3 percent slopes (where drained)
- 73040 Maplewood silt loam, 2 to 5 percent slopes, eroded
- 73044 Crestmeade silt loam, 0 to 2 percent slopes



Figure 7.—An area of Winnipeg silt loam, 3 to 8 percent slopes, with soybeans in the foreground and corn in the background.

- |       |  |       |   |
|-------|--|-------|---|
| 73045 | Crestmeade silty clay loam, 1 to 3 percent slopes, eroded  | 75385 | Gabriel silt loam, 0 to 2 percent slopes, occasionally flooded (where drained)  |
| 73136 | Union silt loam, 1 to 3 percent slopes   | 75386 | Speed silt loam, 0 to 3 percent slopes, rarely flooded  |
| 73137 | Clafork silt loam, 2 to 5 percent slopes, eroded   | 75387 | Hacreek silt loam, 0 to 2 percent slopes, occasionally flooded  |
| 73138 | Clafork silt loam, 2 to 5 percent slopes   | 75415 | Jemerson silt loam, 0 to 3 percent slopes, occasionally flooded   |
| 75378 | Sturkie silt loam, 0 to 2 percent slopes, frequently flooded (where protected from flooding or not frequently flooded during the growing season) | 75421 | Racket silt loam, 0 to 3 percent slopes, occasionally flooded (where protected from flooding or not frequently flooded during the growing season) |
| 75384 | Healing silt loam, 0 to 3 percent slopes, occasionally flooded   |       |   |

# Use and Management of the Soils

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

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

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.

## Interpretive Ratings

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

The ratings in these tables are both verbal and numerical.

### Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited or not limited by all of the soil features that affect a specified use. Terms for the limitation classes are *not limited*, *slightly limited*, *moderately limited*, *limited*, and *very limited*.

### Numerical Ratings

Numerical ratings in the tables indicate the severity of individual limitations. They also indicate the overall degree to which a soil is limited or not limited for a specific use. The numerical ratings are shown as decimal fractions ranging from 0.00 to 1.00. Limitation classes are assigned as follows:

Not limited .....	0.00
Slightly limited .....	0.01 to 0.30
Moderately limited .....	0.31 to 0.60
Limited .....	0.61 to 0.99
Very limited .....	1.00

The numerical ratings used to express the severity of individual limitations indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation.

In tables that use limitation class terms, such as *very limited* or *limited*, *etc.*, limitation ratings, and numerical ratings are shown for each soil feature listed. As many as three soil features may be listed for each soil component if applicable. The overall limitation rating for the soil component is based on the most severe limitation.

## Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Natural Resources 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 the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

According to the Missouri Department of Agriculture, approximately 16,000 acres in Morgan County was used as cropland in 1997 and an estimated 138,000 acres was used as pastureland (Missouri Department of Agriculture, 1997).

Field crops, though not extensive, are very significant in Morgan County. In 1997, corn was planted on about 4,800 acres, soybeans on 7,400 acres, grain sorghum on 1,200 acres, and wheat on

2,600 acres (Missouri Department of Agriculture, 1997). Oats, barley, and rye were grown on small acreages.

Most of the corn and soybeans are grown on the flood plains in the county. Many areas of the more droughty soils, primarily in the uplands, are used for grain sorghum, wheat, grass, or grass-legume pasture and hay (fig. 8).

The potential for increased crop production in Morgan County is good. Production can be increased by use of the latest agricultural technology on all cropland in the county. This survey can facilitate the application of such technology. About 84,670 acres in the county is prime farmland that generally is suitable for intensive cultivation. Trees have been cleared from most of this acreage.

***Cropland erosion.*** Soil erosion is the major hazard on nearly all sloping cropland and overgrazed pastureland in Morgan County. All soils with slopes



Figure 8.—Large bales of hay in an area of Glensted silt loam, 1 to 3 percent slopes.

greater than 2 percent are susceptible to damage from erosion.

Soil erosion results in the gradual loss of the surface layer and reduces productivity. Erosion is especially damaging on soils that have a clayey subsoil, which then becomes mixed with the plow layer. Good seedbed preparation and germination rates become increasingly difficult to achieve. Gunlock, Hartville, Maplewood, and Sacville soils are commonly tilled, are erodible, and have a clayey subsoil. Clayey areas resulting from erosion make tillage and seedbed preparation difficult. Erosion also reduces the productivity of soils that have rooting depths that are restricted by fragipans or bedrock, such as Bardley and Union soils, by effectively decreasing the volume of soil available to supply water and nutrients.

Erosion also removes valuable slow-release nutrients in the topsoil. The nutrients in one ton of topsoil are estimated to be worth about \$5 or \$6. At that rate, unprotected upland crop fields can lose \$200 to \$240 worth of nutrients each year.

Soil erosion on farmland results in sediment entering streams, lakes, ponds, and road ditches. Controlling this erosion minimizes the pollution of streams by sediment and collateral pesticides, thereby improving the quality of water for municipal and recreational uses and for fish and wildlife. It also prolongs the useful life of ponds, lakes, and roadside ditches by preventing sediment from filling them.

**Erosion-control practices.** Erosion-control practices provide protective surface cover, reduce runoff, and increase infiltration. A cropping system that keeps vegetative cover or residue on the soil surface can hold erosion losses to amounts that will not reduce the productive capacity of the soil. Growing grasses and legumes for pasture and hay is very effective in controlling erosion. Including grasses and legumes in the crop rotation improves tilling, and the legumes provide nitrogen for the following crop.

Significant reductions in soil loss can be accomplished by basic management techniques. Farming on the contour reduces soil loss by as much as 50 percent. Conservation tillage is a management practice in which the amount of tillage is reduced or changed so that at least 30 percent of the soil surface is covered with residue after the crop is planted. The residue controls erosion by reducing the impact of raindrops, which can dislodge unprotected topsoil. Also, runoff is reduced, and soil particles are not as likely to be removed from the field. This system becomes more effective with increasing amounts of residue on the soil surface. All of the

upland soils that are commonly used for row crops are well suited to conservation tillage. No-till farming is a practice that eliminates tillage operations entirely and leaves nearly all of the crop residue on the soil surface. Some farmers in the county are finding this to be a cornerstone of their conservation efforts. Other benefits of no-till farming include less expenditure for equipment, less soil compaction, time savings at planting, conservation of soil moisture, and fuel savings.

The large amounts of residue left as a result of no-till farming also shield the soil from sunshine, which slows evaporation. This is an asset in the summer during droughty periods, but tends to delay warming and drying of the soil in the spring. Therefore, no-till farming is best suited to deep or very deep, moderately well drained or well drained soils that are not frequently flooded, which include Gravois, Gunlock, Healing, Jemerson, Union, Winnipeg, and Wrengart soils.

Contour stripcropping reduces erosion by maintenance of contoured strips of permanent vegetation. Such grass or legume strips are usually used for hay. The areas between the strips are cultivated, and row crops are planted on the contour. The grass or legume strips minimize erosion and help filter the sediment from runoff that would otherwise leave the field.

Terraces reduce the length of slopes and reduce runoff and erosion. Broad-base terraces are most practical on uneroded upland soils that have smooth slopes less than 8 percent. Construction of grassed backslope or narrow-base terraces reduces the steepness of the slope because construction cuts are made from the downslope side. Construction of broad-base terraces actually increases the slope and makes additional erosion-control practices crucial. On many soils, such as Eldon, Maplewood, and Sacville soils, topsoiling may be required in areas where terracing exposes the clayey subsoil. Gravois, Gunlock, and Union soils have similar intensive management needs because of a dense layer in the subsoil.

Grade stabilization structures are small water bodies that cover up gullied areas and prevent further uphill encroachment. These structures provide a stable place into which tile terrace outlets or grassed waterways can empty runoff from terraced fields.

**Soil wetness.** Wetness is a management concern on about 15,564 acres in the county. Moniteau and Willowfork soils are naturally so wet that planting or harvesting is delayed or crop production is reduced in most years. Land grading or surface drainage may be needed to some extent on these soils.

In the past, drainage of wetland areas was unregulated and, therefore, occurred at the discretion of individual landowners. In recent years, however, legislation has been enacted recognizing the importance of wetlands to the total environment. The effect of these laws is to protect most existing wetlands from further degradation and to encourage redevelopment of areas that were formerly wetlands. Before altering any area that might be considered a wetland, the Natural Resources Conservation Service should be contacted in order to ensure compliance with existing laws.

Flooding is a hazard on the Cedargap, Gabriel, Hacreek, Healing, Jemerson, Moniteau, Racket, and Sturkie soils. If flooding occurs, it is commonly during the period from November to May.

**Soil fertility.** Soil fertility is naturally low in most of the eroded and shallow soils in the survey area. However, all of the soils need additional plant nutrients for maximum production. Most of the soils are naturally acid in the upper part of the rooting zone and require applications of lime to raise the pH and calcium levels sufficiently for optimum growth of legumes. Additions of lime and fertilizer should be based on the results of soil tests, on the needs of the crop, and on the production level desired. The Cooperative Extension Service can help in determining these values. Soil samples can be organized using the soil survey to identify contrasting soil types.

**Soil tilth.** Soil tilth affects seedbed preparation, seed germination, and water infiltration. Soils that have good tilth are granular and porous. Regular additions of organic matter help to maintain good tilth.

Most of the cultivated soils in the county have a surface layer of silt loam. If these soils are frequently cultivated, soil structure becomes weak and intense rainfall can cause the formation of a crust on the surface. The crust is hard when dry, thereby reducing water infiltration and increasing runoff. Returning crop residue to the soil or regularly adding other organic material improves fertility, minimizes crusting, and increases the rate of water infiltration.

The bearing weight of machinery as it travels over the soil surface tends to compact the soil if it is moist or wet. This compaction reduces infiltration of water into the soil and makes the resulting seedbed less favorable for root penetration. Operation of machinery when soil moisture is optimum will reduce the effects of compaction. Periodic deep tillage can improve existing compacted areas.

Fall cultivation of the more sloping soils in the uplands results in serious soil losses. Such losses

can be catastrophic when intense spring rains follow partial thawing of the bare, frozen surface layer.

### Pasture and Hayland

A combination of different kinds of grasses and legumes is necessary to obtain maximum forage production for the climate in Morgan County. Cool temperatures in the spring and fall are favorable for the production of cool-season grasses. The hot summer months are more favorable for production of warm-season grasses. Many of the soils in the survey area are suited to both kinds of grasses, and some of the soils are suited to legumes. A management system that includes cool-season grasses, warm-season grasses, and legumes takes advantage of the entire growing season for forage production.

**Cool-season grasses.** The cool-season grass most commonly grown in Morgan County is tall fescue. Orchardgrass, timothy, smooth brome grass, reed canarygrass, and Kentucky bluegrass are grown on limited acreages. All of these grasses are commonly grown on upland soils, except for reed canarygrass, which is planted primarily on wetter bottomland sites. These cool-season grasses can provide top production only when properly managed. Rotational grazing systems help to keep forages at an optimum height for highest production. Supplemental fertilization and timely weed control are also essential for top production.

Cool-season grasses grow vigorously when temperatures are cool (between 50 and 85 degrees F). These grasses generally start growing in late March and can be grazed by late April. Timothy and brome grass will not produce tillers unless a seedhead is allowed to develop. Therefore, overgrazing or haying too early in the growing season will reduce total production of these forages. Orchardgrass will regrow vigorously with or without development of a seedhead, so the timing of grazing or haying is less critical. Bluegrass is generally less productive than the other cool-season grasses, but can better withstand overgrazing and poor management. Fescue can also withstand abuse and severe site conditions, but endophyte-infested stands are widespread and produce less than optimum weight gains, especially during summer months. Reestablishment of existing stands with endophyte-free seed is an option some managers are selecting. Careful grazing management and interseeding of legumes can minimize the effects and reduce the spread of the infestation. Poor palatability can also be a problem with fescue stands. Reed canarygrass is moderately palatable and is highly productive in

areas that would be too wet for other grasses or row crops.

Because of increasing temperatures and day length, cool-season grass production decreases significantly by mid-June. As fall brings cooler temperatures and shorter days, growth increases accordingly. Production continues until the first killing frost occurs, usually in late October. One exception to this growth pattern is tall fescue that continues growth until sometime in December.

**Warm-season grasses.** Warm-season grasses that are commonly grown in Morgan County include big bluestem, indiangrass, switchgrass, and little bluestem. Gammagrass is grown on some small acreages and requires high or very high available water capacity. This soil survey is a useful tool for locating sites that have such specific requirements.

Warm-season grasses were native to many areas of the county before the arrival of early pioneers. These grasses were native because of their adaptation to the soils and climate of the county. Their suitability for the climate is vividly demonstrated during the hot summer months of June, July, and August. As their name implies, these grasses peak in production when the temperature reaches 90 degrees F. Growth slows when the temperature falls below 70 degrees F. An important advantage for summer forage production is that warm-season grasses need only 40 percent as much water as cool-season grasses to produce the same amount of forage.

Strict management techniques are necessary for optimum warm-season grass production and longevity. Rotational grazing patterns must be used so these grasses can be utilized when growing vigorously and to eliminate overgrazing during dormant periods. Minimum grazing height guidelines and prescribed burning plans must be followed. Supplemental fertilizer needs for warm-season grasses are small compared to cool-season grasses. Usually nitrogen is the only supplement necessary for top production.

**Legumes.** Legumes are included in many forage systems in Morgan County. They improve overall forage quality and quantity. When included with grasses in a seeding mixture, legumes stimulate growth of the grasses because of nitrogen fixation by bacteria on the roots of the legumes.

Pure legume stands provide sources of high protein forage. Some legumes, such as alfalfa and ladino clover, can cause bloating if unrestricted grazing is allowed; therefore, most pure legume stands are used for hay. Alfalfa is the legume most commonly used for hay production. Other legumes,

such as red clover, birdsfoot trefoil, and ladino clover, are used in pasture mixes. Crown-vetch is used to stabilize steep banks and critically eroding areas.

Use and management of legumes involves selecting soils that are compatible with the growth characteristics of the various plants. Most legumes require well drained or moderately well drained, very deep soils with high or very high available water capacity for healthy productive stands. Healing, Jemerson, Racket, Sturkie, Winnipeg, and Wrengart soils have such characteristics. Some legumes, such as alsike clover, will tolerate wetter soils. This soil survey can help in fitting the most productive forages to appropriate soils.

Legumes do not need supplemental nitrogen because of the natural fixation that occurs in the root system. When used for hay, legumes often require large amounts of phosphorus and potassium. Heavy applications of limestone are also needed for optimum production on most soils.

**Balanced management.** Cool-season grasses, warm-season grasses, and legumes have different periods of the growing season when their production peaks. Management plans that include all three kinds of forage will make optimum use of the entire season. Such a system with rotational grazing or haying of these different crops can help to increase production and profit while protecting the topsoil with permanent cover.

Certain management practices are needed on all soils in the survey area. Timely mowing or chemical weed control reduces competition from undesirable plants and encourages uniform grazing. Overgrazing reduces production of grasses and legumes and increases weed growth. Grazing when the soil is too wet causes surface compaction, poor tilth, and excessive runoff. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture and soil in good condition.

### **Yields per Acre**

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of map units in the survey area also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and

results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

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

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

### Land Capability Classification

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

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit.

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

Class 1 soils have slight limitations that restrict their use.

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

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

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

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

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

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

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

*Capability subclasses* are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, 2*e*. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

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

The capability classification of map units in this survey area is given in the yields table.

### Pasture and Hayland Suitability Groups

The soils in Morgan County are assigned to a pasture and hayland group according to their suitability for pasture management.

Many different pasture and hayland suitability groups are in the survey area. Over time, the combination of plants best suited to a particular soil and climate has or will become dominant. Plant communities are not static but vary slightly from year to year and place to place.

The relationship between soils and vegetation was ascertained during this survey. Thus, pasture and hayland suitability groups generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of each plant species. Soil reaction, salt content, and a seasonal high water table are also important. The "Field Office Technical Guide," which is available at local offices of the Natural Resources Conservation Service, can provide specific information about pasture and hayland suitability groups.

Table 6 shows, for each soil, the assigned pasture and hayland suitability group. Specific concerns and recommendations for pasture and hayland management for each group are discussed below.

**Group WLB—Wet Loamy Bottom.** A seasonal high water table and flooding are the main management problems. Plants should be selected accordingly. A seedbed can be easily prepared. A drainage system can improve the growth of deep-rooted species. The hazard of flooding should be considered when a grazing system is designed.

**Group WCB—Wet Clayey Bottom.** Wetness and flooding are the main management problems. The soils in this group are poorly suited to hay. The hazard of flooding should be considered when a grazing system is designed. Maintaining stands of desirable species is difficult in depressional areas. A drainage system can improve the growth of deep-rooted species.

**Group WCU—Wet Clayey Upland.** Wetness is the main management concern. Maintaining stands of desirable species is difficult in depressional areas. A drainage system can improve the growth of deep-rooted species.

**Group WLO—Wet Loamy Overflow.** Wetness and flooding are the main management problems. A seedbed can be easily prepared. A drainage system can improve the growth of deep-rooted species. The hazard of flooding should be considered when a grazing system is designed.

**Group LyO—Loamy Overflow.** Flooding is the main management problem. The hazard of flooding should be considered when a grazing system is designed.

**Group LyU—Loamy Upland.** No serious problems affect pasture and hayland management. Erosion is a

hazard in newly seeded areas. Timely seedbed preparation is needed to ensure a good ground cover.

**Group CyU—Clayey Upland.** Pasture and hay crops are effective in controlling erosion. Erosion during seedbed preparation is the main problem. Timely tillage and a quickly established ground cover reduce the hazard of erosion. The forage species that are tolerant of wetness grow best. The production of deep-rooted legumes is limited because of wetness and a restricted rooting depth.

**Group GrU—Gravelly Upland.** The soils in this group generally are not suited to cultivated crops. Droughtiness and erosion are the main management problems. Seedbeds should be prepared on the contour. Timely seedbed preparation helps to ensure rapid plant growth and a protective ground cover.

**Group MDU—Moderately Deep Upland.** Shallow-rooted species that are tolerant of droughtiness should be selected for planting. Erosion is a serious hazard in newly seeded areas. Timely tillage and a quickly established ground cover reduce the hazard of erosion.

**Group WtP—Wet Pan.** The species that are tolerant of wetness grow best. A dense layer in the subsoil can restrict the rooting depth and result in insufficient soil moisture in dry years. Erosion during seedbed preparation is the main problem. Timely tillage and a quickly established ground cover reduce the hazard of erosion.

**Group LyP—Loamy Pan.** A few small areas of this group are used for cultivated crops, and some areas are wooded. A dense layer in the subsoil can restrict the rooting depth and result in insufficient soil moisture in dry years. Erosion during seedbed preparation is a hazard. Seedbeds should be prepared on the contour. Timely tillage and a quickly established ground cover reduce the hazard of erosion.

**Group GrO—Gravelly Overflow.** Most areas of this group have been cleared of trees and are used for pasture and hay. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during periods of flooding help to keep the pasture in good condition.

**Group ShU—Shallow Upland.** Most areas of this group are used for native pasture and are best suited to shallow-rooted species. In some areas tillage is nearly impossible. Broadcast seeding may be necessary. The slope and rock outcrop can hinder mowing in places.

**Group GNS—Generally Not Suited.** The soils in this group generally are not suited to pasture and hay. The suitability for forage species and the use of

equipment are limited by the slope, by a high content of rock fragments, or by both of these.

## Woodland Management and Productivity

Douglas C. Wallace, forester, Natural Resources Conservation Service, helped prepare this section.

According to woodland survey estimates by the Missouri Department of Conservation, approximately 51 percent, or 200,675 acres, of Morgan County was forested in 1986. Upland woodland tracts in the county range from small to medium, private holdings of 10 to 100 acres in the north to large, 1000 or more, acres in the south. Most wooded tracts are essentially unmanaged (Geissman and others, 1986). In the flood plains, forests are restricted to long, narrow bands bordering streams and rivers.

Tree species and growth rates in the county vary, depending on soil properties, site characteristics, and past management.

Soil properties that affect the growth of trees include reaction (pH), fertility, drainage, texture, structure, and soil depth. The soil also serves as a reservoir for moisture, provides an anchor for roots, and supplies essential plant nutrients. Soils that do not have extremes of these properties and have effective rooting depths greater than 40 inches provide the best growth conditions for wood production.

Site characteristics that affect tree growth include aspect and topographic position. These site characteristics influence the amount of available sunlight, air drainage, soil temperature, soil moisture, and relative humidity. Generally, north and east aspects and lower slope positions, which are cooler and have better moisture conditions, are the best upland sites for tree growth. The most productive bottomland sites are generally deep, moderately well drained, occasionally flooded soils.

Management activities can influence woodland productivity and should be aimed at eliminating factors causing tree stress. Generally, this involves thinning overstocked young stands; harvesting old, mature trees; and eliminating destructive fire and grazing. Fire and grazing have very negative impacts on forest growth and quality. While forest fires are no longer a major problem in the county, about 50 percent of the woodland is still subject to grazing. Grazing destroys the leaf layer on the surface, compacts the soil, and eliminates or damages tree seedlings. Woodland sites that are ungrazed and unburned have the highest potential for optimum woodland production.

Bardley, Goss, Gravois, Niangua, and Rueter soils are associated with the largest acreages of upland forests (fig. 9). Typical tree species associated with these soils are white oak, northern red oak, black oak, and post oak. Post oak, black oak, eastern red cedar, shagbark hickory, and blackjack oak predominate on the lesser productive Bardley and Niangua soils located on steeply dissected, weathered dolostone and limestone slopes of the county.

Along watercourses, Cedargap, Gabriel, Hacreek, Healing, Jemerson, Moniteau, Racket, and Sturkie soils support bottomland hardwoods adapted to seasonally saturated or flooded soil conditions. Most of these areas have been cleared for crop and forage production. The uncleared wooded sites typically contain silver maple, green ash, hackberry, American elm, swamp white oak, sycamore, and pin oak. Bur oak, shellbark hickory, and black walnut are common along narrower stream bottoms and stream terraces of the major streams. A high potential for excellent forest growth exists on these sites. Besides timber production, streamside forests are crucial to the protection and enhancement of the water resources of Morgan County. Used as a component of an integrated management system, including nutrient management and sediment and erosion-control practices, streamside forests can produce a number of beneficial effects on the quality of land and water resources (Welsch, 1991).

Special use tree plantings (Christmas trees, nut trees, and fuelwood trees) utilizing adapted tree species can be very successful. Christmas tree plantings can be established on any soil that is not poorly drained or very poorly drained. Species of trees suited for Morgan County are Scotch pine, Austrian pine, white pine, and Douglas fir. Nut trees, such as black walnut and pecan, are best suited to deep, loamy, moderately well drained to well drained soils, such as Cedargap, Jemerson, Racket, and Sturkie on the bottomlands. Other soils are also suited, but may be less productive. Tree plantations for fuelwood utilizing fast growing trees also have potential for use in Morgan County. Species most adaptable for this purpose are green ash, black locust, cottonwood, sycamore, and silver maple.

## Forest Productivity and Management

The tables in this section can help forest owners or managers plan the use of soils for wood crops. Potential productivity of the soils for wood crops is provided in table 7. Interpretative ratings are provided



Figure 9.—Native hardwoods in an area of Rueter gravelly silt loam, 3 to 8 percent slopes.

for various aspects of forest management in tables 8a and 8b.

### Forest Productivity

In table 7, the *potential productivity* of merchantable or *common trees* on a soil is expressed as a site index and as a volume number. The *site index* is the average height, in feet, that dominant and codominant trees of a given species

attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that forest managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. More detailed information regarding site index is available in the "National Forestry Manual," which is available in local offices of the Natural Resources

Conservation Service or in electronic form (<http://nsscnt.nssc.nrcs.usda.gov/nfm/>).

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

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

### Forestland Management

In tables 8a and 8b, interpretative ratings are given for various aspects of forest management. The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified aspect of forest management. *Not limited* indicates that the soil has features that are very favorable for the specified aspect of management. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified aspect of management. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Moderately limited* indicates that the soil has features that are moderately favorable for the specified aspect of management. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Limited* indicates that the soil has one or more features that are significant limitations for the specified aspect of management. The limitations can be overcome, but generally require special design, special planning, soil reclamation, specialized equipment, or other procedures that may result in additional expense. Fair performance and moderate to high maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified aspect of management. The limitations generally cannot be overcome without major soil reclamation, special design, specialized equipment, or other expensive procedures. Poor performance, unsafe conditions, or high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The numerical ratings are shown as decimal fractions ranging from

0.00 to 1.00. Limitation classes are assigned as follows:

Not limited .....	0.00
Slightly limited .....	0.01 to 0.30
Moderately limited .....	0.31 to 0.60
Limited .....	0.61 to 0.99
Very limited .....	1.00

The numerical ratings used to express the severity of individual limitations indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation.

Limitation class terms, such as *very limited* or *limited, etc.*, and numerical ratings are shown for each soil feature listed. As many as three soil features may be listed for each soil component if applicable. The overall limitation class for the soil component is based on the most severe limitation.

The paragraphs that follow indicate the soil properties considered in rating the soils for forest management factors. More detailed information about the criteria used in the ratings is available in the "National Forestry Manual," which is available in local offices of the Natural Resources Conservation Service or in electronic form (<http://nsscnt.nssc.nrcs.usda.gov/nfm/>).

Ratings in the column *hand planting suitability* are based on slope, depth to a restrictive layer, content of sand, plasticity index, rock fragments on or below the surface, a water table, and ponding. Ratings indicate the expected difficulty of hand planting, which includes the proper placement of root systems of tree seedlings to a depth of up to 12 inches, using standard hand planting tools. It is assumed that necessary site preparation is completed before seedlings are planted.

Ratings in the column *mechanical planting suitability* are based on slope, depth to a restrictive layer, content of sand, plasticity index, rock fragments on or below the surface, a water table, and ponding. Ratings indicate the expected difficulty using a mechanical planter, which includes proper placement of root systems of tree seedlings to a depth up to 12 inches. It is assumed that necessary site preparation is completed before seedlings are planted.

Ratings in the column *harvest equipment operability* are based on slope, rock fragments on the surface, plasticity index, content of sand, surface texture, a water table, and ponding. Ratings indicate the suitability for operating harvest equipment for off-road transport or harvest of logs and/or wood

products by ground-based wheeled or tracked equipment.

Ratings in the column *mechanical site preparation (surface)* are based on slope, depth to a restrictive layer, plasticity index, rock fragments on or below the surface, a water table, and ponding. The part of the soil from the surface to a depth of about 12 inches is considered in the ratings. Ratings indicate the suitability of using surface-altering soil tillage equipment to prepare the site for planting or seeding.

Ratings in the column *road suitability (natural surface)* are based on slope, rock fragments on the surface, plasticity index, content of sand, surface texture, a water table, ponding, flooding, and the hazard of soil slippage. The ratings indicate the suitability for using the natural surface of the soil for roads on which trucks transport logs and other wood products from the site.

Ratings in the column *potential erosion hazard (road/trail)* are based on the soil erodibility factor K, slope, and content of rock fragments. The ratings apply to unsurfaced roads and trails.

Ratings in the column *potential erosion hazard (off-road/off-trail)* are based on slope and on soil erodibility factor K. The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50 to 75 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance.

Ratings in the column *soil rutting hazard* are based on a water table, rock fragments on or below the surface, surface texture, depth to a restrictive layer, and slope. Ratings indicate the hazard or risk of ruts in the uppermost soil surface layers by operation of forest equipment. Soil displacement and puddling (soil deformation and compaction) may occur simultaneously with rutting.

Ratings in the column *log landing suitability* are based on slope, rock fragments on the surface, plasticity index, content of sand, surface texture, a water table, ponding, flooding, and the hazard of soil slippage. Ratings indicate the suitability of the soil at the forest site to serve as a log landing and allows the efficient and effective use of equipment for the temporary storage and handling of logs.

Ratings in the column *potential seedling mortality* are based on flooding, ponding, a water table, content of lime, reaction, salinity, available water capacity, soil moisture regime, soil temperature regime, aspect, and slope. Ratings indicate the impact of soil, physiographic, and climatic conditions on the survivability of newly established tree seedlings.

## Windbreaks and Environmental Plantings

Douglas C. Wallace, forester, Natural Resources Conservation Service, helped prepare this section.

Living plants play an important role in supporting our life and improving its condition. When properly used and maintained, plants help to provide positive solutions to many problems existing in our contemporary environment. In Morgan County, windbreaks and environmental plantings can be utilized throughout the landscape for a variety of engineering, climatological, and aesthetic needs.

Windbreaks can be grown successively in most areas of Morgan County. Some important considerations for managing farmstead and feedlot windbreaks are design and layout; species selection; site preparation; seedling handling; weed management; irrigation; and protection from diseases, insects, and livestock.

Windbreaks protect livestock, buildings, yards, fruit trees, gardens, and cropland from wind and snow; help to keep snow on fields; and provide food and cover for wildlife. Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 9 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in the table are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local office of the Natural Resources Conservation Service or of the Cooperative Extension Service or from a commercial nursery.

## Recreational Development

The soils of the survey area are rated in table 10 according to limitations that affect their suitability for recreational use. Soils are rated for camp areas, picnic areas, playgrounds, and paths and trails.

The ratings in the table are based on restrictive

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

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect recreation site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Moderately limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Limited* indicates that the soil has one or more features that are significant limitations for the specified use. The limitations can be overcome, but generally require special design, soil reclamation, or installation procedures that may result in additional expense. Fair performance and moderate to high maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The numerical ratings are shown as decimal fractions ranging from 0.00 to 1.00. Limitation classes are assigned as follows:

Not limited .....	0.00
Slightly limited .....	0.01 to 0.30
Moderately limited .....	0.31 to 0.60
Limited .....	0.61 to 0.99
Very limited .....	1.00

The numerical ratings used to express the severity of individual limitations indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation.

Limitation class terms, such as *very limited* or *limited, etc.*, limitation ratings, and numerical ratings are shown for each soil feature listed. As many as three soil features may be listed for each soil component if applicable. The overall limitation rating for the soil component is based on the most severe limitation.

The information in table 10 can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

*Camp areas* require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

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

*Playgrounds* require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and

that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

*Paths and trails* for hiking and horseback riding should require little or no cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, a water table, ponding, flooding, slope, and texture of the surface layer. The best soils are not

wet, are firm after rains, are not dusty when dry, and are not subject to frequent flooding during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

The information in the table can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 13 and interpretations for dwellings without basements and for local roads and streets in table 12.

## Wildlife Habitat

Bill Goodwin, wildlife services biologist, Missouri Department of Conservation, helped prepare this section.

Morgan County straddles the transition between the rolling Ozarks border and the Ozarks plateau. As a result, the county is blessed with a tremendous



Figure 10.—Urban development in an area of Niangua-Bardley complex, 15 to 50 percent slopes, extremely stony.

diversity of habitat for fish and wildlife. A mix of row crops, pastureland, and scattered woodland is drained by sluggish meandering transition streams and steeper Ozarks streams. Steep forested uplands dissected by temporary and permanent flowing Ozarks streams dominate the landscape as you head south. This combination of diverse landforms provides a rich store of wildlife resources.

Several factors played a part in the makeup of the wildlife habitat and population. Over time, the native prairie and savanna plants have largely been replaced with introduced cool-season grasses, predominantly tall fescue. In the southern part of the county, urban development around the Lake of the Ozarks and clearing of timber for pasture have resulted in a fragmented forest (fig. 10).

The northern half of the county lies in the Ozarks border and is characterized by gently sloping, rolling hills. Soils are poorly drained to well drained. The region, prior to settlement, supported a mixed woodland and prairie flora of oak hickory, mixed native warm-season grasses, legumes, and forbs. Many of the prairie plants still survive in roadsides, field edges, and isolated prairies. Grasses, such as big bluestem, indiagrass, little bluestem, and eastern gamagrass, once dominated the uplands. Pale purple prairie cone flower, compass plant, goat's rue, and gayfeather added colorful variety. Prairie cordgrass occupied wet seeps and bottomland prairies.

In "Presettlement Prairie of Missouri," Walter Schroeder indicates that in Morgan County an individual could walk an average of 5 miles in a straight line before encountering a change from grassland to timber (Schroeder, 1983). Trees usually occurred on a lower elevation along drainages and stream corridors. Associated with the predominantly grassland habitat historically occupying this region was a unique and varied wildlife population. These included wolves, white-tailed deer, elk, bison, bears, badgers, weasels, spotted skunk, prairie chickens, upland sandpipers, dickcissels, short-eared owls, and numerous species of grassland birds.

Land use changes have altered the plant communities on the prairies and resulted in sharp changes in the wildlife community. Remnant flocks of prairie chickens and other prairie wildlife occupy limited open land habitat in declining numbers. Coyotes have replaced wolves and panthers as large predators. The bison and elk are gone. White-tailed deer and domestic cattle are the largest herbivores. Extensive grassland areas have been converted to crop production and trees have been planted or allowed to invade former grassland areas. Formerly

extensive, savanna habitat has been fragmented. Some of the native wildlife has survived in the new introduced cool-season grass environment, however, in lesser numbers than during presettlement.

The southern half of the county has a very different make up. Historically, this area ranged from open savanna (open woodland with grasses and forbs dominating the understory) to dense forestland on the northern slopes and river bottoms. The woodland cover resulted in better drained soils than those found in the Ozarks border. The droughty nature of the soils often combined with fragipans, have resulted in a mix of timber, oak-hickory savannas, and small interspersed prairie openings (fig. 11). Periodic fires maintained the savannas, prairies, and woodland areas. At first, Native Americans, and then later, early settlers, carried on the tradition of seasonally burning the land to provide forage and reduce the brushy understory.

Wildlife adapted to the presettlement forest/savanna region included some of the same species as the prairie areas and included black bear, elk, white-tailed deer, raccoons, wolves, opossum, beaver, gray fox, panther, bobcat, wild turkey, pileated woodpecker, and an abundant bird community.

Today, wildlife in Morgan County is abundant and diverse. Deer and turkey are plentiful. Prairie chickens, upland sandpipers, and wildlife species dependent on open grassland to survive remain in scattered locations while others have departed. Wildlife species that benefit from "edge" (the area where habitat types change), such as bobwhite quail, cottontail rabbits, white-tailed deer, brown thrashers, striped skunks, coyotes, red foxes, and doves, have expanded their range.

Bobwhite quail, wild turkey, cottontail rabbits, and white-tailed deer have readily accepted agriculture. As a result, hunting opportunities for small game, such as quail and rabbits, are plentiful. Some of the best habitat is found where cropping and livestock operations coexist. This combination of crops, grassland, and low woody fencerow cover provides the food and cover needs of quail and rabbits. In the southern portion of the county, pastureland mixed with fairly extensive woodland cover guarantees good hunting for deer and turkey. Dense woody stream bottoms hold scattered seasonal populations of woodcock. In years when food is abundant, woodland sites support a good population of squirrels.

Two of the major streams in the county are Richland Creek and Flat Creek. Streams in the prairie meander through small, relatively flat, silty bottoms. As the transition from prairie to Ozarks takes place, the streams become clearer, more gravelly, and



**Figure 11.—A stand of eastern redcedar and warm-season grasses in an area of Moko-Rock outcrop complex, 3 to 15 percent slopes, very stony.**

gradient increases. Flat Creek and Richland Creek, the two streams that flow together to become the Lamine, are typical of streams in the county. Flat Creek is a meandering sluggish Ozarks/prairie transition stream with a mostly mud bottom channel. Richland Creek has a gravelly bed, greater gradient, and runs clearer.

Streams across the county provide a rather unique aquatic resource due to the transition from Ozarks border to Ozarks. The fisheries reflect their transition nature, often possessing mixed populations of prairie and Ozarks species. A fish species list would include minnows like the red-bellied dace, wide silver chub, large-scale stone roller, redbfin, and rosyface shiners.

Darters, small members of the perch family, are common in these Ozarks border streams. Most Missouri catfish are present in the Morgan County streams, including flatheads and channel catfish. Freckled madtoms and tadpole madtoms, which are small, secretive, seldom seen catfish, are common in the Ozark border streams. Largemouth bass, smallmouth bass, and spotted bass are all found in the region's streams.

The county has numerous farm ponds that provide recreational fishing opportunity as well as wildlife watering sources and habitat for reptiles and amphibians. The Lake of the Ozarks impoundment provides extensive recreational opportunity and a

large reservoir environment that supports populations of walleye, largemouth bass, crappie, buffalo, carp, white bass, paddlefish, catfish species, and others.

Wetland habitat in the county is limited primarily to shallow areas provided by large and small impoundments, streams, oxbows, and sloughs along streams. The Lake of the Ozarks provides habitat for seasonal use by waterfowl for resting and feeding. Wading birds and shorebirds take advantage of shallow areas and mud flats created by periodic fluctuations in lake water levels.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In tables 11a and 11b, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. *Not limited* indicates that the soil has features that are very favorable for the specified use. Habitat is easily established, improved, or maintained. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Habitat can be established, improved, or maintained. *Moderately limited* indicates that the soil has features that are moderately favorable for the specified use. Habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. *Limited* indicates that the soil has one or more features that are significant limitations for the specified use. Habitat is difficult to create, improve, or maintain in most places. Management is difficult and must be very intensive. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. Habitat is usually impractical or impossible to create,

improve, or maintain. Management would be very difficult and unsatisfactory results can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The numerical ratings are shown as decimal fractions ranging from 0.00 to 1.00. Limitation classes are assigned as follows:

Not limited .....	0.00
Slightly limited .....	0.01 to 0.30
Moderately limited .....	0.31 to 0.60
Limited .....	0.61 to 0.99
Very limited .....	1.00

The numerical ratings used to express the severity of individual limitations indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation.

Limitation class terms, such as *very limited* or *limited, etc.*, and numerical ratings are shown for each soil feature listed. As many as three soil features may be listed for each soil component if applicable. The overall limitation class for the soil component is based on the most severe limitation.

The elements of wildlife habitat are described in the following paragraphs.

*Grain and seed crops* are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Selection should be made from a list of locally adapted species.

*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, flooding, and slope. Soil temperature and soil moisture are also considerations. Selection should be made from a list of locally adapted species.

*Upland wild herbaceous plants* are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Selection should be made from a list of locally adapted species.

*Upland shrubs and vines* are bushy woody plants

that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs and vines are depth of the root zone, available water capacity, salinity, and soil moisture. Selection should be made from a list of locally adapted species.

*Upland deciduous trees* and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees are depth of the root zone, available water capacity, and wetness. Selection should be made from a list of locally adapted species.

*Upland mixed deciduous-conifer trees* and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, browse, seeds and foliage. Soil properties and features that affect the growth of these trees are depth of the root zone, available water capacity, and wetness. Selection should be made from a list of locally adapted species.

*Riparian herbaceous plants* are annual and perennial native or naturally established grasses and forbs that grow on moist or wet sites. Soil properties and features affecting riparian herbaceous plants are surface texture, wetness, flooding, ponding, and surface stones. Selection should be made from a list of locally adapted species.

*Riparian shrubs, vines, and trees* are bushy woody plants and trees that grow on moist or wet sites. Soil properties and features affecting these plants are surface texture, wetness, flooding, ponding, and surface stones. Selection should be made from a list of locally adapted species.

*Freshwater wetland plants* are grasses, forbs, and shrubs that are adapted to wet soil conditions. The soils suitable for this habitat generally occur adjacent to springs, seeps, depressions, bottomlands, marshes, or backwater areas of flood plains. Most areas are ponded for some period of time during the year. Soil properties and features affecting these plants are surface texture, wetness, ponding, and soil reaction. Selection should be made from a list of locally adapted species.

*Irrigated freshwater wetland plants* are grasses, forbs, and shrubs that are adapted to wet soil conditions. The soils suitable for this habitat generally occur in areas of cropland, previously cropped areas, and marginal areas associated with cropland and wetlands. These areas may be ponded for some period of time during the year. These areas are generally suitable for restoring wetland features temporarily or permanently. Soil properties and features affecting these plants are surface texture, permeability, wetness, ponding, and soil reaction.

Selection should be made from a list of locally adapted species.

## Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, water management, and waste management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

*Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.*

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

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

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways,

pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

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

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

**Building Site Development**

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Table 12 shows the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping.

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Moderately limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Limited* indicates that the soil has one or more features that are significant limitations for the specified use. The limitations can be overcome, but generally require special design, soil reclamation, or installation procedures that may result in additional expense. Fair performance and moderate to high maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil

reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The numerical ratings are shown as decimal fractions ranging from 0.00 to 1.00. Limitation classes are assigned as follows:

Not limited .....	0.00
Slightly limited .....	0.01 to 0.30
Moderately limited .....	0.31 to 0.60
Limited .....	0.61 to 0.99
Very limited .....	1.00

The numerical ratings used to express the severity of individual limitations indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation.

Limitation class terms, such as *very limited* or *limited, etc.*, limitation ratings, and numerical ratings are shown for each soil feature listed. As many as three soil features may be listed for each soil component if applicable. The overall limitation rating for the soil component is based on the most severe limitation.

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

*Small commercial buildings* are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the

capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

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

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

**Sanitary Facilities**

The soils of the survey area are rated in table 13 according to limitations that affect their suitability for sanitary facilities. Soils are rated for septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill.

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features

that affect sanitary facilities. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Moderately limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Limited* indicates that the soil has one or more features that are significant limitations for the specified use. The limitations can be overcome, but generally require special design, soil reclamation, or installation procedures that may result in additional expense. Fair performance and moderate to high maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The numerical ratings are shown as decimal fractions ranging from 0.00 to 1.00. Limitation classes are assigned as follows:

Not limited .....	0.00
Slightly limited .....	0.01 to 0.30
Moderately limited .....	0.31 to 0.60
Limited .....	0.61 to 0.99
Very limited .....	1.00

The numerical ratings used to express the severity of individual limitations indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation.

Limitation class terms, such as *very limited* or *limited, etc.*, limitation ratings, and numerical ratings are shown for each soil feature listed. As many as three soil features may be listed for each soil component if applicable. The overall limitation rating for the soil component is based on the most severe limitation.

*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 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and

public health. Permeability, a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may be contaminated. Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, hillside seepage, and contamination of ground water, can affect public health.

*Sewage lagoons* are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

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

A *trench sanitary landfill* is an area where solid

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

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

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

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

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

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can

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

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

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

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

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

**Construction Materials and Excavating**

The soils of the survey area are rated in table 14 as a source of roadfill, sand, gravel, or topsoil. Normal compaction, minor processing, and other standard construction practices are assumed. The soils are also rated according to limitations that affect their suitability for shallow excavations. The ratings in the table are both verbal and numerical.

The soils are rated as a *probable, possible or improbable* source of sand and gravel. A rating of *probable* means that the source material is likely to be in or below the soil. A rating of *possible* means that the source material may be in or below the soil and further investigation is warranted. A rating of *improbable* means that the source material is unlikely to be in or below the soil. The numerical ratings in these columns indicate the degree of probability. A numerical rating of 1.00 indicates that the soil is an improbable source. A numerical rating of less than

1.00 indicates the degree to which the soil is a possible or probable source of sand or gravel.

Other rating class terms, as follows, are used to indicate the extent to which the soils are limited by soil features that affect use as a source for roadfill or topsoil or suitability for shallow excavations. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Moderately limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Limited* indicates that the soil has one or more features that are significant limitations for the specified use. The limitations can be overcome, but generally require special design, soil reclamation, or installation procedures that may result in additional expense. Fair performance and moderate to high maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The numerical ratings are shown as decimal fractions ranging from 0.00 to 1.00. Limitation classes are assigned as follows:

Not limited .....	0.00
Slightly limited .....	0.01 to 0.30
Moderately limited .....	0.31 to 0.60
Limited .....	0.61 to 0.99
Very limited .....	1.00

The numerical ratings used to express the severity of individual limitations indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation.

Limitation class terms, such as *very limited or limited, etc.*, limitation ratings, and numerical ratings are shown for each soil feature listed. As many as three soil features may be listed for each soil component if applicable. The overall limitation rating for the soil component is based on the most severe limitation.

*Roadfill* is soil material that is excavated in one

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

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

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

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

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

*Sand* and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In the table, 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 Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the lowest layer of the soil contains sand or gravel, the soil is rated as a probable source regardless of

thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

*Shallow excavations* are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

### **Water Management**

The soils of the survey area are rated in table 15 according to limitations that affect their suitability for water management. Soils are rated for pond reservoir areas, drainage, irrigation, terraces and diversions, and grassed waterways. Restrictive features that affect each soil for the specified use is also provided in the table.

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Moderately limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Limited* indicates that the soil has one or more features that are significant limitations for the specified use. The limitations can be overcome, but generally require special design, soil reclamation, or installation procedures that may result in additional expense. Fair performance and moderate to high maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special

design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The numerical ratings are shown as decimal fractions ranging from 0.00 to 1.00. Limitation classes are assigned as follows:

Not limited .....	0.00
Slightly limited .....	0.01 to 0.30
Moderately limited .....	0.31 to 0.60
Limited .....	0.61 to 0.99
Very limited .....	1.00

The numerical ratings used to express the severity of individual limitations indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation.

Limitation class terms, such as *very limited* or *limited, etc.*, limitation ratings, and numerical ratings are shown for each soil feature listed. As many as three soil features may be listed for each soil component if applicable. The overall limitation rating for the soil component is based on the most severe limitation.

*Pond reservoir areas* hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock, or other permeable material. Slope can affect the storage capacity of the reservoir area.

*Drainage* is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, permeability, depth to a water table, ponding, slope, and flooding. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or a cemented pan, large stones, slope, and the likelihood that cutbanks will cave. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, and sulfur. The availability of drainage outlets is not considered in the ratings.

*Irrigation* is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to a water table, ponding, flooding, available water capacity, intake rate, permeability, erodibility, and slope. The construction of a system is affected by large stones and depth to bedrock. The performance of a system is affected by the depth of the root zone, reaction, and the amount of salts, sodium, sulfur, lime, or gypsum.

*Terraces and diversions* are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, a water table, ponding, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, erodibility, an excessively coarse texture, and restricted permeability adversely affect maintenance.

*Grassed waterways* are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, a water table, slope, and depth to bedrock affect the construction of grassed waterways. Erodibility, soil moisture regime, available water capacity, restricted rooting depth, restricted permeability, and toxic substances, such as salts and sodium, affect the growth and maintenance of the grass after construction.

**Waste Management**

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

Table 16 shows the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of this table, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 mg/l. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 mg/l. When wastewater is applied, checks should be made

to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings in the table are for waste management systems that not only dispose of and treat organic waste or wastewater but also are beneficial to crops (application of manure and food-processing waste, application of sewage sludge, and disposal of wastewater through irrigation) and for waste management systems that are designed only for the purpose of wastewater disposal and treatment (overland flow of wastewater, rapid infiltration of wastewater, and slow rate treatment of wastewater).

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Moderately limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Limited* indicates that the soil has one or more features that are significant limitations for the specified use. The limitations can be overcome, but generally require special design, soil reclamation, or installation procedures that may result in additional expense. Fair performance and moderate to high maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The numerical ratings are shown as decimal fractions ranging from 0.00 to 1.00. Limitation classes are assigned as follows:

Not limited .....	0.00
Slightly limited .....	0.01 to 0.30
Moderately limited .....	0.31 to 0.60
Limited .....	0.61 to 0.99
Very limited .....	1.00

The numerical ratings used to express the severity of individual limitations indicate gradations between the point at which a soil feature has the greatest

negative impact on the use and the point at which the soil feature is not a limitation.

Limitation class terms, such as *very limited* or *limited, etc.*, limitation ratings, and numerical ratings are shown for each soil feature listed. As many as three soil features may be listed for each soil component if applicable. The overall limitation rating for the soil component is based on the most severe limitation.

*Land application of manure and food-processing waste* not only disposes of waste material but also improves crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure and food-processing waste are either solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings.

The ratings are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include permeability, a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood of wind erosion or water erosion. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste.

*Land application of municipal sewage sludge* not only disposes of waste material but also improves crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include permeability, a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood of wind erosion or water erosion. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge.

*Disposal of wastewater by irrigation* not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also improves crop production by increasing the amount of water available to crops. The ratings in the table are based on the soil properties that affect the design, construction, management, and performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, a water table, ponding, available water capacity, permeability, slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock or a cemented pan, a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals.

*Slow rate treatment of wastewater* is a process in which wastewater is applied to land at a rate normally between 0.5 inch and 4.0 inches per week. The application rate commonly exceeds the rate needed for irrigation of cropland. The applied wastewater is

treated as it moves through the soil. Much of the treated water percolates to the ground water, and some enters the atmosphere through evapotranspiration. The applied water generally is not allowed to run off the surface. Waterlogging is prevented either through control of the application rate or through the use of tile drains, or both.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, and the application of waste. The properties that affect absorption include the sodium adsorption ratio, a water table, ponding, available water capacity, permeability, depth to bedrock or a cemented pan, reaction, the cation-exchange capacity, and slope. Reaction, the sodium adsorption ratio, salinity, and bulk density affect plant growth and microbial activity. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood of wind erosion or water erosion. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste.

*Rapid infiltration of wastewater* is a process in which wastewater applied in a level basin at a rate of 4 to 120 inches per week percolates through the soil, eventually reaching the ground water. The application rate commonly exceeds the rate needed for irrigation of cropland. Vegetation is not a necessary part of the treatment; hence, the basins may or may not be vegetated. The thickness of the soil material needed for proper treatment of the wastewater is more than 72 inches. As a result, geologic and hydrologic investigation is needed to ensure proper design and performance and to determine the risk of ground-water pollution.

The ratings in the table are based on the soil properties that affect the risk of pollution and the design, construction, and performance of the system. A water table, ponding, flooding, and depth to bedrock or a cemented pan affect the risk of pollution and the design and construction of the system. Slope, stones, and cobbles also affect design and construction. Permeability and reaction affect performance.

Table 5.--Land Capability and Yields per Acre of Crops and Grassland

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.)

Map symbol and soil name	Land capability	Corn	Grain sorghum	Orchardgrass- red clover*	Soybeans	Tall fescue	Warm season grasses**	Winter wheat
		Bu	Bu	Tons	Bu	Tons	Tons	Bu
15002: McGirk-----	2e	83.00	66.00	5.80	28.00	5.30	7.30	33.00
66000: Moniteau-----	3w	96.00	89.00	5.80	32.00	5.30	7.40	38.00
70008: Goss-----	4e	---	---	4.40	---	4.00	4.60	---
70009: Goss-----	6e	---	---	4.40	---	4.00	4.60	---
70023: Eldon-----	4e	73.00	66.00	4.50	27.00	5.00	6.00	30.00
70024: Goss-----	7e	---	---	4.40	---	4.00	4.60	---
70028: Moko-----	6s	---	---	---	---	1.00	1.40	---
Rock outcrop-----	8s	---	---	---	---	---	---	---
70046: Sacville-----	2e	97.00	90.00	6.50	33.00	6.00	7.30	39.00
73012: Gravois-----	3e	73.00	66.00	3.60	27.00	3.60	3.80	30.00
73034: Gravois, eroded-----	4e	70.00	63.00	3.60	24.00	3.60	3.80	28.00
73035: Gravois-----	4e	65.00	58.00	3.60	20.00	3.60	3.80	23.00
73036: Willowfork-----	2w	103.00	96.00	5.80	34.00	5.30	7.30	41.00
73037: Friendly-----	2e	91.00	82.00	4.50	32.00	5.00	6.00	37.00

See footnotes at end of table.

Table 5.--Land Capability and Yields per Acre of Crops and Grassland--Continued

Map symbol and soil name	Land capability	Corn	Grain sorghum	Orchardgrass- red clover*	Soybeans	Tall fescue	Warm season grasses**	Winter wheat
		<u>Bu</u>	<u>Bu</u>	<u>Tons</u>	<u>Bu</u>	<u>Tons</u>	<u>Tons</u>	<u>Bu</u>
73038: Glensted-----	2w	97.00	90.00	6.50	33.00	6.00	7.30	39.00
73039: Glensted-----	2e	96.00	89.00	6.50	32.00	6.00	7.30	38.00
73040: Maplewood-----	3e	90.00	83.00	4.50	32.00	5.00	6.00	37.00
73041: Maplewood-----	3e	85.00	78.00	4.50	32.00	5.00	6.00	37.00
73042: Niangua-----	7e	---	---	---	---	1.00	1.00	---
Bardley-----	7e	---	---	---	---	1.00	1.00	---
73043: Hartville-----	3e	89.00	83.00	5.80	32.00	5.30	7.30	35.00
73044: Crestmeade-----	2e	105.00	98.00	5.60	34.00	5.30	5.50	41.00
73045: Crestmeade-----	3e	99.00	91.00	5.60	32.00	5.30	5.50	39.00
73046: Wrengart-----	3e	100.00	92.00	3.60	33.00	3.60	3.80	39.00
73047: Bardley-----	6s	---	---	4.40	---	4.00	4.60	---
Moko-----	6s	---	---	---	---	1.00	1.40	---
73048: Rueter-----	4e	---	---	4.40	---	4.00	4.60	---
73050: Rock outcrop.								
Bardley-----	7e	---	---	---	---	---	1.00	---
73112: Gunlock-----	3e	75.00	68.00	3.60	29.00	3.60	3.80	34.00

See footnotes at end of table.

Table 5.--Land Capability and Yields per Acre of Crops and Grassland--Continued

Map symbol and soil name	Land capability	Corn	Grain sorghum	Orchardgrass- red clover*	Soybeans	Tall fescue	Warm season grasses**	Winter wheat
		<u>Bu</u>	<u>Bu</u>	<u>Tons</u>	<u>Bu</u>	<u>Tons</u>	<u>Tons</u>	<u>Bu</u>
73136: Union-----	2e	80.00	73.00	3.60	30.00	3.60	3.80	35.00
73137: Clafork-----	3e	100.00	92.00	4.50	33.00	5.00	6.00	39.00
73138: Clafork-----	2e	102.00	94.00	4.50	34.00	5.00	6.00	40.00
73190: Winnipeg-----	3e	110.00	102.00	5.60	36.00	5.00	5.30	44.00
75376: Cedargap-----	3w	---	---	1.00	---	2.00	2.50	22.00
75378: Sturkie-----	2w	107.00	100.00	6.60	34.00	5.00	6.40	42.00
75384: Healing-----	2w	130.00	121.00	6.60	43.00	5.00	6.40	54.00
75385: Gabriel-----	2w	109.00	102.00	5.80	36.00	5.30	7.40	44.00
75386: Speed-----	2w	109.00	102.00	6.40	36.00	5.00	6.60	44.00
75387: Hacreek-----	2w	118.00	111.00	6.40	37.00	5.00	6.60	49.00
75415: Jemerson-----	2w	120.00	113.00	6.60	38.00	5.00	6.40	40.00
75421: Racket-----	2w	108.00	101.00	6.60	35.00	5.00	6.40	43.00
99000: Pits-----	8s	---	---	---	---	---	---	---
99001. Water								
99003. Miscellaneous water								

\* Alsike clover should be substituted for red clover on somewhat poorly drained and poorly drained soils.

\*\* Average yield of all suitable native warm season grasses.

Table 6.--Pasture and Hayland Suitability Groups

Map symbol	Soil name	Component name	Pasture and hayland suitability group
15002	McGirk silt loam, 1 to 3 percent slopes-----	McGirk	WCU
66000	Moniteau silt loam, 0 to 2 percent slopes, occasionally flooded-----	Moniteau	WLB
70008	Goss gravelly silt loam, 3 to 8 percent slopes-----	Goss	GrU
70009	Goss gravelly silt loam, 8 to 15 percent slopes-----	Goss	GrU
70023	Eldon silt loam, 3 to 8 percent slopes-----	Eldon	GrU
70024	Goss very gravelly silt loam, 15 to 35 percent slopes, very stony-----	Goss	GrU
70028	Moko-Rock outcrop complex, 3 to 15 percent slopes, very stony-----	Moko	ShU
		Rock outcrop	GNS
70046	Sacville silt loam, 2 to 5 percent slopes-----	Sacville	WCU
73012	Gravois silt loam, 3 to 8 percent slopes-----	Gravois	LyP
73034	Gravois silt loam, 3 to 8 percent slopes, eroded-----	Gravois	LyP
73035	Gravois silt loam, 8 to 15 percent slopes-----	Gravois	LyP
73036	Willowfork silt loam, 0 to 3 percent slopes-----	Willowfork	WCB
73037	Friendly silt loam, 1 to 3 percent slopes-----	Friendly	WtP
73038	Glensted silt loam, 0 to 1 percent slopes-----	Glensted	WCU
73039	Glensted silt loam, 1 to 3 percent slopes-----	Glensted	WCU
73040	Maplewood silt loam, 2 to 5 percent slopes, eroded-----	Maplewood	WtP
73041	Maplewood silt loam, 5 to 9 percent slopes, eroded-----	Maplewood	WtP
73042	Niangua-Bardley complex, 15 to 50 percent slopes, extremely stony-----	Niangua	GrU
		Bardley	MDU
73043	Hartville silt loam, 3 to 8 percent slopes, eroded-----	Hartville	WCU
73044	Crestmeade silt loam, 0 to 2 percent slopes-----	Crestmeade	CyU
73045	Crestmeade silty clay loam, 1 to 3 percent slopes, eroded-----	Crestmeade	CyU
73046	Wrengart silt loam, 3 to 8 percent slopes, eroded-----	Wrengart	LyP
73047	Bardley-Moko complex, 3 to 15 percent slopes, extremely stony-----	Bardley	MDU
		Moko	ShU
73048	Rueter gravelly silt loam, 3 to 8 percent slopes-----	Rueter	GrU
73050	Rock outcrop-Bardley complex, 35 to 99 percent slopes, extremely stony-----	Rock outcrop	GNS
		Bardley	GNS
73112	Gunlock silt loam, 3 to 8 percent slopes-----	Gunlock	LyP
73136	Union silt loam, 1 to 3 percent slopes-----	Union	LyP
73137	Clafork silt loam, 2 to 5 percent slopes, eroded-----	Clafork	WtP
73138	Clafork silt loam, 2 to 5 percent slopes-----	Clafork	WtP
73190	Winnipeg silt loam, 3 to 8 percent slopes, eroded-----	Winnipeg	LyU
75376	Cedargap gravelly silt loam, 0 to 3 percent slopes, frequently flooded-----	Cedargap	GrO
75378	Sturkie silt loam, 0 to 2 percent slopes, frequently flooded-----	Sturkie	LyO
75384	Healing silt loam, 0 to 3 percent slopes, occasionally flooded-----	Healing	LyO
75385	Gabriel silt loam, 0 to 2 percent slopes, occasionally flooded-----	Gabriel	WLB
75386	Speed silt loam, 0 to 3 percent slopes, rarely flooded-----	Speed	WLO
75387	Hacreek silt loam, 0 to 2 percent slopes, occasionally flooded-----	Hacreek	WLO
75415	Jemerson silt loam, 0 to 3 percent slopes, occasionally flooded-----	Jemerson	LyO
75421	Racket silt loam, 0 to 3 percent slopes, occasionally flooded-----	Racket	LyO
99000	Pits, quarries-----	Pits	---
99001	Water-----	Water	---
99003	Miscellaneous water-----	Miscellaneous water	---

Table 7.--Forest Productivity

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available.)

Map symbol and soil name	Potential productivity			Trees to manage
	Common trees	Site index	Volume of wood fiber cu ft/ac	
15002: McGirk-----	white oak-----	55	43	black oak, pin oak, white oak
66000: Moniteau-----	pin oak-----	70	57	black willow, eastern cottonwood, green ash, pin oak, silver maple
70008: Goss-----	white oak----- post oak----- blackjack oak----- black oak-----	60 --- --- ---	43 --- --- ---	black oak, shortleaf pine, white oak
70009: Goss-----	black oak----- blackjack oak----- post oak----- white oak-----	--- --- --- 60	--- --- --- 43	black oak, shortleaf pine, white oak
70028: Moko-----	eastern redcedar---	30	29	eastern redcedar
Rock outcrop.				
73012: Gravois-----	black oak----- northern red oak--- white oak-----	60 60 57	43 43 43	black oak, northern red oak, white oak
73034: Gravois, eroded-----	black oak----- northern red oak--- white oak-----	60 60 57	43 43 43	black oak, northern red oak, shortleaf pine, white oak
73035: Gravois-----	black oak----- northern red oak--- white oak-----	58 62 50	43 43 43	northern red oak, white oak
73037: Friendly-----	black oak----- pin oak----- post oak----- white oak-----	--- --- --- 50	--- --- --- 29	black oak, white oak
73040: Maplewood-----	black oak----- pin oak----- post oak----- white oak-----	--- --- --- 60	--- --- --- 43	black oak, white oak

Table 7.--Forest Productivity--Continued

Map symbol and soil name	Potential productivity		Volume of wood fiber cu ft/ac	Trees to manage
	Common trees	Site index		
73041: Maplewood-----	black oak----- pin oak----- post oak----- white oak-----	--- --- --- 60	--- --- --- 43	black oak, white oak
73042: Niangua-----	black oak----- northern red oak---- white oak-----	56 --- 54	43 --- 43	Shumard oak, northern red oak
Bardley-----	black oak----- post oak----- white oak-----	54 45 42	43 29 29	black oak, eastern redcedar, shortleaf pine
73043: Hartville-----	white oak-----	55	43	eastern cottonwood, green ash, pin oak
73046: Wrengart-----	black oak----- northern red oak---- shagbark hickory---- white oak-----	63 --- --- 53	43 --- --- 43	black oak, northern red oak, white oak
73047: Bardley-----	black oak----- post oak----- white oak-----	54 45 42	43 29 29	black oak, eastern redcedar, shortleaf pine
Moko-----	eastern redcedar----	30	29	eastern redcedar
73048: Rueter-----	black oak----- northern red oak---- white oak-----	61 61 58	43 43 43	Shumard oak, northern red oak, white oak
73050: Rock outcrop.				
Bardley-----	black oak----- post oak----- white oak-----	54 45 42	43 29 29	black oak, eastern redcedar, shortleaf pine
73112: Gunlock-----	black oak----- northern red oak---- white oak-----	60 60 57	43 43 43	black oak, northern red oak, white oak
73136: Union-----	black oak----- northern red oak---- white oak-----	58 62 50	43 43 43	northern red oak, shortleaf pine, white oak
73137, 73138: Clafork-----	black oak----- pin oak----- post oak----- white oak-----	--- --- --- 60	--- --- --- 43	black oak, northern red oak, white oak

Table 7.--Forest Productivity--Continued

Map symbol and soil name	Potential productivity		Volume of wood fiber cu ft/ac	Trees to manage
	Common trees	Site index		
73190: Winnipeg-----	American sycamore---	---	---	American sycamore,
	black oak-----	---	---	black walnut,
	black walnut-----	---	---	green ash
	white oak-----	60	43	
75376: Cedargap-----	Shumard oak-----	---	---	Shumard oak,
	black oak-----	66	43	black walnut,
	black walnut-----	---	---	green ash, white
	green ash-----	---	---	oak
75378: Sturkie-----	American sycamore---	80	86	American sycamore,
	eastern cottonwood--	100	129	black walnut,
	northern red oak---	80	57	eastern
	white oak-----	70	57	cottonwood,
				northern red oak,
				white oak
75384: Healing-----	eastern cottonwood--	90	100	black walnut,
	northern red oak---	80	57	eastern
	white oak-----	70	57	cottonwood,
				northern red oak,
				white oak
75415: Jemerson-----	black oak-----	65	43	black oak, green
	northern red oak---	60	43	ash, northern red
	white oak-----	65	43	oak
75421: Racket-----	American sycamore---	---	---	black walnut, green
	black cherry-----	---	---	ash
	black walnut-----	72	72	
	northern red oak---	---	---	
	white ash-----	---	---	

Table 8a.--Forestland Management

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Hand planting suitability		Mechanical planting suitability		Harvest equipment operability		Mechanical site preparation (surface)		Road suitability (natural surface)	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
15002: McGirk-----	Moderately limited ~seasonal wetness (moderately limited)	0.60	Moderately limited ~seasonal wetness (moderately limited)	0.60	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.72	Limited ~seasonal wetness (limited)	0.72	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.72
66000: Moniteau-----	Moderately limited ~seasonal wetness (moderately limited)	0.60	Moderately limited ~seasonal wetness (moderately limited)	0.60	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.91	Limited ~seasonal wetness (limited)	0.91	Limited ~seasonal wetness (limited) ~flooding (moderately limited) ~low strength (moderately limited)	0.91
70008: Goss-----	Slightly limited ~small stones (slightly limited)	0.13	Slightly limited ~small stones (slightly limited) ~slope (slightly limited)	0.13 0.10	Moderately limited ~low strength (moderately limited)	0.50	Not limited		Moderately limited ~low strength (moderately limited)	0.50
70009: Goss-----	Slightly limited ~small stones (slightly limited)	0.13	Moderately limited ~slope (moderately limited) ~small stones (slightly limited)	0.47 0.13	Moderately limited ~low strength (moderately limited)	0.50	Not limited		Limited ~slope (limited) ~low strength (moderately limited)	0.76 0.50
70023: Eldon-----	Not limited		Slightly limited ~slope (slightly limited)	0.10	Moderately limited ~low strength (moderately limited)	0.50	Not limited		Moderately limited ~low strength (moderately limited)	0.50
70024: Goss-----	Moderately limited ~small stones (moderately limited) ~slope (slightly limited)	0.42 0.14	Limited ~slope (limited) ~surface stones (moderately limited) ~small stones (moderately limited)	0.99 0.45 0.42	Moderately limited ~slope (moderately limited)	0.60	Moderately limited ~slope (moderately limited) ~small stones (slightly limited)	0.60 0.30	Very limited ~slope (very limited)	1.00

Table 8a.--Forestland Management--Continued

Map symbol and soil name	Hand planting suitability		Mechanical planting suitability		Harvest equipment operability		Mechanical site preparation (surface)		Road suitability (natural surface)	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
70028: Moko-----	Slightly limited ~small stones (slightly limited)	0.13	Very limited Very limited ~surface stones (moderately limited) ~slope (moderately limited)	1.00 0.45 0.34	Moderately limited ~low strength (moderately limited)	0.50	Very limited Very limited	1.00	Moderately limited ~slippage potential (moderately limited) ~low strength (moderately limited) ~slope (moderately limited)	0.50 0.50 0.45
Rock outcrop---	Not rated		Not rated		Not rated		Not rated		Not rated	
70046: Sacville-----	Moderately limited ~seasonal wetness (moderately limited)	0.60	Moderately limited ~seasonal wetness (moderately limited)	0.60	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.91 0.50	Limited ~seasonal wetness (limited)	0.91	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.91 0.50
73012: Gravois-----	Not limited		Slightly limited ~slope (slightly limited)	0.10	Moderately limited ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.50 0.26	Slightly limited ~seasonal wetness (slightly limited)	0.26	Moderately limited ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.50 0.26
73034: Gravois, eroded-----	Not limited		Slightly limited ~slope (slightly limited)	0.10	Moderately limited ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.50 0.26	Slightly limited ~seasonal wetness (slightly limited)	0.26	Moderately limited ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.50 0.26
73035: Gravois-----	Not limited		Moderately limited ~slope (moderately limited)	0.43	Moderately limited ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.50 0.26	Slightly limited ~seasonal wetness (slightly limited)	0.26	Limited ~slope (limited) ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.68 0.50 0.26
73036: Willowfork-----	Moderately limited ~seasonal wetness (moderately limited)	0.60	Moderately limited ~seasonal wetness (moderately limited)	0.60	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.76 0.50	Limited ~seasonal wetness (limited)	0.76	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.76 0.50

Table 8a.--Forestland Management--Continued

Map symbol and soil name	Hand planting suitability		Mechanical planting suitability		Harvest equipment operability		Mechanical site preparation (surface)		Road suitability (natural surface)	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73037: Friendly-----	Moderately limited ~seasonal wetness (moderately limited)	0.60	Moderately limited ~seasonal wetness (moderately limited)	0.60	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.62 0.50	Limited ~seasonal wetness (limited)	0.62	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.62 0.50
73038, 73039: Glensted-----	Moderately limited ~seasonal wetness (moderately limited)	0.60	Moderately limited ~seasonal wetness (moderately limited)	0.60	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.76 0.50	Limited ~seasonal wetness (limited)	0.76	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.76 0.50
73040: Maplewood-----	Moderately limited ~seasonal wetness (moderately limited)	0.60	Moderately limited ~seasonal wetness (moderately limited)	0.60	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.62 0.50	Limited ~seasonal wetness (limited)	0.62	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.62 0.50
73041: Maplewood-----	Moderately limited ~seasonal wetness (moderately limited)	0.60	Moderately limited ~seasonal wetness (moderately limited) ~slope (slightly limited)	0.60 0.20	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.62 0.50	Limited ~seasonal wetness (limited)	0.62	Limited ~seasonal wetness (limited) ~low strength (moderately limited) ~slope (slightly limited)	0.62 0.50 0.15
73042: Niangua-----	Moderately limited ~surface stones (moderately limited) ~small stones (moderately limited) ~slope (slightly limited)	0.42 0.42 0.25	Very limited ~slope (very limited) ~surface stones (limited) ~small stones (moderately limited)	1.00 0.80 0.42	Limited ~slope (limited) ~large surface stones (moderately limited)	0.91 0.60	Limited ~slope (limited) ~large surface stones (moderately limited) ~small stones (slightly limited)	0.91 0.60 0.30	Very limited ~slope (very limited) ~large surface stones (moderately limited) ~surface stones (moderately limited)	1.00 0.60 0.42
Bardley-----	Moderately limited ~surface stones (moderately limited) ~slope (slightly limited) ~small stones (slightly limited)	0.42 0.25 0.24	Very limited ~slope (very limited) ~surface stones (limited) ~small stones (slightly limited)	1.00 0.80 0.24	Limited ~slope (limited) ~large surface stones (moderately limited)	0.91 0.60	Limited ~slope (limited) ~large surface stones (moderately limited) ~small stones (slightly limited)	0.91 0.60 0.01	Very limited ~slope (very limited) ~large surface stones (moderately limited) ~surface stones (moderately limited)	1.00 0.60 0.42

Table 8a.--Forestland Management--Continued

Map symbol and soil name	Hand planting suitability		Mechanical planting suitability		Harvest equipment operability		Mechanical site preparation (surface)		Road suitability (natural surface)	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73043: Hartville-----	Moderately limited ~seasonal wetness (moderately limited)	0.60	Moderately limited ~seasonal wetness (moderately limited)	0.60	Limited ~seasonal wetness (limited)	0.62	Limited ~seasonal wetness (limited)	0.62	Limited ~seasonal wetness (limited)	0.62
			~slope (slightly limited)	0.10	~low strength (moderately limited)	0.50			~low strength (moderately limited)	0.50
73044: Crestmeade-----	Moderately limited ~seasonal wetness (moderately limited)	0.60	Moderately limited ~seasonal wetness (moderately limited)	0.60	Limited ~seasonal wetness (limited)	0.62	Limited ~seasonal wetness (limited)	0.62	Limited ~seasonal wetness (limited)	0.62
					~low strength (moderately limited)	0.50			~low strength (moderately limited)	0.50
73045: Crestmeade-----	Moderately limited ~seasonal wetness (moderately limited)	0.60	Moderately limited ~seasonal wetness (moderately limited)	0.60	Limited ~seasonal wetness (limited)	0.62	Limited ~seasonal wetness (limited)	0.62	Limited ~seasonal wetness (limited)	0.62
			~stickiness (surface) (moderately limited)	0.50	~stickiness (surface) (moderately limited)	0.50	~stickiness (surface) (moderately limited)	0.50	~stickiness (surface) (moderately limited)	0.50
					~low strength (moderately limited)	0.50			~low strength (moderately limited)	0.50
73046: Wrengart-----	Not limited		Slightly limited ~slope (slightly limited)	0.10	Moderately limited ~low strength (moderately limited)	0.50	Slightly limited ~seasonal wetness (slightly limited)	0.11	Moderately limited ~low strength (moderately limited)	0.50
					~seasonal wetness (slightly limited)	0.11			~seasonal wetness (slightly limited)	0.11
73047: Bardley-----	Moderately limited ~surface stones (moderately limited)	0.42	Limited ~surface stones (limited)	0.80	Moderately limited ~large surface stones (moderately limited)	0.60	Moderately limited ~large surface stones (moderately limited)	0.60	Moderately limited ~large surface stones (moderately limited)	0.60
			~small stones (slightly limited)	0.24	~slope (moderately limited)	0.34	~small stones (slightly limited)	0.01	~slope (moderately limited)	0.45
			~small stones (slightly limited)	0.24					~surface stones (moderately limited)	0.42
Moko-----	Moderately limited ~surface stones (moderately limited)	0.42	Very limited Very limited	1.00	Moderately limited ~large surface stones (moderately limited)	0.60	Very limited Very limited	1.00	Moderately limited ~large surface stones (moderately limited)	0.60
			~small stones (slightly limited)	0.13	~surface stones (limited)	0.80	~large surface stones (moderately limited)	0.60	~slippage potential (moderately limited)	0.50
					~slope (moderately limited)	0.34			~low strength (moderately limited)	0.50

Table 8a.--Forestland Management--Continued

Map symbol and soil name	Hand planting suitability		Mechanical planting suitability		Harvest equipment operability		Mechanical site preparation (surface)		Road suitability (natural surface)	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73048: Rueter-----	Slightly limited ~small stones (slightly limited)	0.17	Slightly limited ~small stones (slightly limited) ~slope (slightly limited)	0.17 0.10	Moderately limited ~low strength (moderately limited)	0.50	Not limited		Moderately limited ~slippage potential (moderately limited) ~low strength (moderately limited)	0.50 0.50
73050: Rock outcrop---	Not rated		Not rated		Not rated		Not rated		Not rated	
Bardley-----	Very limited ~slope (very limited) ~surface stones (moderately limited) ~small stones (slightly limited)	1.00 0.42 0.24	Very limited ~slope (very limited) ~surface stones (limited) ~small stones (slightly limited)	1.00 0.80 0.24	Very limited ~slope (very limited) ~large surface stones (moderately limited)	1.00 0.60	Very limited ~slope (very limited) ~large surface stones (moderately limited) ~small stones (slightly limited)	1.00 0.60 0.01	Very limited ~slope (very limited) ~large surface stones (moderately limited) ~surface stones (moderately limited)	1.00 0.60 0.60 0.42
73112: Gunlock-----	Not limited		Slightly limited ~slope (slightly limited)	0.10	Moderately limited ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.50 0.28	Slightly limited ~seasonal wetness (slightly limited)	0.28	Moderately limited ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.50 0.28
73136: Union-----	Not limited		Not limited		Moderately limited ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.50 0.28	Slightly limited ~seasonal wetness (slightly limited)	0.28	Moderately limited ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.50 0.28
73137, 73138: Clafork-----	Not limited		Not limited		Moderately limited ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.50 0.29	Slightly limited ~seasonal wetness (slightly limited)	0.29	Moderately limited ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.50 0.29
73190: Winnipeg-----	Not limited		Slightly limited ~slope (slightly limited)	0.10	Moderately limited ~low strength (moderately limited)	0.50	Not limited		Moderately limited ~low strength (moderately limited)	0.50

Table 8a.--Forestland Management--Continued

Map symbol and soil name	Hand planting suitability		Mechanical planting suitability		Harvest equipment operability		Mechanical site preparation (surface)		Road suitability (natural surface)	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
75376: Cedargap-----	Slightly limited ~small stones (slightly limited)	0.03	Slightly limited ~small stones (slightly limited)	0.03	Moderately limited ~low strength (moderately limited)	0.50	Not limited		Very limited ~flooding (very limited) ~low strength (moderately limited)	1.00  0.50
75378: Sturkie-----	Not limited		Not limited		Moderately limited ~low strength (moderately limited)	0.50	Not limited		Very limited ~flooding (very limited) ~low strength (moderately limited)	1.00  0.50
75384: Healing-----	Not limited		Not limited		Moderately limited ~low strength (moderately limited)	0.50	Not limited		Moderately limited ~flooding (moderately limited) ~low strength (moderately limited)	0.60  0.50
75385: Gabriel-----	Not limited		Not limited		Moderately limited ~low strength (moderately limited) ~seasonal wetness (moderately limited)	0.50  0.49	Moderately limited ~seasonal wetness (moderately limited)	0.49	Moderately limited ~flooding (moderately limited) ~low strength (moderately limited) ~seasonal wetness (moderately limited)	0.60  0.50  0.49
75386: Speed-----	Not limited		Not limited		Moderately limited ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.50  0.25	Slightly limited ~seasonal wetness (slightly limited)	0.25	Moderately limited ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.50  0.25
75387: Hacreek-----	Moderately limited ~seasonal wetness (moderately limited)	0.60	Moderately limited ~seasonal wetness (moderately limited)	0.60	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.62  0.50	Limited ~seasonal wetness (limited)	0.62	Limited ~seasonal wetness (limited) ~flooding (moderately limited) ~low strength (moderately limited)	0.62  0.60  0.50

Table 8a.--Forestland Management--Continued

Map symbol and soil name	Hand planting suitability		Mechanical planting suitability		Harvest equipment operability		Mechanical site preparation (surface)		Road suitability (natural surface)	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
75415: Jemerson-----	Not limited		Not limited		Moderately limited ~low strength (moderately limited)	0.50	Not limited		Moderately limited ~flooding (moderately limited)	0.60
									~low strength (moderately limited)	0.50
75421: Racket-----	Not limited		Not limited		Moderately limited ~low strength (moderately limited)	0.50	Not limited		Moderately limited ~flooding (moderately limited)	0.60
									~low strength (moderately limited)	0.50
99000: Pits-----	Not rated		Not rated		Not rated		Not rated		Not rated	
99001: Water-----	Not rated		Not rated		Not rated		Not rated		Not rated	
99003: Miscellaneous water-----	Not rated		Not rated		Not rated		Not rated		Not rated	

Table 8b.--Forestland Management

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Potential erosion hazard (road/trail)		Potential erosion hazard (off-road/off-trail)		Soil rutting hazard		Log landing suitability		Potential seedling mortality	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
15002: McGirk-----	Slightly limited ~slope/erodibility (slightly limited)	0.22	Slightly limited ~slope/erodibility (slightly limited)	0.05	Limited ~low strength (limited) ~seasonal wetness (limited)	0.80 0.72	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.72 0.50	Limited ~seasonal wetness (limited)	0.72
66000: Moniteau-----	Slightly limited ~slope/erodibility (slightly limited)	0.11	Slightly limited ~slope/erodibility (slightly limited)	0.02	Limited ~seasonal wetness (limited) ~low strength (limited)	0.91 0.80	Limited ~seasonal wetness (limited) ~flooding (moderately limited) ~low strength (moderately limited)	0.91 0.60 0.50	Limited ~seasonal wetness (limited) ~flooding (moderately limited)	0.91 0.60
70008: Goss-----	Moderately limited ~slope/erodibility (moderately limited)	0.38	Slightly limited ~slope/erodibility (slightly limited)	0.12	Limited ~low strength (limited)	0.80	Moderately limited ~low strength (moderately limited)	0.50	Not limited	
70009: Goss-----	Limited ~slope/erodibility (limited)	0.75	Slightly limited ~slope/erodibility (slightly limited)	0.24	Limited ~low strength (limited)	0.80	Limited ~slope (limited) ~low strength (moderately limited)	0.76 0.50	Not limited	
70023: Eldon-----	Limited ~slope/erodibility (limited)	0.67	Slightly limited ~slope/erodibility (slightly limited)	0.12	Limited ~low strength (limited)	0.80	Moderately limited ~low strength (moderately limited)	0.50	Not limited	
70024: Goss-----	Very limited ~slope/erodibility (very limited)	1.00	Moderately limited ~slope/erodibility (moderately limited)	0.49	Not limited		Very limited ~slope (very limited)	1.00	Slightly limited ~droughty (slightly limited)	0.05

Table 8b.-Forestland Management--Continued

Map symbol and soil name	Potential erosion hazard (road/trail)		Potential erosion hazard (off-road/off-trail)		Soil rutting hazard		Log landing suitability		Potential seedling mortality	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
70028: Moko-----	Very limited ~slope/erodibility (very limited)	1.00	Slightly limited ~slope/erodibility (slightly limited)	0.18	Limited ~low strength (limited)	0.80	Moderately limited ~slippage potential (moderately limited) ~low strength (moderately limited) ~slope (moderately limited)	0.50 0.50 0.45	Very limited ~droughty (very limited)	1.00
Rock outcrop--	Not rated		Not rated		Not rated		Not rated		Not rated	
70046: Sacville-----	Moderately limited ~slope/erodibility (moderately limited)	0.44	Slightly limited ~slope/erodibility (slightly limited)	0.08	Limited ~seasonal wetness (limited) ~low strength (limited)	0.91 0.80	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.91 0.50	Limited ~seasonal wetness (limited)	0.91
73012: Gravois-----	Limited ~slope/erodibility (limited)	0.67	Slightly limited ~slope/erodibility (slightly limited)	0.15	Limited ~low strength (limited) ~seasonal wetness (slightly limited)	0.80 0.26	Moderately limited ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.50 0.26	Not limited	
73034: Gravois, eroded-----	Limited ~slope/erodibility (limited)	0.67	Slightly limited ~slope/erodibility (slightly limited)	0.15	Limited ~low strength (limited) ~seasonal wetness (slightly limited)	0.80 0.26	Moderately limited ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.50 0.26	Not limited	
73035: Gravois-----	Very limited ~slope/erodibility (very limited)	1.00	Slightly limited ~slope/erodibility (slightly limited)	0.27	Limited ~low strength (limited) ~seasonal wetness (slightly limited)	0.80 0.26	Limited ~slope (limited) ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.68 0.50 0.26	Not limited	
73036: Willowfork----	Slightly limited ~slope/erodibility (slightly limited)	0.22	Slightly limited ~slope/erodibility (slightly limited)	0.04	Limited ~low strength (limited) ~seasonal wetness (limited)	0.80 0.76	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.76 0.50	Limited ~seasonal wetness (limited)	0.76

Table 8b.-Forestland Management--Continued

Map symbol and soil name	Potential erosion hazard (road/trail)		Potential erosion hazard (off-road/off-trail)		Soil rutting hazard		Log landing suitability		Potential seedling mortality	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73037: Friendly-----	Slightly limited ~slope/erodibility (slightly limited)	0.22	Slightly limited ~slope/erodibility (slightly limited)	0.05	Limited ~low strength (limited) ~seasonal wetness (limited)	0.80 0.62	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.62 0.50	Limited ~seasonal wetness (limited)	0.62
73038: Glensted-----	Slightly limited ~slope/erodibility (slightly limited)	0.06	Slightly limited ~slope/erodibility (slightly limited)	0.01	Limited ~low strength (limited) ~seasonal wetness (limited)	0.80 0.76	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.76 0.50	Limited ~seasonal wetness (limited) ~droughty (slightly limited)	0.76 0.23
73039: Glensted-----	Slightly limited ~slope/erodibility (slightly limited)	0.22	Slightly limited ~slope/erodibility (slightly limited)	0.04	Limited ~low strength (limited) ~seasonal wetness (limited)	0.80 0.76	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.76 0.50	Limited ~seasonal wetness (limited) ~droughty (slightly limited)	0.76 0.23
73040: Maplewood-----	Moderately limited ~slope/erodibility (moderately limited)	0.33	Slightly limited ~slope/erodibility (slightly limited)	0.07	Limited ~low strength (limited) ~seasonal wetness (limited)	0.80 0.62	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.62 0.50	Limited ~seasonal wetness (limited)	0.62
73041: Maplewood-----	Limited ~slope/erodibility (limited)	0.78	Slightly limited ~slope/erodibility (slightly limited)	0.17	Limited ~low strength (limited) ~seasonal wetness (limited)	0.80 0.62	Limited ~seasonal wetness (limited) ~low strength (moderately limited) ~slope (slightly limited)	0.62 0.50 0.15	Limited ~seasonal wetness (limited)	0.62
73042: Niangua-----	Very limited ~slope/erodibility (very limited)	1.00	Limited ~slope/erodibility (limited)	0.65	Not limited		Very limited ~slope (very limited) ~large surface stones (moderately limited) ~surface stones (moderately limited)	1.00 0.60 0.42	Not limited	

Table 8b.-Forestland Management--Continued

Map symbol and soil name	Potential erosion hazard (road/trail)		Potential erosion hazard (off-road/off-trail)		Soil rutting hazard		Log landing suitability		Potential seedling mortality	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73042: Bardley-----	Very limited ~slope/erodibility (very limited)	1.00	Limited ~slope/erodibility (limited)	0.65	Not limited		Very limited ~slope (very limited) ~large surface stones (moderately limited) ~surface stones (moderately limited)	1.00 0.60 0.42	Not limited	
73043: Hartville-----	Limited ~slope/erodibility (limited)	0.67	Slightly limited ~slope/erodibility (slightly limited)	0.15	Limited ~low strength (limited) ~seasonal wetness (limited)	0.80 0.62	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.62 0.50	Limited ~seasonal wetness (limited)	0.62
73044: Crestmeade----	Slightly limited ~slope/erodibility (slightly limited)	0.11	Slightly limited ~slope/erodibility (slightly limited)	0.02	Limited ~low strength (limited) ~seasonal wetness (limited)	0.80 0.62	Limited ~seasonal wetness (limited) ~low strength (moderately limited)	0.62 0.50	Limited ~seasonal wetness (limited)	0.62
73045: Crestmeade----	Slightly limited ~slope/erodibility (slightly limited)	0.22	Slightly limited ~slope/erodibility (slightly limited)	0.05	Limited ~low strength (limited) ~seasonal wetness (limited)	0.80 0.62	Limited ~seasonal wetness (limited) ~stickiness (surface) (moderately limited) ~low strength (moderately limited)	0.62 0.50 0.50	Limited ~seasonal wetness (limited)	0.62
73046: Wrengart-----	Limited ~slope/erodibility (limited)	0.67	Slightly limited ~slope/erodibility (slightly limited)	0.15	Limited ~low strength (limited) ~seasonal wetness (slightly limited)	0.80 0.11	Moderately limited ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.50 0.11	Not limited	
73047: Bardley-----	Very limited ~slope/erodibility (very limited)	1.00	Slightly limited ~slope/erodibility (slightly limited)	0.18	Not limited		Moderately limited ~large surface stones (moderately limited) ~slope (moderately limited) ~surface stones (moderately limited)	0.60 0.45 0.42	Not limited	

Table 8b.-Forestland Management--Continued

Map symbol and soil name	Potential erosion hazard (road/trail)		Potential erosion hazard (off-road/off-trail)		Soil rutting hazard		Log landing suitability		Potential seedling mortality	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73047: Moko-----	Very limited ~slope/erodibility (very limited)	1.00	Slightly limited ~slope/erodibility (slightly limited)	0.18	Limited ~low strength (limited)	0.80	Moderately limited ~large surface stones (moderately limited) ~slippage potential (moderately limited) ~low strength (moderately limited)	0.60 0.50 0.50	Very limited ~droughty (very limited)	1.00
73048: Rueter-----	Limited ~slope/erodibility (limited)	0.67	Slightly limited ~slope/erodibility (slightly limited)	0.12	Limited ~low strength (limited)	0.80	Moderately limited ~slippage potential (moderately limited) ~low strength (moderately limited)	0.50 0.50	Slightly limited ~soil reaction (slightly limited) ~droughty (slightly limited)	0.18 0.09
73050: Rock outcrop--	Not rated		Not rated		Not rated		Not rated		Not rated	
Bardley-----	Very limited ~slope/erodibility (very limited)	1.00	Very limited ~slope/erodibility (very limited)	1.00	Not limited		Very limited ~slope (very limited) ~large surface stones (moderately limited) ~surface stones (moderately limited)	1.00 0.60 0.42	Not limited	
73112: Gunlock-----	Limited ~slope/erodibility (limited)	0.67	Slightly limited ~slope/erodibility (slightly limited)	0.15	Limited ~low strength (limited) ~seasonal wetness (slightly limited)	0.80 0.28	Moderately limited ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.50 0.28	Not limited	
73136: Union-----	Slightly limited ~slope/erodibility (slightly limited)	0.22	Slightly limited ~slope/erodibility (slightly limited)	0.05	Limited ~low strength (limited) ~seasonal wetness (slightly limited)	0.80 0.28	Moderately limited ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.50 0.28	Not limited	
73137, 73138: Clafork-----	Moderately limited ~slope/erodibility (moderately limited)	0.44	Slightly limited ~slope/erodibility (slightly limited)	0.08	Limited ~low strength (limited) ~seasonal wetness (slightly limited)	0.80 0.29	Moderately limited ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.50 0.29	Not limited	

Table 8b.-Forestland Management--Continued

Map symbol and soil name	Potential erosion hazard (road/trail)		Potential erosion hazard (off-road/off-trail)		Soil rutting hazard		Log landing suitability		Potential seedling mortality	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73190: Winnipeg-----	Limited ~slope/erodibility (limited)	0.67	Slightly limited ~slope/erodibility (slightly limited)	0.15	Limited ~low strength (limited)	0.80	Moderately limited ~low strength (moderately limited)	0.50	Not limited	
75376: Cedargap-----	Slightly limited ~slope/erodibility (slightly limited)	0.11	Slightly limited ~slope/erodibility (slightly limited)	0.02	Limited ~low strength (limited)	0.80	Very limited ~flooding (very limited) ~low strength (moderately limited)	1.00 0.50	Limited ~flooding (limited)	0.90
75378: Sturkie-----	Slightly limited ~slope/erodibility (slightly limited)	0.11	Slightly limited ~slope/erodibility (slightly limited)	0.02	Limited ~low strength (limited)	0.80	Very limited ~flooding (very limited) ~low strength (moderately limited)	1.00 0.50	Limited ~flooding (limited)	0.90
75384: Healing-----	Slightly limited ~slope/erodibility (slightly limited)	0.22	Slightly limited ~slope/erodibility (slightly limited)	0.05	Limited ~low strength (limited)	0.80	Moderately limited ~flooding (moderately limited) ~low strength (moderately limited)	0.60 0.50	Moderately limited ~flooding (moderately limited)	0.60
75385: Gabriel-----	Slightly limited ~slope/erodibility (slightly limited)	0.11	Slightly limited ~slope/erodibility (slightly limited)	0.02	Limited ~low strength (limited) ~seasonal wetness (moderately limited)	0.80 0.49	Moderately limited ~flooding (moderately limited) ~low strength (moderately limited) ~seasonal wetness (moderately limited)	0.60 0.50 0.49	Moderately limited ~flooding (moderately limited) ~seasonal wetness (moderately limited)	0.60 0.39
75386: Speed-----	Slightly limited ~slope/erodibility (slightly limited)	0.22	Slightly limited ~slope/erodibility (slightly limited)	0.04	Limited ~low strength (limited) ~seasonal wetness (slightly limited)	0.80 0.25	Moderately limited ~low strength (moderately limited) ~seasonal wetness (slightly limited)	0.50 0.25	Not limited	

Table 8b.-Forestland Management--Continued

Map symbol and soil name	Potential erosion hazard (road/trail)		Potential erosion hazard (off-road/off-trail)		Soil rutting hazard		Log landing suitability		Potential seedling mortality	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
75387: Hacreek-----	Slightly limited ~slope/erodibility (slightly limited)	0.11	Slightly limited ~slope/erodibility (slightly limited)	0.02	Limited (limited) ~seasonal wetness (limited)	0.80 0.62	Limited ~seasonal wetness (limited) ~flooding (moderately limited) ~low strength (moderately limited)	0.62 0.60 0.50	Limited ~seasonal wetness (limited) ~flooding (moderately limited)	0.62 0.60
75415: Jemerson-----	Slightly limited ~slope/erodibility (slightly limited)	0.22	Slightly limited ~slope/erodibility (slightly limited)	0.05	Limited (limited) ~low strength (limited)	0.80	Moderately limited ~flooding (moderately limited) ~low strength (moderately limited)	0.60 0.50	Moderately limited ~flooding (moderately limited)	0.60
75421: Racket-----	Slightly limited ~slope/erodibility (slightly limited)	0.22	Slightly limited ~slope/erodibility (slightly limited)	0.04	Limited (limited) ~low strength (limited)	0.80	Moderately limited ~flooding (moderately limited) ~low strength (moderately limited)	0.60 0.50	Moderately limited ~flooding (moderately limited)	0.60
99000: Pits-----	Not rated		Not rated		Not rated		Not rated		Not rated	
99001: Water-----	Not rated		Not rated		Not rated		Not rated		Not rated	
99003: Miscellaneous water-----	Not rated		Not rated		Not rated		Not rated		Not rated	

Table 9.--Windbreaks and Environmental Plantings

(Absence of an entry indicates that trees generally do not grow to the given height.)

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
15002: McGirk-----	fragrant sumac, ninebark	gray dogwood, possumhaw, Amur maple	eastern redcedar	Austrian pine, Norway spruce, common hackberry, thornless honeylocust, pin oak	---
66000: Moniteau-----	buttonbush	possumhaw	nannyberry, eastern arborvitae, eastern redcedar	common hackberry, baldcypress, pin oak	eastern cottonwood
70008: Goss-----	fragrant sumac	American plum, gray dogwood, southern arrowwood	Washington hawthorn, eastern redbud, eastern redcedar	white fir, green ash, northern red oak, tuliptree	eastern white pine
70009: Goss-----	common lilac, fragrant sumac	American plum, gray dogwood	bur oak, common hackberry, eastern redcedar, Austrian pine, green ash, thornless honeylocust	---	---
70023: Eldon-----	common lilac, fragrant sumac	American plum, gray dogwood	bur oak, common hackberry, eastern redcedar, Austrian pine, green ash, thornless honeylocust	---	---
70024: Goss-----	common lilac, fragrant sumac	American plum, gray dogwood	bur oak, common hackberry, eastern redcedar, Austrian pine, green ash, thornless honeylocust	---	---
70028: Moko.  Rock outcrop.					
70046: Sacville-----	American cranberrybush, common lilac, fragrant sumac	gray dogwood, Amur maple	eastern redcedar, common hackberry, green ash	Austrian pine, pin oak, shortleaf pine	---
73012: Gravois-----	common lilac, fragrant sumac	Amur maple, gray dogwood	common hackberry, eastern redcedar	Norway spruce, green ash, honeylocust, pin oak, eastern white pine	---

Table 9.-Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
73034: Gravois, eroded----	common lilac	Amur maple, gray dogwood	common hackberry, eastern redcedar	Norway spruce, green ash, honeylocust, pin oak, eastern white pine	---
73035: Gravois-----	American plum, common lilac, fragrant sumac	Washington hawthorn, gray dogwood, Amur maple	Austrian pine, Virginia pine, common hackberry, eastern redcedar, honeylocust	---	---
73036: Willowfork-----	common ninebark, fragrant sumac	gray dogwood, possumhaw, Amur maple	eastern redcedar, Virginia pine	common hackberry, thornless honeylocust, pin oak, shortleaf pine	---
73037: Friendly-----	common lilac, fragrant sumac	American plum, autumn olive, gray dogwood	bur oak, common hackberry, eastern redcedar, Austrian pine, green ash, honeylocust	---	---
73038, 73039: Glensted-----	American plum, redosier dogwood	common chokecherry	common hackberry, eastern redcedar	Norway spruce, green ash, golden willow, northern red oak, thornless honeylocust, silver maple	eastern cottonwood
73040, 73041: Maplewood-----	fragrant sumac, ninebark	gray dogwood, possumhaw, Amur maple	eastern redcedar	Austrian pine, Norway spruce, common hackberry, honeylocust, pin oak	---
73042: Niangua-----	common lilac, fragrant sumac	American plum, gray dogwood	bur oak, common hackberry, eastern redcedar, Austrian pine, green ash, thornless honeylocust	---	---
Bardley-----	common lilac, fragrant sumac	American plum, autumn olive, gray dogwood	bur oak, common hackberry, eastern redcedar, Austrian pine, green ash, thornless honeylocust	---	---
73043: Hartville-----	common lilac, fragrant sumac	American plum, Amur maple	Manchurian crabapple, eastern redcedar, common hackberry, green ash, Austrian pine	thornless honeylocust	---

Table 9.-Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
73044, 73045: Crestmeade-----	common lilac, fragrant sumac	American plum, Amur maple	Manchurian crabapple, eastern redcedar, common hackberry, green ash, Austrian pine, Norway spruce	thornless honeylocust	---
73046: Wrengart-----	fragrant sumac, redosier dogwood, silky dogwood	American plum, southern arrowwood	Washington hawthorn, eastern redcedar	white fir, green ash, northern red oak	eastern white pine
73047: Bardley-----	common lilac, fragrant sumac	American plum, gray dogwood	bur oak, common hackberry, eastern redcedar, Austrian pine, green ash, thornless honeylocust	---	---
Moko. 73048. Rueter					
73050: Rock outcrop.					
Bardley-----	common lilac, fragrant sumac	American plum, autumn olive, gray dogwood	bur oak, common hackberry, eastern redcedar, Austrian pine, green ash, thornless honeylocust	---	---
73112: Gunlock-----	common lilac, silky dogwood	Amur maple, redosier dogwood	common hackberry, eastern redcedar	Norway spruce, green ash, thornless honeylocust, pin oak, sweetgum	eastern white pine
73136: Union-----	American plum, common lilac, fragrant sumac	Washington hawthorn, gray dogwood, Amur maple	Austrian pine, Virginia pine, common hackberry, eastern redcedar, thornless honeylocust	---	---
73137, 73138: Clafork-----	common lilac	Amur maple, roughleaf dogwood	common hackberry, eastern redcedar	Norway spruce, green ash, honeylocust, pin oak, eastern white pine	---
73190: Winnipeg-----	common lilac, silky dogwood	American plum, Amur maple, gray dogwood	bur oak, eastern redcedar, tulip- poplar	Austrian pine, common hackberry, green ash, thornless honeylocust, pin oak, eastern white pine	eastern cottonwood

Table 9.-Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
75376: Cedargap-----	American plum, fragrant sumac	blackhaw, gray dogwood	Washington hawthorn, nannyberry, eastern redcedar	baldcypress, green ash, sweetgum	eastern white pine, pin oak
75378. Sturkie					
75384. Healing					
75385: Gabriel-----	American plum, fragrant sumac, silky dogwood	blackhaw, gray dogwood	Washington hawthorn, eastern arborvitae	baldcypress, green ash, sweetgum	eastern white pine, pin oak
75386: Speed-----	silky dogwood	American cranberrybush, common lilac	Washington hawthorn, eastern arborvitae, eastern redcedar	Norway spruce, common hackberry, green ash, thornless honeylocust	eastern white pine, eastern cottonwood
75387: Hacreek-----	American plum, fragrant sumac, silky dogwood	blackhaw, gray dogwood	Washington hawthorn, eastern arborvitae	baldcypress, green ash, sweetgum	eastern white pine, pin oak
75415: Jemerson-----	silky dogwood	American cranberrybush, Amur honeysuckle	Amur privet, Washington hawthorn, blue spruce, white fir	Austrian pine, Norway spruce, eastern white pine	pin oak
75421. Racket					
99000. Pits					
99001. Water					
99003. Miscellaneous water					

Table 10.--Recreational Site Development

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds		Paths and trails	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
15002:								
McGirk-----	Very limited		Very limited		Very limited		Very limited	
	~wetness	1.00	~wetness	1.00	~wetness	1.00	~wetness	1.00
	(very limited)		(very limited)		(very limited)		(very limited)	
	~percs slowly	0.39	~percs slowly	0.39	~percs slowly	0.39		
	(moderately limited)		(moderately limited)		(moderately limited)			
66000:								
Moniteau-----	Very limited		Very limited		Very limited		Very limited	
	~flooding	1.00	~wetness	1.00	~wetness	1.00	~wetness	1.00
	(very limited)		(very limited)		(very limited)		(very limited)	
	~wetness	1.00	~percs slowly	0.13	~flooding	0.60		
	(very limited)		(slightly limited)		(moderately limited)			
	~percs slowly	0.13			~percs slowly	0.13		
	(slightly limited)				(slightly limited)			
70008:								
Goss-----	Limited		Limited		Very limited		Not limited	
	~small stones	0.64	~small stones	0.64	~small stones	1.00		
	(limited)		(limited)		(very limited)			
					~slope	0.98		
					(limited)			
70009:								
Goss-----	Limited		Limited		Very limited		Not limited	
	~small stones	0.64	~small stones	0.64	~slope	1.00		
	(limited)		(limited)		(very limited)			
	~slope	0.63	~slope	0.63	~small stones	1.00		
	(limited)		(limited)		(very limited)			
70023:								
Eldon-----	Not limited		Not limited		Limited		Not limited	
					~slope	0.98		
					(limited)			
					~small stones	0.60		
					(moderately limited)			

Table 10.--Recreational Site Development--Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds		Paths and trails	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
70024: Goss-----	Very limited ~slope (very limited)	1.00	Very limited ~slope (very limited)	1.00	Very limited ~small stones (very limited)	1.00	Limited ~slope (limited)	0.92
	~small stones (very limited)	1.00	~small stones (very limited)	1.00	~slope (very limited)	1.00	~large surface stones (limited)	0.80
	~large surface stones (limited)	0.80	~large surface stones (limited)	0.80			~small stones (slightly limited)	0.30
70028: Moko-----	Limited ~shallow to bedrock (limited)	0.90	Limited ~shallow to bedrock (limited)	0.90	Very limited ~bedrock <20 in. (very limited)	1.00	Limited ~large surface stones (limited)	0.80
	~large surface stones (limited)	0.80	~large surface stones (limited)	0.80	~slope (very limited)	1.00		
	~small stones (limited)	0.64	~small stones (limited)	0.64	~small stones (very limited)	1.00		
Rock outcrop-----	Not rated		Not rated		Not rated		Not rated	
70046: Sacville-----	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00
	~percs slowly (moderately limited)	0.39	~percs slowly (moderately limited)	0.39	~slope (moderately limited)	0.40		
					~percs slowly (moderately limited)	0.39		
73012: Gravois-----	Limited ~wetness (limited)	0.85	Moderately limited ~wetness (moderately limited)	0.49	Limited ~slope (limited)	0.98	Moderately limited ~wetness (moderately limited)	0.49
	~percs slowly (moderately limited)	0.39	~percs slowly (moderately limited)	0.39	~wetness (limited)	0.85		
					~percs slowly (moderately limited)	0.39		
73034: Gravois, eroded----	Limited ~wetness (limited)	0.85	Moderately limited ~wetness (moderately limited)	0.49	Limited ~slope (limited)	0.98	Moderately limited ~wetness (moderately limited)	0.49
	~percs slowly (moderately limited)	0.39	~percs slowly (moderately limited)	0.39	~wetness (limited)	0.85		
					~percs slowly (moderately limited)	0.39		

Table 10.--Recreational Site Development--Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds		Paths and trails	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73035: Gravois-----	Limited ~wetness (limited) ~percs slowly (moderately limited) ~slope (moderately limited)	0.85  0.39  0.37	Moderately limited ~wetness (moderately limited) ~percs slowly (moderately limited) ~slope (moderately limited)	0.49  0.39  0.37	Very limited ~slope (very limited) ~wetness (limited) ~percs slowly (moderately limited)	1.00  0.85  0.39	Very limited ~erodes easily (very limited) ~wetness (moderately limited)	1.00    0.49
73036: Willowfork-----	Very limited ~wetness (very limited) ~percs slowly (slightly limited)	1.00  0.13	Very limited ~wetness (very limited) ~percs slowly (slightly limited)	1.00  0.13	Very limited ~wetness (very limited) ~percs slowly (slightly limited)	1.00  0.13	Very limited ~wetness (very limited)	1.00
73037: Friendly-----	Very limited ~wetness (very limited) ~percs slowly (moderately limited)	1.00  0.39	Very limited ~wetness (very limited) ~percs slowly (moderately limited)	1.00  0.39	Very limited ~wetness (very limited) ~percs slowly (moderately limited) ~small stones (slightly limited)	1.00  0.39  0.00	Very limited ~wetness (very limited)	1.00
73038, 73039: Glensted-----	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00
73040: Maplewood-----	Very limited ~wetness (very limited) ~percs slowly (slightly limited)	1.00  0.13	Very limited ~wetness (very limited) ~percs slowly (slightly limited)	1.00  0.13	Very limited ~wetness (very limited) ~percs slowly (slightly limited) ~slope (slightly limited)	1.00  0.13  0.10	Very limited ~wetness (very limited)	1.00

Table 10.--Recreational Site Development--Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds		Paths and trails	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73041: Maplewood-----	Very limited ~wetness (very limited) ~percs slowly (slightly limited)	1.00  0.13	Very limited ~wetness (very limited) ~percs slowly (slightly limited)	1.00  0.13	Very limited ~slope (very limited) ~wetness (very limited) ~percs slowly (slightly limited)	1.00  1.00  0.13	Very limited ~wetness (very limited)	1.00
73042: Niangua-----	Very limited ~slope (very limited) ~small stones (very limited) ~large surface stones (very limited)	1.00  1.00  1.00	Very limited ~slope (very limited) ~large surface stones (very limited) ~small stones (very limited)	1.00  1.00  1.00	Very limited ~small stones (very limited) ~slope (very limited) ~percs slowly (slightly limited)	1.00  1.00  0.13	Very limited ~slope (very limited) ~large surface stones (very limited) ~small stones (slightly limited)	1.00  1.00  0.30
Bardley-----	Very limited ~slope (very limited) ~large surface stones (very limited) ~small stones (limited)	1.00  1.00  1.00	Very limited ~slope (very limited) ~large surface stones (very limited) ~small stones (limited)	1.00  1.00  1.00	Very limited ~small stones (very limited) ~slope (very limited) ~depth to bedrock (moderately limited)	1.00  1.00  0.46	Very limited ~slope (very limited) ~large surface stones (very limited) ~small stones (slightly limited)	1.00  1.00  0.01
73043: Hartville-----	Very limited ~wetness (very limited) ~percs slowly (moderately limited)	1.00  0.39	Very limited ~wetness (very limited) ~percs slowly (moderately limited)	1.00  0.39	Very limited ~wetness (very limited) ~slope (limited) ~percs slowly (moderately limited)	1.00  0.98  0.39	Very limited ~wetness (very limited)	1.00
73044: Crestmeade-----	Very limited ~wetness (very limited) ~percs slowly (moderately limited)	1.00  0.39	Very limited ~wetness (very limited) ~percs slowly (moderately limited)	1.00  0.39	Very limited ~wetness (very limited) ~percs slowly (moderately limited)	1.00  0.39	Very limited ~wetness (very limited)	1.00

Table 10.--Recreational Site Development--Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds		Paths and trails	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73045: Crestmeade-----	Very limited ~wetness (very limited) ~too clayey (moderately limited) ~percs slowly (moderately limited)	1.00  0.60  0.39	Very limited ~wetness (very limited) ~too clayey (moderately limited) ~percs slowly (moderately limited)	1.00  0.60  0.39	Very limited ~wetness (very limited) ~too clayey (moderately limited) ~percs slowly (moderately limited)	1.00  0.60  0.39	Very limited ~wetness (very limited) ~too clayey (moderately limited)	1.00  0.60
73046: Wrengart-----	Slightly limited ~wetness (slightly limited)	0.15	Slightly limited ~wetness (slightly limited)	0.04	Limited ~slope (limited) ~wetness (slightly limited)	0.98  0.15	Slightly limited ~wetness (slightly limited)	0.04
73047: Bardley-----	Very limited ~large surface stones (very limited) ~small stones (limited) ~slope (slightly limited)	1.00  1.00  0.04	Very limited ~large surface stones (very limited) ~small stones (limited) ~slope (slightly limited)	1.00  1.00  0.04	Very limited ~small stones (very limited) ~slope (very limited) ~depth to bedrock (moderately limited)	1.00  1.00  0.46	Very limited ~large surface stones (very limited) ~small stones (slightly limited)	1.00  0.01
Moko-----	Very limited ~large surface stones (very limited) ~shallow to bedrock (limited) ~small stones (limited)	1.00  0.90  0.64	Very limited ~large surface stones (very limited) ~shallow to bedrock (limited) ~small stones (limited)	1.00  0.90  0.64	Very limited ~bedrock <20 in. (very limited) ~slope (very limited) ~small stones (very limited)	1.00  1.00  1.00	Very limited ~large surface stones (very limited)	1.00
73048: Rueter-----	Limited ~small stones (limited) ~too acid (limited)	0.82  0.71	Limited ~small stones (limited) ~too acid (limited)	0.82  0.71	Very limited ~small stones (very limited) ~slope (limited) ~too acid (limited)	1.00  0.98  0.71	Not limited	

Table 10.--Recreational Site Development--Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds		Paths and trails	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73050: Rock outcrop-----	Not rated		Not rated		Not rated		Not rated	
Bardley-----	Very limited		Very limited		Very limited		Very limited	
	~slope (very limited)	1.00	~slope (very limited)	1.00	~small stones (very limited)	1.00	~slope (very limited)	1.00
	~large surface stones (very limited)	1.00	~large surface stones (very limited)	1.00	~slope (very limited)	1.00	~large surface stones (very limited)	1.00
	~small stones (limited)	1.00	~small stones (limited)	1.00	~depth to bedrock (moderately limited)	0.46	~small stones (slightly limited)	0.01
73112: Gunlock-----	Limited		Moderately limited		Limited		Moderately limited	
	~wetness (limited)	0.92	~wetness (moderately limited)	0.56	~slope (limited)	0.98	~wetness (moderately limited)	0.56
	~percs slowly (slightly limited)	0.13	~percs slowly (slightly limited)	0.13	~wetness (limited)	0.92		
					~percs slowly (slightly limited)	0.13		
73136: Union-----	Limited		Moderately limited		Limited		Moderately limited	
	~wetness (limited)	0.92	~wetness (moderately limited)	0.56	~wetness (limited)	0.92	~wetness (moderately limited)	0.56
73137, 73138: Clafork-----	Limited		Limited		Limited		Limited	
	~wetness (limited)	0.97	~wetness (limited)	0.60	~wetness (limited)	0.97	~wetness (limited)	0.60
	~percs slowly (slightly limited)	0.13	~percs slowly (slightly limited)	0.13	~slope (moderately limited)	0.40		
					~percs slowly (slightly limited)	0.13		
73190: Winnipeg-----	Not limited		Not limited		Limited		Not limited	
					~slope (limited)	0.98		
75376: Cedargap-----	Very limited		Moderately limited		Very limited		Moderately limited	
	~flooding (very limited)	1.00	~flooding (moderately limited)	0.60	~flooding (very limited)	1.00	~flooding (moderately limited)	0.60
	~small stones (slightly limited)	0.27	~small stones (slightly limited)	0.27	~small stones (very limited)	1.00		
					~large stones (slightly limited)	0.01		

Table 10.--Recreational Site Development--Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds		Paths and trails	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
75378: Sturkie-----	Very limited ~flooding (very limited)	1.00	Moderately limited ~flooding (moderately limited)	0.60	Very limited ~flooding (very limited)	1.00	Moderately limited ~flooding (moderately limited)	0.60
75384: Healing-----	Very limited ~flooding (very limited)	1.00	Not limited		Moderately limited ~flooding (moderately limited)	0.60	Not limited	
75385: Gabriel-----	Very limited ~flooding (very limited) ~wetness (very limited) ~percs slowly (slightly limited)	1.00 1.00 0.13	Limited ~wetness (limited) ~percs slowly (slightly limited)	0.86 0.13	Very limited ~wetness (very limited) ~flooding (moderately limited) ~percs slowly (slightly limited)	1.00 0.60 0.13	Limited ~wetness (limited)	0.86
75386: Speed-----	Limited ~flooding (rare) (limited) ~wetness (limited)	0.90 0.80	Moderately limited ~wetness (moderately limited)	0.45	Limited ~wetness (limited)	0.80	Moderately limited ~wetness (moderately limited)	0.45
75387: Hacreek-----	Very limited ~flooding (very limited) ~wetness (very limited) ~percs slowly (slightly limited)	1.00 1.00 0.13	Very limited ~wetness (very limited) ~percs slowly (slightly limited)	1.00 0.13	Very limited ~wetness (very limited) ~flooding (moderately limited) ~percs slowly (slightly limited)	1.00 0.60 0.13	Very limited ~wetness (very limited)	1.00
75415: Jemerson-----	Very limited ~flooding (very limited)	1.00	Not limited		Moderately limited ~flooding (moderately limited)	0.60	Not limited	
75421: Racket-----	Very limited ~flooding (very limited)	1.00	Not limited		Moderately limited ~flooding (moderately limited)	0.60	Not limited	

Table 10.--Recreational Site Development--Continued

Map symbol and soil name	Camp areas		Picnic areas		Playgrounds		Paths and trails	
	<u>Limitation</u>	<u>Value</u>	<u>Limitation</u>	<u>Value</u>	<u>Limitation</u>	<u>Value</u>	<u>Limitation</u>	<u>Value</u>
99000: Pits-----	Not rated		Not rated		Not rated		Not rated	
99001: Water-----	Not rated		Not rated		Not rated		Not rated	
99003: Miscellaneous water-----	Not rated		Not rated		Not rated		Not rated	

Table 11a.--Wildlife Habitat Suitability

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Grain and seed crops (for use as food and cover)		Domestic grasses and legumes (for use as food and cover)		Upland wild herbaceous plants		Upland shrubs and vines		Upland deciduous trees	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
15002: McGirk-----	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00
	~moderate erodibility (moderately limited)	0.50	~moderate erodibility (moderately limited)	0.50						
	~percs slowly (moderately limited)	0.39	~percs slowly (moderately limited)	0.39						
66000: Moniteau-----	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00
	~flooding (moderately limited)	0.60	~flooding (moderately limited)	0.60						
	~percs slowly (slightly limited)	0.13	~percs slowly (slightly limited)	0.13						
70008: Goss-----	Very limited ~droughty (very limited)	1.00	Limited ~small stones (limited)	0.64	Slightly limited ~droughty (slightly limited)	0.19	Slightly limited ~droughty (slightly limited)	0.19	Slightly limited ~droughty (slightly limited)	0.19
	~small stones (limited)	0.64	~moderate erodibility (moderately limited)	0.50	~small stones (slightly limited)	0.13				
	~moderate erodibility (moderately limited)	0.50	~droughty (slightly limited)	0.19						
70009: Goss-----	Very limited ~droughty (very limited)	1.00	Limited ~high erodibility (limited)	0.80	Slightly limited ~droughty (slightly limited)	0.19	Slightly limited ~droughty (slightly limited)	0.19	Slightly limited ~droughty (slightly limited)	0.19
	~high erodibility (limited)	0.80	~small stones (limited)	0.64	~small stones (slightly limited)	0.13				
	~small stones (limited)	0.64	~droughty (slightly limited)	0.19						
70023: Eldon-----	Limited ~droughty (limited)	0.80	Moderately limited ~moderate erodibility (moderately limited)	0.50	Not limited		Not limited		Not limited	
	~moderate erodibility (moderately limited)	0.50								

Table 11a.--Wildlife Habitat Suitability--Continued

Map symbol and soil name	Grain and seed crops (for use as food and cover)		Domestic grasses and legumes (for use as food and cover)		Upland wild herbaceous plants		Upland shrubs and vines		Upland deciduous trees	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
70024: Goss-----	Very limited ~droughty (very limited)	1.00	Very limited ~small stones (very limited)	1.00	Moderately limited ~small stones (moderately limited)	0.42	Moderately limited ~droughty (moderately limited)	0.31	Moderately limited ~droughty (moderately limited)	0.31
	~small stones (very limited)	1.00	~high erodibility (limited)	0.80	~droughty (moderately limited)	0.31	~small stones (slightly limited)	0.30		
	~high erodibility (limited)	0.80	~slope (moderately limited)	0.60						
70028: Moko-----	Very limited ~droughty (very limited)	1.00	Very limited ~droughty (very limited)	1.00	Very limited ~droughty (very limited)	1.00	Very limited ~droughty (very limited)	1.00	Very limited ~droughty (very limited)	1.00
	~bedrock <20 in. (very limited)	1.00	~bedrock <20 in. (very limited)	1.00	~small stones (slightly limited)	0.13	~bedrock <20 in. (very limited)	1.00	~bedrock <20 in. (very limited)	1.00
	~high erodibility (limited)	0.80	~high erodibility (limited)	0.80						
Rock outcrop---	Not rated		Not rated		Not rated		Not rated		Not rated	
70046: Sacville-----	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00
	~moderate erodibility (moderately limited)	0.50	~moderate erodibility (moderately limited)	0.50						
	~percs slowly (moderately limited)	0.39	~percs slowly (moderately limited)	0.39						
73012: Gravois-----	Limited ~droughty (limited)	0.83	Moderately limited ~wetness (moderately limited)	0.55	Moderately limited ~wetness (moderately limited)	0.55	Moderately limited ~wetness (moderately limited)	0.55	Limited ~wetness (limited)	0.85
	~wetness (moderately limited)	0.55	~moderate erodibility (moderately limited)	0.50						
	~moderate erodibility (moderately limited)	0.50	~percs slowly (moderately limited)	0.39						
73034: Gravois, eroded-----	Limited ~droughty (limited)	0.83	Moderately limited ~wetness (moderately limited)	0.55	Moderately limited ~wetness (moderately limited)	0.55	Moderately limited ~wetness (moderately limited)	0.55	Limited ~wetness (limited)	0.85
	~wetness (moderately limited)	0.55	~moderate erodibility (moderately limited)	0.50						
	~moderate erodibility (moderately limited)	0.50	~percs slowly (moderately limited)	0.39						

Table 11a.--Wildlife Habitat Suitability--Continued

Map symbol and soil name	Grain and seed crops (for use as food and cover)		Domestic grasses and legumes (for use as food and cover)		Upland wild herbaceous plants		Upland shrubs and vines		Upland deciduous trees	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73035: Gravois-----	Limited ~droughty (limited) ~high erodibility (limited) ~wetness (moderately limited)	0.83 0.80 0.55	Limited ~high erodibility (limited) ~wetness (moderately limited) ~percs slowly (moderately limited)	0.80 0.55 0.39	Moderately limited ~wetness (moderately limited)	0.55	Moderately limited ~wetness (moderately limited)	0.55	Limited ~wetness (limited)	0.85
73036: Willowfork-----	Very limited ~wetness (very limited) ~percs slowly (slightly limited)	1.00 0.13	Very limited ~wetness (very limited) ~percs slowly (slightly limited)	1.00 0.13	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00
73037: Friendly-----	Very limited ~wetness (very limited) ~droughty (moderately limited) ~moderate erodibility (moderately limited)	1.00 0.51 0.50	Very limited ~wetness (very limited) ~moderate erodibility (moderately limited) ~percs slowly (moderately limited)	1.00 0.50 0.39	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00
73038: Glensted-----	Very limited ~droughty (very limited) ~wetness (very limited)	1.00 1.00	Very limited ~droughty (very limited) ~wetness (very limited)	1.00 1.00	Very limited ~droughty (very limited) ~wetness (very limited)	1.00 1.00	Very limited ~droughty (very limited) ~wetness (very limited)	1.00 1.00	Very limited ~droughty (very limited) ~wetness (very limited)	1.00 1.00
73039: Glensted-----	Very limited ~droughty (very limited) ~wetness (very limited) ~moderate erodibility (moderately limited)	1.00 1.00 0.50	Very limited ~droughty (very limited) ~wetness (very limited) ~moderate erodibility (moderately limited)	1.00 1.00 0.50	Very limited ~droughty (very limited) ~wetness (very limited)	1.00 1.00	Very limited ~droughty (very limited) ~wetness (very limited)	1.00 1.00	Very limited ~droughty (very limited) ~wetness (very limited)	1.00 1.00

Table 11a.--Wildlife Habitat Suitability--Continued

Map symbol and soil name	Grain and seed crops (for use as food and cover)		Domestic grasses and legumes (for use as food and cover)		Upland wild herbaceous plants		Upland shrubs and vines		Upland deciduous trees	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73040: Maplewood-----	Very limited ~droughty (very limited) ~wetness (very limited) ~moderate erodibility (moderately limited)	1.00 1.00 0.50	Very limited ~wetness (very limited) ~moderate erodibility (moderately limited) ~droughty (slightly limited)	1.00 0.50 0.14	Very limited ~wetness (very limited) ~droughty (slightly limited)	1.00 0.14	Very limited ~wetness (very limited) ~droughty (slightly limited)	1.00 0.14	Very limited ~wetness (very limited) ~droughty (slightly limited)	1.00 0.14
73041: Maplewood-----	Very limited ~droughty (very limited) ~wetness (very limited) ~high erodibility (limited)	1.00 1.00 0.80	Very limited ~wetness (very limited) ~high erodibility (limited) ~droughty (slightly limited)	1.00 0.80 0.20	Very limited ~wetness (very limited) ~droughty (slightly limited)	1.00 0.20	Very limited ~wetness (very limited) ~droughty (slightly limited)	1.00 0.20	Very limited ~wetness (very limited) ~droughty (slightly limited)	1.00 0.20
73042: Niangua-----	Very limited ~small stones (very limited) ~droughty (very limited) ~slope (limited)	1.00 1.00 0.91	Very limited ~small stones (very limited) ~slope (limited) ~high erodibility (limited)	1.00 0.91 0.80	Moderately limited ~small stones (moderately limited)	0.42	Slightly limited ~small stones (slightly limited)	0.30	Not limited	
Bardley-----	Very limited ~droughty (very limited) ~small stones (limited) ~slope (limited)	1.00 1.00 0.91	Limited ~small stones (limited) ~slope (limited) ~high erodibility (limited)	1.00 0.91 0.80	Limited ~droughty (limited) ~small stones (slightly limited)	0.66 0.24	Limited ~droughty (limited) ~depth to bedrock (moderately limited) ~small stones (slightly limited)	0.66 0.46 0.01	Limited ~droughty (limited) ~depth to bedrock (moderately limited)	0.66 0.46
73043: Hartville-----	Very limited ~wetness (very limited) ~moderate erodibility (moderately limited) ~percs slowly (moderately limited)	1.00 0.50 0.39	Very limited ~wetness (very limited) ~moderate erodibility (moderately limited) ~percs slowly (moderately limited)	1.00 0.50 0.39	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00

Table 11a.--Wildlife Habitat Suitability--Continued

Map symbol and soil name	Grain and seed crops (for use as food and cover)		Domestic grasses and legumes (for use as food and cover)		Upland wild herbaceous plants		Upland shrubs and vines		Upland deciduous trees	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73044: Crestmeade-----	Very limited ~wetness (very limited) ~percs slowly (moderately limited)	1.00  0.39	Very limited ~wetness (very limited) ~percs slowly (moderately limited)	1.00  0.39	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00
73045: Crestmeade-----	Very limited ~wetness (very limited) ~percs slowly (moderately limited) ~too clayey (slightly limited)	1.00  0.39  0.08	Very limited ~wetness (very limited) ~percs slowly (moderately limited) ~too clayey (slightly limited)	1.00  0.39  0.08	Very limited ~wetness (very limited) ~too clayey (slightly limited)	1.00  0.08	Very limited ~wetness (very limited) ~too clayey (slightly limited)	1.00  0.08	Very limited ~wetness (very limited)	1.00
73046: Wrengart-----	Moderately limited ~moderate erodibility (moderately limited) ~droughty (moderately limited) ~wetness (moderately limited)	0.50  0.39  0.31	Moderately limited ~moderate erodibility (moderately limited) ~wetness (moderately limited)	0.50  0.31	Moderately limited ~wetness (moderately limited)	0.31	Moderately limited ~wetness (moderately limited)	0.31	Moderately limited ~wetness (moderately limited)	0.46
73047: Bardley-----	Very limited ~droughty (very limited) ~small stones (limited) ~high erodibility (limited)	1.00  1.00  0.80	Limited ~small stones (limited) ~high erodibility (limited) ~droughty (limited)	1.00  0.80  0.66	Limited ~droughty (limited) ~small stones (slightly limited)	0.66  0.24	Limited ~droughty (limited) ~depth to bedrock (moderately limited) ~small stones (slightly limited)	0.66  0.46  0.01	Limited ~droughty (limited) ~depth to bedrock (moderately limited)	0.66  0.46
Moko-----	Very limited ~droughty (very limited) ~bedrock <20 in. (very limited) ~high erodibility (limited)	1.00  1.00  0.80	Very limited ~droughty (very limited) ~bedrock <20 in. (very limited) ~high erodibility (limited)	1.00  1.00  0.80	Very limited ~droughty (very limited) ~small stones (slightly limited)	1.00  0.13	Very limited ~droughty (very limited) ~bedrock <20 in. (very limited)	1.00  1.00	Very limited ~droughty (very limited) ~bedrock <20 in. (very limited)	1.00  1.00

Table 11a.--Wildlife Habitat Suitability--Continued

Map symbol and soil name	Grain and seed crops (for use as food and cover)		Domestic grasses and legumes (for use as food and cover)		Upland wild herbaceous plants		Upland shrubs and vines		Upland deciduous trees	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73048:										
Rueter-----	Very limited ~droughty (very limited)	1.00	Limited ~small stones (limited)	0.82	Moderately limited ~droughty (moderately limited)	0.35	Moderately limited ~droughty (moderately limited)	0.35	Moderately limited ~droughty (moderately limited)	0.35
	~small stones (limited)	0.82	~moderate erodibility (moderately limited)	0.50	~small stones (slightly limited)	0.17				
	~moderate erodibility (moderately limited)	0.50	~droughty (moderately limited)	0.35						
73050:										
Rock outcrop---	Not rated		Not rated		Not rated		Not rated		Not rated	
Bardley-----	Very limited ~droughty (very limited)	1.00	Very limited ~slope (very limited)	1.00	Limited ~droughty (limited)	0.66	Limited ~droughty (limited)	0.66	Limited ~droughty (limited)	0.66
	~slope (very limited)	1.00	~small stones (limited)	1.00	~small stones (slightly limited)	0.24	~depth to bedrock (moderately limited)	0.46	~depth to bedrock (moderately limited)	0.46
	~small stones (limited)	1.00	~droughty (limited)	0.66			~small stones (slightly limited)	0.01		
73112:										
Gunlock-----	Limited ~droughty (limited)	0.99	Limited ~high erodibility (limited)	0.80	Moderately limited ~wetness (moderately limited)	0.58	Moderately limited ~wetness (moderately limited)	0.58	Limited ~wetness (limited)	0.93
	~high erodibility (limited)	0.80	~wetness (moderately limited)	0.58						
	~wetness (moderately limited)	0.58	~percs slowly (slightly limited)	0.13						
73136:										
Union-----	Moderately limited ~wetness (moderately limited)	0.58	Moderately limited ~wetness (moderately limited)	0.58	Moderately limited ~wetness (moderately limited)	0.58	Moderately limited ~wetness (moderately limited)	0.58	Limited ~wetness (limited)	0.93
	~moderate erodibility (moderately limited)	0.50	~moderate erodibility (moderately limited)	0.50						
	~droughty (slightly limited)	0.17								
73137, 73138:										
Clafork-----	Moderately limited ~wetness (moderately limited)	0.60	Moderately limited ~wetness (moderately limited)	0.60	Moderately limited ~wetness (moderately limited)	0.60	Moderately limited ~wetness (moderately limited)	0.60	Limited ~wetness (limited)	0.99
	~moderate erodibility (moderately limited)	0.50	~moderate erodibility (moderately limited)	0.50						
	~percs slowly (slightly limited)	0.13	~percs slowly (slightly limited)	0.13						

Table 11a.--Wildlife Habitat Suitability--Continued

Map symbol and soil name	Grain and seed crops (for use as food and cover)		Domestic grasses and legumes (for use as food and cover)		Upland wild herbaceous plants		Upland shrubs and vines		Upland deciduous trees	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73190: Winnipeg-----	Moderately limited ~moderate erodibility (moderately limited)	0.50	Moderately limited ~moderate erodibility (moderately limited)	0.50	Not limited		Not limited		Not limited	
75376: Cedargap-----	Limited ~droughty (limited) ~flooding (limited) ~small stones (slightly limited)	0.94 0.90 0.27	Limited ~flooding (limited) ~small stones (slightly limited)	0.90 0.27	Slightly limited ~small stones (slightly limited)	0.03	Not limited		Not limited	
75378: Sturkie-----	Limited ~flooding (limited)	0.90	Limited ~flooding (limited)	0.90	Not limited		Not limited		Not limited	
75384: Healing-----	Moderately limited ~flooding (moderately limited)	0.60	Moderately limited ~flooding (moderately limited)	0.60	Not limited		Not limited		Not limited	
75385: Gabriel-----	Limited ~wetness (limited) ~flooding (moderately limited) ~percs slowly (slightly limited)	0.86 0.60 0.13	Limited ~wetness (limited) ~flooding (moderately limited) ~percs slowly (slightly limited)	0.86 0.60 0.13	Limited ~wetness (limited)	0.86	Limited ~wetness (limited)	0.86	Very limited ~wetness (very limited)	1.00
75386: Speed-----	Moderately limited ~wetness (moderately limited)	0.53	Moderately limited ~wetness (moderately limited)	0.53	Moderately limited ~wetness (moderately limited)	0.53	Moderately limited ~wetness (moderately limited)	0.53	Limited ~wetness (limited)	0.80
75387: Hacreek-----	Very limited ~wetness (very limited) ~flooding (moderately limited) ~percs slowly (slightly limited)	1.00 0.60 0.13	Very limited ~wetness (very limited) ~flooding (moderately limited) ~percs slowly (slightly limited)	1.00 0.60 0.13	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00

Table 11a.--Wildlife Habitat Suitability--Continued

Map symbol and soil name	Grain and seed crops (for use as food and cover)		Domestic grasses and legumes (for use as food and cover)		Upland wild herbaceous plants		Upland shrubs and vines		Upland deciduous trees	
	<u>Limitation</u>	<u>Value</u>	<u>Limitation</u>	<u>Value</u>	<u>Limitation</u>	<u>Value</u>	<u>Limitation</u>	<u>Value</u>	<u>Limitation</u>	<u>Value</u>
75415: Jemerson-----	Moderately limited ~flooding (moderately limited)	0.60	Moderately limited ~flooding (moderately limited)	0.60	Not limited		Not limited		Not limited	
75421: Racket-----	Moderately limited ~flooding (moderately limited)	0.60	Moderately limited ~flooding (moderately limited)	0.60	Not limited		Not limited		Not limited	
99000: Pits-----	Not rated		Not rated		Not rated		Not rated		Not rated	
99001: Water-----	Not rated		Not rated		Not rated		Not rated		Not rated	
99003: Miscellaneous water-----	Not rated		Not rated		Not rated		Not rated		Not rated	

Table 11b.--Wildlife Habitat Suitability

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Upland mixed deciduous- conifer trees		Riparian herbaceous plants		Riparian shrubs, vines, and trees		Freshwater wetland plants		Irrigated freshwater wetland plants	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
15002: McGirk-----	Very limited ~wetness (very limited)	1.00	Limited ~infrequent flooding (limited)	0.80	Not limited		Not limited		Not limited	
66000: Moniteau-----	Very limited ~wetness (very limited)	1.00	Moderately limited ~infrequent flooding (moderately limited)	0.50	Not limited		Not limited		Slightly limited ~seepage (slightly limited)	0.18
70008: Goss-----	Slightly limited ~droughty (slightly limited)	0.19	Very limited ~deep to water (very limited) ~infrequent flooding (limited)	1.00 0.80	Very limited ~deep to water (very limited) ~droughty (slightly limited)	1.00 0.19	Very limited ~deep to water (very limited)	1.00	Very limited ~deep to water (very limited) ~slope (limited) ~seepage (moderately limited)	1.00 0.91 0.45
70009: Goss-----	Slightly limited ~droughty (slightly limited)	0.19	Very limited ~deep to water (very limited) ~infrequent flooding (limited)	1.00 0.80	Very limited ~deep to water (very limited) ~droughty (slightly limited)	1.00 0.19	Very limited ~deep to water (very limited)	1.00	Very limited ~slope (very limited) ~deep to water (very limited) ~seepage (moderately limited)	1.00 1.00 0.45
70023: Eldon-----	Not limited		Very limited ~deep to water (very limited) ~infrequent flooding (limited)	1.00 0.80	Very limited ~deep to water (very limited)	1.00	Very limited ~deep to water (very limited)	1.00	Very limited ~deep to water (very limited) ~slope (limited) ~seepage (moderately limited)	1.00 0.91 0.45

Table 11b.--Wildlife Habitat Suitability--Continued

Map symbol and soil name	Upland mixed deciduous- conifer trees		Riparian herbaceous plants		Riparian shrubs, vines, and trees		Freshwater wetland plants		Irrigated freshwater wetland plants	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
70024: Goss-----	Moderately limited ~droughty (moderately limited)	0.31	Very limited ~deep to water (very limited) ~infrequent flooding (limited) ~small stones (slightly limited)	1.00 0.80 0.30	Very limited ~droughty (very limited) ~small stones (slightly limited)	1.00 0.31 0.30	Very limited ~deep to water (very limited)	1.00	Very limited ~slope (very limited) ~deep to water (very limited) ~seepage (moderately limited)	1.00 1.00 0.45
70028: Moko-----	Very limited ~droughty (very limited) ~bedrock <20 in. (very limited)	1.00 1.00	Very limited ~deep to water (very limited) ~infrequent flooding (limited)	1.00 0.80	Very limited ~droughty (very limited) ~deep to water (very limited)	1.00 1.00	Very limited ~deep to water (very limited)	1.00	Very limited ~deep to water (very limited) ~slope (very limited) ~seepage (moderately limited)	1.00 1.00 0.45
Rock outcrop---	Not rated		Not rated		Not rated		Not rated		Not rated	
70046: Sacville-----	Very limited ~wetness (very limited)	1.00	Limited ~infrequent flooding (limited)	0.80	Not limited		Not limited		Moderately limited ~slope (moderately limited)	0.31
73012: Gravois-----	Limited ~wetness (limited)	0.85	Limited ~infrequent flooding (limited) ~deep to water (moderately limited)	0.80 0.35	Not limited		Moderately limited ~deep to water (moderately limited)	0.35	Limited ~slope (limited)	0.91
73034: Gravois, eroded-----	Limited ~wetness (limited)	0.85	Limited ~infrequent flooding (limited) ~deep to water (moderately limited)	0.80 0.35	Not limited		Moderately limited ~deep to water (moderately limited)	0.35	Limited ~slope (limited)	0.91
73035: Gravois-----	Limited ~wetness (limited)	0.85	Limited ~infrequent flooding (limited) ~deep to water (moderately limited)	0.80 0.35	Not limited		Moderately limited ~deep to water (moderately limited)	0.35	Very limited ~slope (very limited)	1.00

Table 11b.--Wildlife Habitat Suitability--Continued

Map symbol and soil name	Upland mixed deciduous- conifer trees		Riparian herbaceous plants		Riparian shrubs, vines, and trees		Freshwater wetland plants		Irrigated freshwater wetland plants	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73036: Willowfork-----	Very limited ~wetness (very limited)	1.00	Limited ~infrequent flooding (limited)	0.80	Not limited		Not limited		Slightly limited ~seepage (slightly limited)	0.18
73037: Friendly-----	Very limited ~wetness (very limited)	1.00	Limited ~infrequent flooding (limited)	0.80	Not limited		Not limited		Not limited	
73038, 73039: Glensted-----	Very limited ~droughty (very limited) ~wetness (very limited)	1.00 1.00	Limited ~infrequent flooding (limited)	0.80	Very limited ~droughty (very limited)	1.00	Not limited		Moderately limited ~seepage (moderately limited)	0.45
73040: Maplewood-----	Very limited ~wetness (very limited) ~droughty (slightly limited)	1.00 0.14	Limited ~infrequent flooding (limited)	0.80	Slightly limited ~droughty (slightly limited)	0.14	Not limited		Slightly limited ~seepage (slightly limited) ~slope (slightly limited)	0.18 0.08
73041: Maplewood-----	Very limited ~wetness (very limited) ~droughty (slightly limited)	1.00 0.20	Limited ~infrequent flooding (limited)	0.80	Slightly limited ~droughty (slightly limited)	0.20	Not limited		Very limited ~slope (very limited) ~seepage (slightly limited)	1.00 0.18
73042: Niangua-----	Not limited		Very limited ~deep to water (very limited) ~infrequent flooding (limited) ~small stones (slightly limited)	1.00 0.80 0.30	Very limited ~deep to water (very limited) ~small stones (slightly limited)	1.00 0.30	Very limited ~deep to water (very limited)	1.00	Very limited ~slope (very limited) ~deep to water (very limited) ~seepage (slightly limited)	1.00 1.00 0.18
Bardley-----	Limited ~droughty (limited) ~depth to bedrock (moderately limited)	0.66 0.46	Very limited ~deep to water (very limited) ~infrequent flooding (limited) ~small stones (slightly limited)	1.00 0.80 0.01	Very limited ~deep to water (very limited) ~droughty (limited) ~small stones (slightly limited)	1.00 0.66 0.01	Very limited ~deep to water (very limited)	1.00	Very limited ~slope (very limited) ~deep to water (very limited) ~seepage (moderately limited)	1.00 1.00 0.45

Table 11b.--Wildlife Habitat Suitability--Continued

Map symbol and soil name	Upland mixed deciduous- conifer trees		Riparian herbaceous plants		Riparian shrubs, vines, and trees		Freshwater wetland plants		Irrigated freshwater wetland plants	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73043: Hartville-----	Very limited ~wetness (very limited)	1.00	Limited ~infrequent flooding (limited)	0.80	Not limited		Not limited		Limited ~slope (limited)	0.91
73044, 73045: Crestmeade-----	Very limited ~wetness (very limited)	1.00	Limited ~infrequent flooding (limited)	0.80	Not limited		Not limited		Not limited	
73046: Wrengart-----	Moderately limited ~wetness (moderately limited)	0.46	Limited ~infrequent flooding (limited) ~deep to water (moderately limited)	0.80 0.58	Not limited		Moderately limited ~deep to water (moderately limited)	0.58	Limited ~slope (limited) ~seepage (moderately limited)	0.91 0.45
73047: Bardley-----	Limited ~droughty (limited) ~depth to bedrock (moderately limited)	0.66 0.46	Very limited ~deep to water (very limited) ~infrequent flooding (limited) ~small stones (slightly limited)	1.00 0.80 0.01	Very limited ~droughty (limited) ~small stones (slightly limited)	1.00 0.66 0.01	Very limited ~deep to water (very limited)	1.00	Very limited ~deep to water (very limited) ~slope (very limited) ~seepage (moderately limited)	1.00 1.00 0.45
73047: Moko-----	Very limited ~droughty (very limited) ~bedrock <20 in. (very limited)	1.00 1.00	Very limited ~deep to water (very limited) ~infrequent flooding (limited)	1.00 0.80	Very limited ~droughty (very limited) ~deep to water (very limited)	1.00 1.00	Very limited ~deep to water (very limited)	1.00	Very limited ~deep to water (very limited) ~slope (very limited) ~seepage (moderately limited)	1.00 1.00 0.45
73048: Rueter-----	Moderately limited ~droughty (moderately limited)	0.35	Very limited ~deep to water (very limited) ~infrequent flooding (limited)	1.00 0.80	Very limited ~deep to water (very limited) ~droughty (moderately limited)	1.00 0.35	Very limited ~deep to water (very limited) ~soil reaction (slightly limited)	1.00 0.18	Very limited ~deep to water (very limited) ~slope (limited) ~seepage (limited)	1.00 0.91 0.80
73050: Rock outcrop---	Not rated		Not rated		Not rated		Not rated		Not rated	

Table 11b.--Wildlife Habitat Suitability--Continued

Map symbol and soil name	Upland mixed deciduous- conifer trees		Riparian herbaceous plants		Riparian shrubs, vines, and trees		Freshwater wetland plants		Irrigated freshwater wetland plants	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73050: Bardley-----	Limited ~droughty (limited) ~depth to bedrock (moderately limited)	0.66  0.46	Very limited ~deep to water (very limited) ~infrequent flooding (limited) ~small stones (slightly limited)	1.00  0.80  0.01	Very limited ~deep to water (very limited) ~droughty (limited) ~small stones (slightly limited)	1.00  0.66  0.01	Very limited ~deep to water (very limited)	1.00	Very limited ~slope (very limited) ~deep to water (very limited) ~seepage (moderately limited)	1.00  1.00  0.45
73112: Gunlock-----	Limited ~wetness (limited)	0.93	Limited ~infrequent flooding (limited) ~deep to water (moderately limited)	0.80  0.32	Not limited		Moderately limited ~deep to water (moderately limited)	0.32	Limited ~slope (limited) ~seepage (slightly limited)	0.91  0.18
73136: Union-----	Limited ~wetness (limited)	0.93	Limited ~infrequent flooding (limited) ~deep to water (moderately limited)	0.80  0.32	Not limited		Moderately limited ~deep to water (moderately limited)	0.32	Moderately limited ~seepage (moderately limited)	0.45
73137, 73138: Clafork-----	Limited ~wetness (limited)	0.99	Limited ~infrequent flooding (limited) ~deep to water (slightly limited)	0.80  0.30	Not limited		Slightly limited ~deep to water (slightly limited)	0.30	Moderately limited ~slope (moderately limited) ~seepage (slightly limited)	0.31  0.18
73190: Winnipeg-----	Not limited		Very limited ~deep to water (very limited) ~infrequent flooding (limited)	1.00  0.80	Very limited ~deep to water (very limited)	1.00	Very limited ~deep to water (very limited)	1.00	Very limited ~deep to water (very limited) ~slope (limited) ~seepage (moderately limited)	1.00  0.91  0.45
75376: Cedargap-----	Not limited		Very limited ~deep to water (very limited) ~infrequent flooding (moderately limited)	1.00  0.50	Very limited ~deep to water (very limited)	1.00	Very limited ~deep to water (very limited)	1.00	Very limited ~deep to water (very limited) ~seepage (moderately limited)	1.00  0.45

Table 11b.--Wildlife Habitat Suitability--Continued

Map symbol and soil name	Upland mixed deciduous- conifer trees		Riparian herbaceous plants		Riparian shrubs, vines, and trees		Freshwater wetland plants		Irrigated freshwater wetland plants	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
75378: Sturkie-----	Not limited		Very limited ~deep to water (very limited)	1.00	Very limited ~deep to water (very limited)	1.00	Very limited ~deep to water (very limited)	1.00	Very limited ~deep to water (very limited) ~seepage (moderately limited)	0.45
75384: Healing-----	Not limited		Very limited ~deep to water (very limited) ~infrequent flooding (moderately limited)	1.00 0.50	Very limited ~deep to water (very limited)	1.00	Very limited ~deep to water (very limited)	1.00	Very limited ~deep to water (very limited) ~seepage (moderately limited)	0.45
75385: Gabriel-----	Very limited ~wetness (very limited)	1.00	Moderately limited ~infrequent flooding (moderately limited) ~deep to water (slightly limited)	0.50 0.11	Not limited		Slightly limited ~deep to water (slightly limited)	0.11	Slightly limited ~seepage (slightly limited)	0.18
75386: Speed-----	Limited ~wetness (limited)	0.80	Limited ~infrequent flooding (limited) ~deep to water (moderately limited)	0.80 0.37	Not limited		Moderately limited ~deep to water (moderately limited)	0.37	Moderately limited ~seepage (moderately limited)	0.45
75387: Hacreek-----	Very limited ~wetness (very limited)	1.00	Moderately limited ~infrequent flooding (moderately limited)	0.50	Not limited		Not limited		Slightly limited ~seepage (slightly limited)	0.18
75415: Jemerson-----	Not limited		Very limited ~deep to water (very limited) ~infrequent flooding (moderately limited)	1.00 0.50	Moderately limited ~deep to water (moderately limited)	0.47	Very limited ~deep to water (very limited)	1.00	Moderately limited ~deep to water (moderately limited) ~seepage (moderately limited)	0.47 0.45
75421: Racket-----	Not limited		Very limited ~deep to water (very limited) ~infrequent flooding (moderately limited)	1.00 0.50	Limited ~deep to water (limited)	0.85	Very limited ~deep to water (very limited)	1.00	Limited ~deep to water (limited) ~seepage (moderately limited)	0.85 0.45

Table 11b.--Wild Habitat Suitability--Continued

Map symbol and soil name	Upland mixed deciduous- conifer trees		Riparian herbaceous plants		Riparian shrubs, vines, and trees		Freshwater wetland plants		Irrigated freshwater wetland plants	
	<u>Limitation</u>	<u>Value</u>	<u>Limitation</u>	<u>Value</u>	<u>Limitation</u>	<u>Value</u>	<u>Limitation</u>	<u>Value</u>	<u>Limitation</u>	<u>Value</u>
99000: Pits-----	Not rated		Not rated		Not rated		Not rated		Not rated	
99001: Water-----	Not rated		Not rated		Not rated		Not rated		Not rated	
99003: Miscellaneous water-----	Not rated		Not rated		Not rated		Not rated		Not rated	

Table 12.--Building Site Development

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
15002: McGirk-----	Very limited ~wetness (very limited) ~shrink-swell (very limited)	1.00 1.00	Very limited ~wetness (very limited) ~shrink-swell (very limited)	1.00 1.00	Very limited ~wetness (very limited) ~shrink-swell (very limited)	1.00 1.00	Very limited ~low strength (very limited) ~wetness (very limited) ~shrink-swell (very limited)	1.00 1.00 1.00	Very limited ~wetness (very limited)	1.00
66000: Moniteau-----	Very limited ~wetness (very limited) ~flooding (very limited) ~shrink-swell (moderately limited)	1.00 1.00 0.45	Very limited ~flooding (very limited) ~wetness (very limited) ~shrink-swell (moderately limited)	1.00 1.00 0.37	Very limited ~flooding (very limited) ~wetness (very limited) ~shrink-swell (moderately limited)	1.00 1.00 0.45	Very limited ~wetness (very limited) ~flooding (very limited) ~low strength (very limited)	1.00 1.00 1.00	Very limited ~wetness (very limited) ~flooding (moderately limited)	1.00 0.60
70008: Goss-----	Moderately limited ~shrink-swell (moderately limited)	0.45	Slightly limited ~shrink-swell (slightly limited)	0.29	Limited ~slope (limited) ~shrink-swell (moderately limited)	0.68 0.45	Moderately limited ~shrink-swell (moderately limited)	0.45	Limited ~small stones (limited) ~droughty (slightly limited)	0.64 0.19
70009: Goss-----	Limited ~slope (limited) ~shrink-swell (moderately limited)	0.76 0.45	Limited ~slope (limited) ~shrink-swell (slightly limited)	0.76 0.29	Very limited ~slope (very limited) ~shrink-swell (moderately limited)	1.00 0.45	Limited ~slope (limited) ~shrink-swell (moderately limited)	0.63 0.45	Limited ~small stones (limited) ~slope (limited) ~droughty (slightly limited)	0.64 0.63 0.19
70023: Eldon-----	Very limited ~shrink-swell (very limited)	1.00	Very limited ~shrink-swell (very limited)	1.00	Very limited ~shrink-swell (very limited) ~slope (limited)	1.00 0.68	Very limited ~shrink-swell (very limited)	1.00	Not limited	

Table 12.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
70024: Goss-----	Very limited ~slope (very limited) ~shrink-swell (moderately limited)	1.00  0.45	Very limited ~slope (very limited) ~shrink-swell (slightly limited)	1.00  0.29	Very limited ~slope (very limited) ~shrink-swell (moderately limited)	1.00  0.45	Very limited ~slope (very limited) ~shrink-swell (moderately limited)	1.00  0.45	Very limited ~slope (very limited) ~small stones (very limited) ~droughty (moderately limited)	1.00  1.00  0.31
70028: Moko-----	Very limited ~hard bedrock <20" (very limited) ~slope (moderately limited)	1.00  0.45	Very limited ~hard bedrock <40" (very limited) ~slope (moderately limited)	1.00  0.45	Very limited ~hard bedrock <20" (very limited) ~slope (very limited)	1.00  1.00	Very limited ~hard bedrock <20" (very limited) ~slope (slightly limited)	1.00  0.04	Very limited ~droughty (very limited) ~bedrock <20 in. (very limited) ~small stones (limited)	1.00  1.00  0.64
Rock outcrop---	Not rated		Not rated		Not rated		Not rated		Not rated	
70046: Sacville-----	Very limited ~wetness (very limited) ~shrink-swell (moderately limited)	1.00  0.45	Very limited ~wetness (very limited) ~shrink-swell (very limited)	1.00  1.00	Very limited ~wetness (very limited) ~shrink-swell (moderately limited) ~slope (slightly limited)	1.00  0.45  0.15	Very limited ~low strength (very limited) ~wetness (very limited) ~shrink-swell (moderately limited)	1.00  1.00  0.45	Very limited ~wetness (very limited)	1.00
73012: Gravois-----	Moderately limited ~wetness (moderately limited) ~shrink-swell (moderately limited)	0.49  0.45	Very limited ~wetness (very limited) ~shrink-swell (slightly limited)	1.00  0.27	Limited ~slope (limited) ~wetness (moderately limited) ~shrink-swell (moderately limited)	0.68  0.49  0.45	Very limited ~low strength (very limited) ~wetness (moderately limited) ~shrink-swell (moderately limited)	1.00  0.49  0.45	Moderately limited ~wetness (moderately limited)	0.49
73034: Gravois, eroded-----	Moderately limited ~wetness (moderately limited) ~shrink-swell (moderately limited)	0.49  0.45	Very limited ~wetness (very limited) ~shrink-swell (slightly limited)	1.00  0.27	Limited ~slope (limited) ~wetness (moderately limited) ~shrink-swell (moderately limited)	0.68  0.49  0.45	Very limited ~low strength (very limited) ~wetness (moderately limited) ~shrink-swell (moderately limited)	1.00  0.49  0.45	Moderately limited ~wetness (moderately limited)	0.49

Table 12.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73035:										
Gravois-----	Limited		Very limited		Very limited		Very limited		Moderately limited	
	~slope (limited)	0.68	~wetness (very limited)	1.00	~slope (very limited)	1.00	~low strength (very limited)	1.00	~wetness (moderately limited)	0.49
	~wetness (moderately limited)	0.49	~slope (limited)	0.68	~wetness (moderately limited)	0.49	~wetness (moderately limited)	0.49	~slope (moderately limited)	0.37
	~shrink-swell (moderately limited)	0.45	~shrink-swell (slightly limited)	0.27	~shrink-swell (moderately limited)	0.45	~shrink-swell (moderately limited)	0.45		
73036:										
Willowfork----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~wetness (very limited)	1.00	~wetness (very limited)	1.00						
			~shrink-swell (limited)	0.81			~low strength (very limited)	1.00		
73037:										
Friendly-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~wetness (very limited)	1.00	~wetness (very limited)	1.00	~wetness (very limited)	1.00	~low strength (very limited)	1.00	~wetness (very limited)	1.00
	~shrink-swell (moderately limited)	0.45	~shrink-swell (moderately limited)	0.58	~shrink-swell (moderately limited)	0.45	~wetness (very limited)	1.00		
							~shrink-swell (moderately limited)	0.45		
73038, 73039:										
Glensted-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~wetness (very limited)	1.00	~droughty (very limited)	1.00						
	~shrink-swell (very limited)	1.00	~shrink-swell (very limited)	1.00	~shrink-swell (very limited)	1.00	~low strength (very limited)	1.00	~wetness (very limited)	1.00
							~shrink-swell (very limited)	1.00		
73040:										
Maplewood-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~wetness (very limited)	1.00	~wetness (very limited)	1.00	~wetness (very limited)	1.00	~low strength (very limited)	1.00	~wetness (very limited)	1.00
	~shrink-swell (very limited)	1.00	~shrink-swell (very limited)	1.00	~shrink-swell (very limited)	1.00	~wetness (very limited)	1.00	~droughty (slightly limited)	0.14
							~shrink-swell (very limited)	1.00		

Table 12.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73041: Maplewood-----	Very limited ~wetness (very limited) ~shrink-swell (very limited) ~slope (slightly limited)	1.00 1.00 0.15	Very limited ~wetness (very limited) ~shrink-swell (very limited) ~slope (slightly limited)	1.00 1.00 0.15	Very limited ~wetness (very limited) ~shrink-swell (very limited) ~slope (limited)	1.00 1.00 0.83	Very limited ~low strength (very limited) ~wetness (very limited) ~shrink-swell (very limited)	1.00 1.00 1.00	Very limited ~wetness (very limited) ~droughty (slightly limited)	1.00 0.20
73042: Niangua-----	Very limited ~slope (very limited) ~shrink-swell (moderately limited)	1.00 0.45	Very limited ~slope (very limited) ~depth to bedrock (moderately limited) ~shrink-swell (moderately limited)	1.00 0.54 0.36	Very limited ~slope (very limited) ~shrink-swell (moderately limited)	1.00 0.45	Very limited ~low strength (very limited) ~slope (very limited) ~shrink-swell (moderately limited)	1.00 1.00 0.45	Very limited ~slope (very limited) ~small stones (very limited)	1.00 1.00
Bardley-----	Very limited ~slope (very limited) ~hard bedrock (moderately limited) ~shrink-swell (moderately limited)	1.00 0.53 0.45	Very limited ~hard bedrock <40" (very limited) ~slope (very limited) ~shrink-swell (moderately limited)	1.00 1.00 0.45	Very limited ~slope (very limited) ~depth to bedrock (moderately limited) ~shrink-swell (moderately limited)	1.00 0.53 0.45	Very limited ~low strength (very limited) ~slope (very limited) ~depth to bedrock (moderately limited)	1.00 1.00 0.53	Very limited ~slope (very limited) ~small stones (limited) ~droughty (limited)	1.00 1.00 0.66
73043: Hartville-----	Very limited ~wetness (very limited) ~shrink-swell (very limited)	1.00 1.00	Very limited ~wetness (very limited) ~shrink-swell (very limited)	1.00 1.00	Very limited ~wetness (very limited) ~shrink-swell (very limited) ~slope (limited)	1.00 1.00 0.68	Very limited ~low strength (very limited) ~wetness (very limited) ~shrink-swell (very limited)	1.00 1.00 1.00	Very limited ~wetness (very limited)	1.00
73044: Crestmeade-----	Very limited ~wetness (very limited) ~shrink-swell (very limited)	1.00 1.00	Very limited ~wetness (very limited) ~shrink-swell (very limited)	1.00 1.00	Very limited ~wetness (very limited) ~shrink-swell (very limited)	1.00 1.00	Very limited ~low strength (very limited) ~wetness (very limited) ~shrink-swell (very limited)	1.00 1.00 1.00	Very limited ~wetness (very limited)	1.00

Table 12.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73045: Crestmeade-----	Very limited ~wetness (very limited) ~shrink-swell (very limited)	1.00  1.00	Very limited ~wetness (very limited) ~shrink-swell (very limited)	1.00  1.00	Very limited ~wetness (very limited) ~shrink-swell (very limited)	1.00  1.00	Very limited ~low strength (very limited) ~wetness (very limited) ~shrink-swell (very limited)	1.00  1.00 1.00	Very limited ~wetness (very limited) ~too clayey (moderately limited)	1.00  0.60
73046: Wrengart-----	Moderately limited ~shrink-swell (moderately limited) ~wetness (slightly limited)	0.45  0.04	Very limited ~wetness (very limited) ~shrink-swell (moderately limited)	1.00  0.45	Limited ~slope (limited) ~shrink-swell (moderately limited) ~wetness (slightly limited)	0.68  0.45 0.04	Very limited ~low strength (very limited) ~shrink-swell (moderately limited) ~wetness (slightly limited)	1.00  0.45 0.04	Slightly limited ~wetness (slightly limited)	0.04
73047: Bardley-----	Moderately limited ~hard bedrock (moderately limited) ~slope (moderately limited) ~shrink-swell (moderately limited)	0.53  0.45 0.45	Very limited ~hard bedrock <40" (very limited) ~slope (moderately limited) ~shrink-swell (moderately limited)	1.00  0.45 0.45	Very limited ~slope (very limited) ~depth to bedrock (moderately limited) ~shrink-swell (moderately limited)	1.00  0.53 0.45	Very limited ~low strength (very limited) ~depth to bedrock (moderately limited) ~shrink-swell (moderately limited)	1.00  0.53 0.45	Very limited ~small stones (limited) ~droughty (limited) ~depth to bedrock (moderately limited)	1.00  0.66 0.46
Moko-----	Very limited ~hard bedrock <20" (very limited) ~slope (moderately limited)	1.00  0.45	Very limited ~hard bedrock <40" (very limited) ~slope (moderately limited)	1.00  0.45	Very limited ~hard bedrock <20" (very limited) ~slope (very limited)	1.00  1.00	Very limited ~hard bedrock <20" (very limited) ~slope (slightly limited)	1.00  0.04	Very limited ~droughty (very limited) ~bedrock <20 in. (very limited) ~small stones (limited)	1.00  1.00 0.64
73048: Rueter-----	Not limited		Slightly limited ~shrink-swell (slightly limited)	0.09	Limited ~slope (limited)	0.68	Not limited		Limited ~too acid (limited) ~small stones (limited) ~droughty (moderately limited)	0.84  0.82 0.35

Table 12.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73050: Rock outcrop---	Not rated		Not rated		Not rated		Not rated		Not rated	
Bardley-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~slope (very limited)	1.00	~slope (very limited)	1.00	~slope (very limited)	1.00	~low strength (very limited)	1.00	~slope (very limited)	1.00
	~hard bedrock (moderately limited)	0.53	~hard bedrock <40" (very limited)	1.00	~depth to bedrock (moderately limited)	0.53	~slope (very limited)	1.00	~small stones (limited)	1.00
	~shrink-swell (moderately limited)	0.45	~shrink-swell (moderately limited)	0.45	~shrink-swell (moderately limited)	0.45	~depth to bedrock (moderately limited)	0.53	~droughty (limited)	0.66
73112: Gunlock-----	Moderately limited		Very limited		Limited		Very limited		Moderately limited	
	~wetness (moderately limited)	0.56	~wetness (very limited)	1.00	~slope (limited)	0.68	~low strength (very limited)	1.00	~wetness (moderately limited)	0.56
	~shrink-swell (moderately limited)	0.45	~shrink-swell (moderately limited)	0.45	~wetness (moderately limited)	0.56	~wetness (moderately limited)	0.56		
					~shrink-swell (moderately limited)	0.45	~shrink-swell (moderately limited)	0.45		
73136: Union-----	Moderately limited		Very limited		Moderately limited		Very limited		Moderately limited	
	~wetness (moderately limited)	0.56	~wetness (very limited)	1.00	~wetness (moderately limited)	0.56	~low strength (very limited)	1.00	~wetness (moderately limited)	0.56
	~shrink-swell (moderately limited)	0.45	~shrink-swell (moderately limited)	0.45	~shrink-swell (moderately limited)	0.45	~wetness (moderately limited)	0.56		
							~shrink-swell (moderately limited)	0.45		
73137, 73138: Clafork-----	Very limited		Very limited		Very limited		Very limited		Limited	
	~shrink-swell (very limited)	1.00	~wetness (very limited)	1.00	~shrink-swell (very limited)	1.00	~low strength (very limited)	1.00	~wetness (limited)	0.60
	~wetness (limited)	0.60	~shrink-swell (very limited)	1.00	~wetness (limited)	0.60	~shrink-swell (very limited)	1.00		
					~slope (slightly limited)	0.15	~wetness (limited)	0.60		
73190: Winnipeg-----	Not limited		Not limited		Limited		Very limited		Not limited	
					~slope (limited)	0.68	~low strength (very limited)	1.00		

Table 12.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
75376: Cedargap-----	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited) ~small stones (slightly limited) ~large stones (slightly limited)	1.00  0.27  0.01
75378: Sturkie-----	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited) ~low strength (very limited)	1.00  1.00	Very limited ~flooding (very limited)	1.00
75384: Healing-----	Very limited ~flooding (very limited) ~shrink-swell (moderately limited)	1.00  0.45	Very limited ~flooding (very limited) ~shrink-swell (moderately limited)	1.00  0.36	Very limited ~flooding (very limited) ~shrink-swell (moderately limited)	1.00  0.45	Very limited ~flooding (very limited) ~low strength (very limited) ~shrink-swell (moderately limited)	1.00  1.00  0.45	Moderately limited ~flooding (moderately limited)	0.60
75385: Gabriel-----	Very limited ~flooding (very limited) ~wetness (limited) ~shrink-swell (moderately limited)	1.00  0.86  0.45	Very limited ~flooding (very limited) ~wetness (very limited) ~shrink-swell (moderately limited)	1.00  1.00  0.37	Very limited ~flooding (very limited) ~wetness (limited) ~shrink-swell (moderately limited)	1.00  0.86  0.45	Very limited ~flooding (very limited) ~low strength (very limited) ~wetness (limited)	1.00  1.00  0.86	Limited ~wetness (limited) ~flooding (moderately limited)	0.86  0.60
75386: Speed-----	Very limited ~flooding (very limited) ~wetness (moderately limited)	1.00  0.45	Very limited ~flooding (very limited) ~wetness (very limited) ~shrink-swell (slightly limited)	1.00  1.00  0.18	Very limited ~flooding (very limited) ~wetness (moderately limited)	1.00  0.45	Limited ~flooding (rare) (limited) ~wetness (moderately limited)	0.90  0.45	Moderately limited ~wetness (moderately limited)	0.45

Table 12.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements		Dwellings with basements		Small commercial buildings		Local roads and streets		Lawns and landscaping	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
75387: Hacreek-----	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~low strength (very limited)	1.00	Very limited ~wetness (very limited)	1.00
	~wetness (very limited)	1.00	~wetness (very limited)	1.00	~wetness (very limited)	1.00	~flooding (very limited)	1.00	~flooding (moderately limited)	0.60
	~shrink-swell (moderately limited)	0.45	~shrink-swell (moderately limited)	0.45	~shrink-swell (moderately limited)	0.45	~wetness (very limited)	1.00		
75415: Jemerson-----	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Moderately limited ~flooding (moderately limited)	0.60
	~shrink-swell (moderately limited)	0.45	~wetness (moderately limited)	0.47	~shrink-swell (moderately limited)	0.45	~low strength (very limited)	1.00		
			~shrink-swell (slightly limited)	0.29			~shrink-swell (moderately limited)	0.45		
75421: Racket-----	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Moderately limited ~flooding (moderately limited)	0.60
	~shrink-swell (moderately limited)	0.45	~wetness (slightly limited)	0.24	~shrink-swell (moderately limited)	0.45	~shrink-swell (moderately limited)	0.45		
			~shrink-swell (slightly limited)	0.09			~low strength (slightly limited)	0.22		
99000: Pits-----	Not rated		Not rated		Not rated		Not rated		Not rated	
99001: Water-----	Not rated		Not rated		Not rated		Not rated		Not rated	
99003: Miscellaneous water-----	Not rated		Not rated		Not rated		Not rated		Not rated	

Table 13.--Sanitary Facilities

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Septic tank absorption field		Sewage lagoons		Sanitary landfill (trench)		Sanitary landfill (area)		Daily cover for landfill	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
15002: McGirk-----	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00
	~percs slowly (limited)	0.85			~too clayey (limited)	0.80			~hard to pack (limited)	0.70
					~too acid (moderately limited)	0.36			~too clayey (moderately limited)	0.60
66000: Moniteau-----	Very limited ~wetness (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~wetness (very limited)	1.00
	~flooding (very limited)	1.00	~wetness (very limited)	1.00	~flooding (very limited)	1.00	~wetness (very limited)	1.00	~too acid (slightly limited)	0.24
	~percs slowly (moderately limited)	0.45			~too acid (slightly limited)	0.24				
70008: Goss-----	Slightly limited ~percs slowly (slightly limited)	0.15	Limited ~slope (limited)	0.91	Very limited ~too clayey (very limited)	1.00	Not limited		Very limited ~small stones >35% (very limited)	1.00
			~seepage (moderately limited)	0.50					~too clayey (slightly limited)	0.24
70009: Goss-----	Limited ~slope (limited)	0.63	Very limited ~slope (very limited)	1.00	Very limited ~too clayey (very limited)	1.00	Limited ~slope (limited)	0.63	Very limited ~small stones >35% (very limited)	1.00
	~percs slowly (slightly limited)	0.15	~seepage (moderately limited)	0.50	~slope (limited)	0.63			~slope (limited)	0.63
									~too clayey (slightly limited)	0.24
70023: Eldon-----	Slightly limited ~percs slowly (slightly limited)	0.15	Limited ~slope (limited)	0.91	Limited ~too clayey (limited)	0.70	Not limited		Limited ~small stones (limited)	0.98
			~seepage (moderately limited)	0.50					~too clayey (moderately limited)	0.45

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption field		Sewage lagoons		Sanitary landfill (trench)		Sanitary landfill (area)		Daily cover for landfill	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
70024: Goss-----	Very limited ~slope (very limited) ~percs slowly (slightly limited)	1.00  0.15	Very limited ~slope (very limited) ~seepage (moderately limited)	1.00  0.50	Very limited ~slope (very limited) ~too clayey (very limited)	1.00  1.00	Very limited ~slope (very limited)	1.00	Very limited ~slope (very limited) ~small stones >35% (very limited) ~too clayey (slightly limited)	1.00  1.00  0.24
70028: Moko-----	Very limited ~depth to bedrock (very limited) ~slope (slightly limited)	1.00  0.04	Very limited ~depth to bedrock (very limited) ~slope (very limited)	1.00  1.00	Very limited ~depth to bedrock (very limited) ~too acid (very limited) ~slope (slightly limited)	1.00  1.00  0.04	Very limited ~depth to bedrock (very limited) ~slope (slightly limited)	1.00  0.04	Very limited ~depth to bedrock (very limited) ~too acid (very limited) ~small stones (limited)	1.00  1.00  0.99
Rock outcrop---	Not rated		Not rated		Not rated		Not rated		Not rated	
70046: Sacville-----	Very limited ~wetness (very limited) ~percs slowly (limited)	1.00  0.85	Very limited ~wetness (very limited) ~slope (moderately limited)	1.00  0.31	Very limited ~wetness (very limited) ~too clayey (limited)	1.00  0.66	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited) ~hard to pack (limited) ~too clayey (moderately limited)	1.00  0.70  0.39
73012: Gravois-----	Very limited ~wetness (very limited) ~percs slowly (moderately limited)	1.00  0.48	Very limited ~wetness (very limited) ~slope (limited)	1.00  0.91	Very limited ~wetness (very limited) ~too clayey (very limited) ~large stones (slightly limited)	1.00  1.00  0.02	Limited ~wetness (limited)	0.92	Very limited ~too clayey (very limited) ~wetness (moderately limited)	1.00  0.57
73034: Gravois, eroded-----	Very limited ~wetness (very limited) ~percs slowly (moderately limited)	1.00  0.48	Very limited ~wetness (very limited) ~slope (limited)	1.00  0.91	Very limited ~wetness (very limited) ~too clayey (very limited) ~large stones (slightly limited)	1.00  1.00  0.02	Limited ~wetness (limited)	0.92	Very limited ~too clayey (very limited) ~wetness (moderately limited)	1.00  0.57

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption field		Sewage lagoons		Sanitary landfill (trench)		Sanitary landfill (area)		Daily cover for landfill	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73035: Gravois-----	Very limited ~wetness (very limited) ~percs slowly (moderately limited) ~slope (moderately limited)	1.00  0.48  0.37	Very limited ~slope (very limited) ~wetness (very limited)	1.00  1.00	Very limited ~wetness (very limited) ~too clayey (very limited) ~slope (moderately limited)	1.00  1.00  0.37	Limited ~wetness (limited) ~slope (moderately limited)	0.92  0.37	Very limited ~too clayey (very limited) ~wetness (moderately limited) ~slope (moderately limited)	1.00  0.57  0.37
73036: Willowfork-----	Very limited ~wetness (very limited) ~percs slowly (moderately limited)	1.00  0.45	Very limited ~wetness (very limited) ~seepage (moderately limited)	1.00  0.50	Very limited ~wetness (very limited) ~too clayey (moderately limited)	1.00  0.45	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited) ~hard to pack (limited) ~too clayey (slightly limited)	1.00  0.70  0.23
73037: Friendly-----	Very limited ~wetness (very limited) ~percs slowly (moderately limited)	1.00  0.45	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited) ~too clayey (very limited)	1.00  1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited) ~too clayey (very limited)	1.00  1.00
73038, 73039: Glensted-----	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited) ~too clayey (limited)	1.00  0.90	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited) ~too clayey (limited)	1.00  0.80
73040: Maplewood-----	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited) ~slope (slightly limited)	1.00  0.08	Very limited ~wetness (very limited) ~too clayey (limited) ~large stones (slightly limited)	1.00  1.00  0.11	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited) ~too clayey (limited) ~hard to pack (limited)	1.00  0.99  0.70

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption field		Sewage lagoons		Sanitary landfill (trench)		Sanitary landfill (area)		Daily cover for landfill	
	Limitation	Value								
73041: Maplewood-----	Very limited ~wetness (very limited)	1.00								
			~slope (very limited)	1.00	~too clayey (limited)	1.00			~too clayey (limited)	0.99
					~large stones (slightly limited)	0.11			~hard to pack (limited)	0.70
73042: Niangua-----	Very limited ~slope (very limited)	1.00								
	~depth to bedrock (moderately limited)	0.54	~depth to bedrock (moderately limited)	0.54	~depth to bedrock (very limited)	1.00	~depth to bedrock (moderately limited)	0.39	~too clayey (very limited)	1.00
	~percs slowly (moderately limited)	0.45			~too clayey (very limited)	1.00			~hard to pack (limited)	0.70
Bardley-----	Very limited ~slope (very limited)	1.00								
	~depth to bedrock (very limited)	1.00								
	~percs slowly (slightly limited)	0.15	~seepage (moderately limited)	0.50	~too clayey (very limited)	1.00			~too clayey (very limited)	1.00
73043: Hartville-----	Very limited ~wetness (very limited)	1.00								
	~percs slowly (limited)	0.85	~slope (limited)	0.91	~too clayey (limited)	0.80			~hard to pack (limited)	0.70
									~too clayey (moderately limited)	0.60
73044, 73045: Crestmeade-----	Very limited ~wetness (very limited)	1.00								
	~percs slowly (limited)	0.85			~too clayey (limited)	0.68			~hard to pack (limited)	0.70
									~too clayey (moderately limited)	0.42

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption field		Sewage lagoons		Sanitary landfill (trench)		Sanitary landfill (area)		Daily cover for landfill	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73046:										
Wrengart-----	Very limited		Very limited		Very limited		Limited		Moderately limited	
	~wetness	1.00	~wetness	1.00	~too clayey	1.00	~wetness	0.63	~too acid	0.48
	(very limited)		(very limited)		(very limited)		(limited)		(moderately limited)	
	~percs slowly	0.15	~slope	0.91	~wetness	0.82			~wetness	0.41
	(slightly limited)		(limited)		(limited)				(moderately limited)	
			~seepage	0.50	~too acid	0.48			~too clayey	0.08
			(moderately limited)		(moderately limited)				(slightly limited)	
73047:										
Bardley-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~depth to bedrock	1.00	~depth to bedrock	1.00	~depth to bedrock	1.00	~depth to bedrock	1.00	~depth to bedrock	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~percs slowly	0.15	~slope	1.00	~too clayey	1.00	~slope	0.04	~too clayey	1.00
	(slightly limited)		(very limited)		(very limited)		(slightly limited)		(very limited)	
	~slope	0.04	~seepage	0.50	~too acid	1.00			~too acid	1.00
	(slightly limited)		(moderately limited)		(very limited)				(very limited)	
Moko-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~depth to bedrock	1.00	~depth to bedrock	1.00	~depth to bedrock	1.00	~depth to bedrock	1.00	~depth to bedrock	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~slope	0.04	~slope	1.00	~too acid	1.00	~slope	0.04	~too acid	1.00
	(slightly limited)		(very limited)		(very limited)		(slightly limited)		(very limited)	
					~slope	0.04			~small stones	0.99
					(slightly limited)				(limited)	
73048:										
Rueter-----	Slightly limited		Very limited		Limited		Limited		Very limited	
	~percs slowly	0.15	~seepage	1.00	~too clayey	0.92	~seepage	0.75	~small stones >35%	1.00
	(slightly limited)		(very limited)		(limited)		(limited)		(very limited)	
			~slope	0.91	~too acid	0.36			~too clayey	0.83
			(limited)		(moderately limited)				(limited)	
					~large stones	0.04			~seepage	0.50
					(slightly limited)				(moderately limited)	
73050:										
Rock outcrop---	Not rated		Not rated		Not rated		Not rated		Not rated	
Bardley-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~slope	1.00	~slope	1.00	~slope	1.00	~slope	1.00	~slope	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~depth to bedrock	1.00	~depth to bedrock	1.00	~depth to bedrock	1.00	~depth to bedrock	1.00	~depth to bedrock	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~percs slowly	0.15	~seepage	0.50	~too clayey	1.00			~too clayey	1.00
	(slightly limited)		(moderately limited)		(very limited)				(very limited)	

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption field		Sewage lagoons		Sanitary landfill (trench)		Sanitary landfill (area)		Daily cover for landfill	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73112: Gunlock-----	Very limited ~wetness (very limited) ~percs slowly (moderately limited)	1.00  0.45	Very limited ~wetness (very limited) ~slope (limited)	1.00  0.91	Very limited ~wetness (very limited) ~too clayey (very limited)	1.00  1.00	Limited ~wetness (limited)	0.96	Very limited ~too clayey (very limited) ~wetness (moderately limited)	1.00  0.59
73136: Union-----	Very limited ~wetness (very limited) ~percs slowly (slightly limited)	1.00  0.15	Very limited ~wetness (very limited) ~seepage (moderately limited)	1.00  0.50	Very limited ~wetness (very limited) ~too clayey (very limited) ~too acid (limited)	1.00  1.00  0.76	Limited ~wetness (limited)	0.96	Very limited ~too clayey (very limited) ~too acid (limited) ~wetness (moderately limited)	1.00  0.76  0.59
73137: Clafork-----	Very limited ~wetness (very limited) ~percs slowly (moderately limited)	1.00  0.45	Very limited ~wetness (very limited) ~seepage (moderately limited) ~slope (moderately limited)	1.00  0.50  0.31	Very limited ~wetness (very limited) ~too clayey (limited)	1.00  0.80	Limited ~wetness (limited)	0.99	Limited ~hard to pack (limited) ~wetness (moderately limited) ~too clayey (moderately limited)	0.70  0.60  0.39
73138: Clafork-----	Very limited ~wetness (very limited) ~percs slowly (moderately limited)	1.00  0.45	Very limited ~wetness (very limited) ~slope (moderately limited)	1.00  0.31	Very limited ~wetness (very limited) ~too clayey (limited)	1.00  0.66	Limited ~wetness (limited)	0.99	Limited ~hard to pack (limited) ~wetness (moderately limited) ~too clayey (moderately limited)	0.70  0.60  0.39
73190: Winnipeg-----	Slightly limited ~percs slowly (slightly limited)	0.15	Limited ~slope (limited) ~seepage (moderately limited)	0.91  0.50	Slightly limited ~too clayey (slightly limited)	0.11	Not limited		Slightly limited ~small stones (slightly limited)	0.12
75376: Cedargap-----	Very limited ~flooding (very limited) ~percs slowly (moderately limited)	1.00  0.45	Very limited ~flooding (very limited) ~seepage (moderately limited)	1.00  0.50	Very limited ~flooding (very limited) ~too clayey (limited)	1.00  0.80	Very limited ~flooding (very limited)	1.00	Very limited ~small stones >35% (very limited) ~too clayey (moderately limited)	1.00  0.60

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption field		Sewage lagoons		Sanitary landfill (trench)		Sanitary landfill (area)		Daily cover for landfill	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
75378: Sturkie-----	Very limited ~flooding (very limited) ~percs slowly (slightly limited)	1.00  0.15	Very limited ~flooding (very limited) ~seepage (moderately limited)	1.00  0.50	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Not limited	
75384: Healing-----	Very limited ~flooding (very limited) ~percs slowly (slightly limited)	1.00  0.15	Very limited ~flooding (very limited) ~seepage (moderately limited)	1.00  0.50	Very limited ~flooding (very limited) ~too clayey (slightly limited)	1.00  0.01	Very limited ~flooding (very limited)	1.00	Not limited	
75385: Gabriel-----	Very limited ~wetness (very limited) ~flooding (very limited) ~percs slowly (moderately limited)	1.00  1.00  0.45	Very limited ~flooding (very limited) ~wetness (very limited)	1.00  1.00	Very limited ~flooding (very limited) ~wetness (very limited) ~too clayey (slightly limited)	1.00  1.00  0.04	Very limited ~flooding (very limited) ~wetness (very limited)	1.00  1.00	Limited ~wetness (limited)	0.86
75386: Speed-----	Very limited ~wetness (very limited) ~flooding (rare) (moderately limited) ~percs slowly (slightly limited)	1.00  0.60  0.15	Very limited ~wetness (very limited) ~seepage (moderately limited)	1.00  0.50	Very limited ~wetness (very limited) ~flooding (rare) (moderately limited)	1.00  0.60	Limited ~wetness (limited) ~flooding (rare) (moderately limited)	0.90  0.60	Moderately limited ~wetness (moderately limited)	0.55
75387: Hacreek-----	Very limited ~wetness (very limited) ~flooding (very limited) ~percs slowly (moderately limited)	1.00  1.00  0.45	Very limited ~flooding (very limited) ~wetness (very limited)	1.00  1.00	Very limited ~flooding (very limited) ~wetness (very limited) ~too clayey (moderately limited)	1.00  1.00  0.31	Very limited ~flooding (very limited) ~wetness (very limited)	1.00  1.00	Very limited ~wetness (very limited) ~too clayey (slightly limited)	1.00  0.15

Table 13.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption field		Sewage lagoons		Sanitary landfill (trench)		Sanitary landfill (area)		Daily cover for landfill	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
75415: Jemerson-----	Very limited ~flooding (very limited)	1.00	Not limited							
	~wetness (moderately limited)	0.52	~seepage (moderately limited)	0.50	~wetness (slightly limited))	0.26				
	~percs slowly (slightly limited)	0.15	~wetness (moderately limited)	0.39						
75421: Racket-----	Very limited ~flooding (very limited)	1.00	Not limited							
	~poor filter (very limited)	1.00	~seepage (very limited)	1.00	~seepage (very limited)	1.00	~seepage (very limited)	1.00		
	~wetness (moderately limited)	0.37	~wetness (slightly limited)	0.02	~wetness (slightly limited))	0.19				
99000: Pits-----	Not rated		Not rated		Not rated		Not rated		Not rated	
99001: Water-----	Not rated		Not rated		Not rated		Not rated		Not rated	
99003: Miscellaneous water-----	Not rated		Not rated		Not rated		Not rated		Not rated	

Table 14.--Construction Materials and Excavating

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
15002:										
McGirk-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~low strength (very limited)	1.00	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~wetness (very limited)	1.00	~wetness (very limited)	1.00
	~wetness (very limited)	1.00	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (very limited)	1.00	~too clayey (moderately limited)	0.60
	~shrink-swell (very limited)	1.00					~too acid (moderately limited)	0.36	~cutbanks cave (slightly limited)	0.29
66000:										
Moniteau-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~wetness (very limited)	1.00	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~wetness (very limited)	1.00	~wetness (very limited)	1.00
	~low strength (very limited)	1.00	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (slightly limited)	0.25	~flooding (moderately limited)	0.60
	~shrink-swell (moderately limited)	0.37					~too acid (slightly limited)	0.24	~cutbanks cave (slightly limited)	0.29
70008:										
Goss-----	Slightly limited		Very limited		Limited		Very limited		Very limited	
	~shrink-swell (slightly limited)	0.29	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~small stones (very limited)	1.00	~cutbanks cave (very limited)	1.00
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	0.99	~area reclaim (very limited)	1.00	~too clayey (slightly limited)	0.24
							~too clayey (limited)	0.94		
70009:										
Goss-----	Slightly limited		Very limited		Limited		Very limited		Very limited	
	~shrink-swell (slightly limited)	0.29	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~small stones (very limited)	1.00	~cutbanks cave (very limited)	1.00
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	0.99	~area reclaim (very limited)	1.00	~slope (limited)	0.63
							~too clayey (limited)	0.94	~too clayey (slightly limited)	0.24

Table 14.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
70023: Eldon-----	Very limited ~shrink-swell (very limited)	1.00	Very limited ~excess fines (thickest layer)	1.00	Limited ~excess fines (thickest layer)	1.00	Very limited ~small stones (very limited)	1.00	Very limited ~cutbanks cave (very limited)	1.00
			~excess fines (bottom layer)	1.00	~excess fines (bottom layer)	0.75	~area reclaim (very limited)	1.00	~too clayey (moderately limited)	0.45
							~too clayey (very limited)	1.00		
70024: Goss-----	Limited ~slope (limited)	0.92	Very limited ~excess fines (thickest layer)	1.00	Limited ~excess fines (bottom layer)	1.00	Very limited ~slope (very limited)	1.00	Very limited ~slope (very limited)	1.00
	~shrink-swell (slightly limited)	0.29	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	0.99	~small stones (very limited)	1.00	~cutbanks cave (very limited)	1.00
							~area reclaim (very limited)	1.00	~too clayey (slightly limited)	0.24
70028: Moko-----	Very limited ~depth to bedrock (very limited)	1.00	Very limited ~excess fines (thickest layer)	1.00	Limited ~excess fines (bottom layer)	1.00	Very limited ~depth to bedrock (very limited)	1.00	Very limited ~hard bedrock <40" (very limited)	1.00
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	0.75	~small stones (very limited)	1.00	~cutbanks cave (slightly limited)	0.29
							~large surface stones (limited)	0.80	~slope (slightly limited)	0.04
Rock outcrop---	Not rated		Not rated		Not rated		Not rated		Not rated	
70046: Sacville-----	Very limited ~low strength (very limited)	1.00	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00
	~wetness (very limited)	1.00	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (limited)	0.66	~too clayey (moderately limited)	0.39
	~shrink-swell (very limited)	1.00							~cutbanks cave (slightly limited)	0.29
73012: Gravois-----	Very limited ~low strength (very limited)	1.00	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (thickest layer)	1.00	Limited ~wetness (limited)	0.76	Very limited ~cutbanks cave (very limited)	1.00
	~wetness (limited)	0.76	~excess fines (bottom layer)	1.00	~excess fines (bottom layer)	1.00	~too clayey (moderately limited)	0.42	~wetness (very limited)	1.00
	~shrink-swell (slightly limited)	0.27	~small stones (bottom layer)	1.00	~small stones (bottom layer)	1.00	~too acid (slightly limited)	0.18	~too clayey (very limited)	1.00

Table 14.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73034: Gravois, eroded-----	Very limited ~low strength (very limited) ~wetness (limited) ~shrink-swell (slightly limited)	1.00  0.76  0.27	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer) ~small stones (bottom layer)	1.00  1.00  1.00	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer) ~small stones (bottom layer)	1.00  1.00  1.00	Limited ~wetness (limited) ~too clayey (moderately limited) ~too acid (slightly limited)	0.76  0.42  0.18	Very limited ~cutbanks cave (very limited) ~wetness (very limited) ~too clayey (very limited)	1.00  1.00  1.00
73035: Gravois-----	Very limited ~low strength (very limited) ~wetness (limited) ~shrink-swell (slightly limited)	1.00  0.76  0.27	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer) ~small stones (bottom layer)	1.00  1.00  1.00	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer) ~small stones (bottom layer)	1.00  1.00  1.00	Limited ~wetness (limited) ~too clayey (moderately limited) ~slope (moderately limited)	0.76  0.42  0.37	Very limited ~cutbanks cave (very limited) ~wetness (very limited) ~too clayey (very limited)	1.00  1.00  1.00
73036: Willowfork-----	Very limited ~low strength (very limited) ~wetness (very limited) ~shrink-swell (limited)	1.00  1.00  0.81	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00  1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00  1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited) ~cutbanks cave (slightly limited) ~too clayey (slightly limited)	1.00  0.29  0.23
73037: Friendly-----	Very limited ~low strength (very limited) ~wetness (very limited) ~shrink-swell (moderately limited)	1.00  1.00  0.58	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00  1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00  1.00	Very limited ~wetness (very limited) ~too clayey (moderately limited)	1.00  0.33	Very limited ~wetness (very limited) ~cutbanks cave (very limited) ~too clayey (very limited)	1.00  1.00  1.00
73038, 73039: Glensted-----	Very limited ~wetness (very limited) ~shrink-swell (very limited) ~low strength (very limited)	1.00  1.00  1.00	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00  1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00  1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited) ~too clayey (limited) ~cutbanks cave (slightly limited)	1.00  0.80  0.29

Table 14.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73040, 73041: Maplewood-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~low strength (very limited)	1.00	~excess fines (thickest layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (very limited)	1.00	~wetness (very limited)	1.00
	~shrink-swell (very limited)	1.00	~excess fines (bottom layer)	1.00	~excess fines (bottom layer)	1.00	~too clayey (limited)	0.94	~too clayey (limited)	0.99
	~wetness (very limited)	1.00	~small stones (bottom layer)	0.99	~small stones (bottom layer)	0.99			~cutbanks cave (slightly limited)	0.29
73042: Niangua-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~low strength (very limited)	1.00	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~slope (very limited)	1.00	~slope (very limited)	1.00
	~slope (very limited)	1.00	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (very limited)	1.00	~cutbanks cave (very limited)	1.00
	~depth to bedrock (moderately limited)	0.39					~large surface stones (very limited)	1.00	~too clayey (very limited)	1.00
Bardley-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~low strength (very limited)	1.00	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~slope (very limited)	1.00	~slope (very limited)	1.00
	~depth to bedrock (very limited)	1.00	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (very limited)	1.00	~hard bedrock <40" (very limited)	1.00
	~slope (very limited)	1.00					~depth to bedrock (very limited)	1.00	~too clayey (very limited)	1.00
73043: Hartville-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~low strength (very limited)	1.00	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~too clayey (very limited)	1.00	~wetness (very limited)	1.00
	~shrink-swell (very limited)	1.00	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (very limited)	1.00	~too clayey (moderately limited)	0.60
	~wetness (very limited)	1.00							~cutbanks cave (slightly limited)	0.29
73044, 73045: Crestmeade-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~low strength (very limited)	1.00	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~too clayey (very limited)	1.00	~wetness (very limited)	1.00
	~shrink-swell (very limited)	1.00	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (very limited)	1.00	~too clayey (moderately limited)	0.42
	~wetness (very limited)	1.00							~cutbanks cave (slightly limited)	0.29

Table 14.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73046:										
Wrengart-----	Very limited		Very limited		Very limited		Limited		Very limited	
	~low strength (very limited)	1.00	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~too clayey (limited)	0.65	~cutbanks cave (very limited)	1.00
	~shrink-swell (moderately limited)	0.45	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (slightly limited)	0.15	~wetness (very limited)	1.00
	~wetness (slightly limited)	0.15							~too clayey (slightly limited)	0.08
73047:										
Bardley-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~low strength (very limited)	1.00	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~too clayey (very limited)	1.00	~hard bedrock <40" (very limited)	1.00
	~depth to bedrock (very limited)	1.00	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~depth to bedrock (very limited)	1.00	~too clayey (very limited)	1.00
	~shrink-swell (moderately limited)	0.45					~large surface stones (very limited)	1.00	~cutbanks cave (slightly limited)	0.29
Moko-----	Very limited		Very limited		Limited		Very limited		Very limited	
	~depth to bedrock (very limited)	1.00	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~depth to bedrock (very limited)	1.00	~hard bedrock <40" (very limited)	1.00
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	0.75	~small stones (very limited)	1.00	~cutbanks cave (slightly limited)	0.29
							~large surface stones (very limited)	1.00	~slope (slightly limited)	0.04
73048:										
Rueter-----	Slightly limited		Very limited		Possible source		Very limited		Very limited	
	~shrink-swell (slightly limited)	0.09	~excess fines (thickest layer)	1.00	~possible source (bottom layer)	0.50	~small stones (very limited)	1.00	~cutbanks cave (very limited)	1.00
			~excess fines (bottom layer)	1.00	~possible source (thickest layer)	0.50	~area reclaim (very limited)	1.00	~too clayey (limited)	0.83
			~small stones (bottom layer)	0.30	~small stones (bottom layer)	0.30	~too acid (moderately limited)	0.36		
73050:										
Rock outcrop---	Not rated		Not rated		Not rated		Not rated		Not rated	
Bardley-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~slope (very limited)	1.00	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~slope (very limited)	1.00	~slope (very limited)	1.00
	~low strength (very limited)	1.00	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (very limited)	1.00	~hard bedrock <40" (very limited)	1.00
	~depth to bedrock (very limited)	1.00					~depth to bedrock (very limited)	1.00	~too clayey (very limited)	1.00

Table 14.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73112:										
Gunlock-----	Very limited		Very limited		Very limited		Limited		Very limited	
	~low strength (very limited)	1.00	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~too clayey (limited)	0.83	~cutbanks cave (very limited)	1.00
	~wetness (limited)	0.82	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~wetness (limited)	0.82	~wetness (very limited)	1.00
	~shrink-swell (moderately limited)	0.45							~too clayey (very limited)	1.00
73136:										
Union-----	Very limited		Very limited		Very limited		Limited		Very limited	
	~low strength (very limited)	1.00	~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	1.00	~dense layer (limited)	0.86	~cutbanks cave (very limited)	1.00
	~wetness (limited)	0.82	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (limited)	0.83	~wetness (very limited)	1.00
	~shrink-swell (moderately limited)	0.45					~wetness (limited)	0.82	~too clayey (very limited)	1.00
73137, 73138:										
Clafork-----	Very limited		Very limited		Possible source		Very limited		Very limited	
	~low strength (very limited)	1.00	~excess fines (thickest layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (very limited)	1.00	~wetness (very limited)	1.00
	~shrink-swell (very limited)	1.00	~excess fines (bottom layer)	1.00	~possible source (bottom layer)	0.50	~wetness (limited)	0.86	~cutbanks cave (very limited)	1.00
	~wetness (limited)	0.86							~too clayey (moderately limited)	0.39
73190:										
Winnipeg-----	Not limited		Very limited		Possible source		Very limited		Very limited	
			~excess fines (thickest layer)	1.00	~excess fines (thickest layer)	1.00	~area reclaim (very limited)	1.00	~cutbanks cave (very limited)	1.00
			~excess fines (bottom layer)	1.00	~possible source (bottom layer)	0.25				
75376:										
Cedargap-----	Not limited		Very limited		Limited		Very limited		Very limited	
			~excess fines (thickest layer)	1.00	~excess fines (bottom layer)	0.75	~small stones (very limited)	1.00	~cutbanks cave (very limited)	1.00
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	0.75	~area reclaim (very limited)	1.00	~flooding (moderately limited)	0.60
							~too clayey (moderately limited)	0.33	~too clayey (moderately limited)	0.60

Table 14.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
75378: Sturkie-----	Very limited ~low strength (very limited)	1.00	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Not limited		Moderately limited ~flooding (moderately limited)	0.60
			~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00			~cutbanks cave (slightly limited)	0.29
75384: Healing-----	Very limited ~low strength (very limited)	1.00	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Slightly limited ~too clayey (slightly limited)	0.28	Moderately limited ~flooding (moderately limited)	0.60
	~shrink-swell (moderately limited)	0.36	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00			~cutbanks cave (slightly limited)	0.29
75385: Gabriel-----	Very limited ~low strength (very limited)	1.00	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Limited ~wetness (limited)	0.98	Very limited ~wetness (very limited)	1.00
	~wetness (limited)	0.98	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (moderately limited)	0.33	~flooding (moderately limited)	0.60
	~shrink-swell (moderately limited)	0.37							~cutbanks cave (slightly limited)	0.29
75386: Speed-----	Very limited ~low strength (very limited)	1.00	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Limited ~wetness (limited)	0.71	Very limited ~wetness (very limited)	1.00
	~wetness (limited)	0.71	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00			~cutbanks cave (slightly limited)	0.29
	~shrink-swell (slightly limited)	0.18								
75387: Hacreek-----	Very limited ~low strength (very limited)	1.00	Very limited ~excess fines (thickest layer)	1.00	Very limited ~excess fines (bottom layer)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00
	~wetness (very limited)	1.00	~excess fines (bottom layer)	1.00	~excess fines (thickest layer)	1.00	~too clayey (limited)	0.78	~flooding (moderately limited)	0.60
	~shrink-swell (moderately limited)	0.45							~cutbanks cave (slightly limited)	0.29

Table 14.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill		Source for sand		Source for gravel		Source for topsoil		Shallow excavations	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
75415: Jemerson-----	Very limited ~low strength (very limited) ~shrink-swell (slightly limited)	1.00  0.29	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00  1.00	Very limited ~excess fines (bottom layer) ~excess fines (thickest layer)	1.00  1.00	Not limited		Very limited ~cutbanks cave (very limited) ~flooding (moderately limited) ~wetness (moderately limited)	1.00  0.60  0.47
75421: Racket-----	Slightly limited ~low strength (slightly limited) ~shrink-swell (slightly limited)	0.22  0.09	Very limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00  1.00	Limited ~excess fines (thickest layer) ~excess fines (bottom layer)	1.00  0.99	Very limited ~area reclaim (very limited)	1.00	Very limited ~cutbanks cave (very limited) ~flooding (moderately limited) ~wetness (slightly limited)	1.00  0.60  0.24
99000: Pits-----	Not rated		Not rated		Not rated		Not rated		Not rated	
99001: Water-----	Not rated		Not rated		Not rated		Not rated		Not rated	
99003: Miscellaneous water-----	Not rated		Not rated		Not rated		Not rated		Not rated	

Table 15.--Water Management

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pond reservoir areas		Drainage		Irrigation		Terraces and diversions		Grassed waterways	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
15002: McGirk-----	Not limited		Moderately limited ~percs slowly (moderately limited)	0.39	Moderately limited ~erodes easily (moderately limited)	0.60	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00
					~percs slowly (moderately limited)	0.39	~erodes easily (moderately limited)	0.60	~erodes easily (moderately limited)	0.60
66000: Moniteau-----	Not limited		Moderately limited ~flooding (moderately limited)	0.60	Moderately limited ~flooding (moderately limited)	0.60	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00
			~percs slowly (slightly limited)	0.13	~erodes easily (moderately limited)	0.60	~erodes easily (moderately limited)	0.60	~erodes easily (moderately limited)	0.60
					~percs slowly (slightly limited)	0.13				
70008: Goss-----	Moderately limited ~seepage (moderately limited)	0.50	Limited ~slope (limited)	0.98	Limited ~slope (limited)	0.98	Limited ~large stones (limited)	0.60	Limited ~large stones (limited)	0.60
	~slope (moderately limited)	0.30	~large stones (moderately limited)	0.51	~droughty (slightly limited)	0.19	~slope (moderately limited)	0.30	~slope (moderately limited)	0.30
								~droughty (slightly limited)	0.19	
70009: Goss-----	Limited ~slope (limited)	0.99	Very limited ~slope (very limited)	1.00	Very limited ~slope (very limited)	1.00	Limited ~slope (limited)	0.99	Limited ~slope (limited)	0.99
	~seepage (moderately limited)	0.50	~large stones (moderately limited)	0.51	~droughty (slightly limited)	0.19	~large stones (limited)	0.60	~large stones (limited)	0.60
								~droughty (slightly limited)	0.19	
70023: Eldon-----	Moderately limited ~seepage (moderately limited)	0.50	Limited ~slope (limited)	0.98	Limited ~slope (limited)	0.98	Moderately limited ~slope (moderately limited)	0.30	Moderately limited ~slope (moderately limited)	0.30
	~slope (moderately limited)	0.30								

Table 15.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas		Drainage		Irrigation		Terraces and diversions		Grassed waterways	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
70024: Goss-----	Very limited ~slope (very limited) ~seepage (moderately limited)	1.00  0.50	Very limited ~slope (very limited) ~large surface stones (limited) ~large stones (moderately limited)	1.00  0.80 0.51	Very limited ~slope (very limited) ~large surface stones (limited) ~droughty (moderately limited)	1.00  0.80 0.31	Very limited ~slope (very limited) ~large surface stones (limited) ~large stones (limited)	1.00  0.80 0.60	Very limited ~slope (very limited) ~large surface stones (limited) ~large stones (limited)	1.00  0.80 0.60
70028: Moko-----	Very limited ~bedrock <20 in. (very limited) ~slope (limited)	1.00  0.70	Very limited ~bedrock <20 in. (very limited) ~slope (very limited) ~large surface stones (limited)	1.00  1.00 0.80	Very limited ~droughty (very limited) ~bedrock <20 in. (very limited) ~slope (very limited)	1.00  1.00 1.00	Very limited ~depth to bedrock (very limited) ~large surface stones (limited) ~slope (limited)	1.00  0.80 0.70	Very limited ~droughty (very limited) ~bedrock <20 in. (very limited) ~large surface stones (limited)	1.00  1.00 0.80
Rock outcrop---	Not rated		Not rated		Not rated		Not rated		Not rated	
70046: Sacville-----	Slightly limited ~slope (slightly limited)	0.10	Moderately limited ~slope (moderately limited) ~percs slowly (moderately limited)	0.40  0.39	Moderately limited ~slope (moderately limited) ~percs slowly (moderately limited)	0.40  0.39	Very limited ~wetness (very limited) ~slope (slightly limited)	1.00  0.10	Very limited ~wetness (very limited) ~slope (slightly limited)	1.00  0.10
73012: Gravois-----	Moderately limited ~slope (moderately limited)	0.30	Limited ~slope (limited) ~percs slowly (moderately limited)	0.98  0.39	Limited ~slope (limited) ~erodes easily (moderately limited) ~percs slowly (moderately limited)	0.98  0.60 0.39	Moderately limited ~erodes easily (moderately limited) ~wetness (moderately limited) ~slope (moderately limited)	0.60  0.55 0.30	Moderately limited ~erodes easily (moderately limited) ~wetness (moderately limited) ~slope (moderately limited)	0.60  0.55 0.30
73034: Gravois, eroded-----	Moderately limited ~slope (moderately limited)	0.30	Limited ~slope (limited) ~percs slowly (moderately limited)	0.98  0.39	Limited ~slope (limited) ~erodes easily (moderately limited) ~percs slowly (moderately limited)	0.98  0.60 0.39	Moderately limited ~erodes easily (moderately limited) ~wetness (moderately limited) ~slope (moderately limited)	0.60  0.55 0.30	Moderately limited ~erodes easily (moderately limited) ~wetness (moderately limited) ~slope (moderately limited)	0.60  0.55 0.30

Table 15.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas		Drainage		Irrigation		Terraces and diversions		Grassed waterways	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73035: Gravois-----	Limited ~slope (limited)	0.89	Very limited ~slope (very limited) ~percs slowly (moderately limited)	1.00 0.39	Very limited ~slope (very limited) ~erodes easily (moderately limited) ~percs slowly (moderately limited)	1.00 0.60 0.39	Limited ~slope (limited) ~erodes easily (moderately limited) ~wetness (moderately limited)	0.89 0.60 0.55	Limited ~slope (limited) ~erodes easily (moderately limited) ~wetness (moderately limited)	0.89 0.60 0.55
73036: Willowfork----	Moderately limited ~seepage (moderately limited)	0.50	Slightly limited ~percs slowly (slightly limited)	0.13	Slightly limited ~percs slowly (slightly limited)	0.13	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00
73037: Friendly-----	Not limited		Moderately limited ~percs slowly (moderately limited)	0.39	Moderately limited ~erodes easily (moderately limited) ~percs slowly (moderately limited)	0.60 0.39	Very limited ~wetness (very limited) ~erodes easily (moderately limited)	1.00 0.60	Very limited ~wetness (very limited) ~erodes easily (moderately limited)	1.00 0.60
73038, 73039: Glensted-----	Not limited		Not limited		Very limited ~droughty (very limited)	1.00	Very limited ~wetness (very limited)	1.00	Very limited ~droughty (very limited) ~wetness (very limited)	1.00 1.00
73040: Maplewood-----	Not limited		Slightly limited ~percs slowly (slightly limited) ~slope (slightly limited)	0.13 0.10	Moderately limited ~erodes easily (moderately limited) ~droughty (slightly limited) ~percs slowly (slightly limited)	0.60 0.14 0.13	Very limited ~wetness (very limited) ~erodes easily (moderately limited)	1.00 0.60	Very limited ~wetness (very limited) ~erodes easily (moderately limited) ~droughty (slightly limited)	1.00 0.60 0.14
73041: Maplewood-----	Moderately limited ~slope (moderately limited)	0.45	Very limited ~slope (very limited) ~percs slowly (slightly limited)	1.00 0.13	Very limited ~slope (very limited) ~erodes easily (moderately limited) ~droughty (slightly limited)	1.00 0.60 0.20	Very limited ~wetness (very limited) ~erodes easily (moderately limited) ~slope (moderately limited)	1.00 0.60 0.45	Very limited ~wetness (very limited) ~erodes easily (moderately limited) ~slope (moderately limited)	1.00 0.60 0.45

Table 15.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas		Drainage		Irrigation		Terraces and diversions		Grassed waterways	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73042:										
Niangua-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~slope	1.00	~slope	1.00	~slope	1.00	~slope	1.00	~slope	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~depth to bedrock	0.50	~large surface stones	1.00	~large surface stones	1.00	~large surface stones	1.00	~large surface stones	1.00
	(moderately limited)		(very limited)		(very limited)		(very limited)		(very limited)	
			~percs slowly	0.13	~percs slowly	0.13	~depth to bedrock	0.39	~depth to bedrock	0.50
			(slightly limited)		(slightly limited)		(moderately limited)		(moderately limited)	
Bardley-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~slope	1.00	~slope	1.00	~slope	1.00	~slope	1.00	~slope	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~depth to bedrock	0.89	~large surface stones	1.00	~large surface stones	1.00	~depth to bedrock	1.00	~large surface stones	1.00
	(limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~seepage	0.50	~depth to bedrock	0.46	~droughty	0.66	~large surface stones	1.00	~depth to bedrock	0.89
	(moderately limited)		(moderately limited)		(limited)		(very limited)		(limited)	
73043:										
Hartville-----	Moderately limited		Limited		Limited		Very limited		Very limited	
	~slope	0.30	~slope	0.98	~slope	0.98	~wetness	1.00	~wetness	1.00
	(moderately limited)		(limited)		(limited)		(very limited)		(very limited)	
			~percs slowly	0.39	~erodes easily	0.60	~erodes easily	0.60	~erodes easily	0.60
			(moderately limited)		(moderately limited)		(moderately limited)		(moderately limited)	
					~percs slowly	0.39	~slope	0.30	~slope	0.30
					(moderately limited)		(moderately limited)		(moderately limited)	
73044:										
Crestmeade-----	Not limited		Moderately limited		Moderately limited		Very limited		Very limited	
			~percs slowly	0.39	~erodes easily	0.60	~wetness	1.00	~wetness	1.00
			(moderately limited)		(moderately limited)		(very limited)		(very limited)	
					~percs slowly	0.39	~erodes easily	0.60	~erodes easily	0.60
					(moderately limited)		(moderately limited)		(moderately limited)	
73045:										
Crestmeade-----	Not limited		Moderately limited		Moderately limited		Very limited		Very limited	
			~percs slowly	0.39	~erodes easily	0.60	~wetness	1.00	~wetness	1.00
			(moderately limited)		(moderately limited)		(very limited)		(very limited)	
					~slow intake	0.60	~erodes easily	0.60	~erodes easily	0.60
					(moderately limited)		(moderately limited)		(moderately limited)	
					~percs slowly	0.39				
					(moderately limited)					

Table 15.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas		Drainage		Irrigation		Terraces and diversions		Grassed waterways	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73046:										
Wrengart-----	Moderately limited		Limited		Limited		Moderately limited		Moderately limited	
	~seepage	0.50	~slope	0.98	~slope	0.98	~erodes easily	0.60	~erodes easily	0.60
	(moderately limited)		(limited)		(limited)		(moderately limited)		(moderately limited)	
	~slope	0.30			~erodes easily	0.60	~wetness	0.31	~wetness	0.31
	(moderately limited)				(moderately limited)		(moderately limited)		(moderately limited)	
							~slope	0.30	~slope	0.30
							(moderately limited)		(moderately limited)	
73047:										
Bardley-----	Limited		Very limited		Very limited		Very limited		Very limited	
	~depth to bedrock	0.89	~slope	1.00	~slope	1.00	~depth to bedrock	1.00	~large surface stones	1.00
	(limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~slope	0.70	~large surface stones	1.00	~large surface stones	1.00	~large surface stones	1.00	~depth to bedrock	0.89
	(limited)		(very limited)		(very limited)		(very limited)		(limited)	
	~seepage	0.50	~depth to bedrock	0.46	~droughty	0.66	~slope	0.70	~slope	0.70
	(moderately limited)		(moderately limited)		(limited)		(limited)		(limited)	
Moko-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~bedrock <20 in.	1.00	~bedrock <20 in.	1.00	~droughty	1.00	~depth to bedrock	1.00	~droughty	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~slope	0.70	~slope	1.00	~bedrock <20 in.	1.00	~large surface stones	1.00	~bedrock <20 in.	1.00
	(limited)		(very limited)		(very limited)		(very limited)		(very limited)	
			~large surface stones	1.00	~slope	1.00	~slope	0.70	~large surface stones	1.00
			(very limited)		(very limited)		(limited)		(very limited)	
73048:										
Rueter-----	Very limited		Limited		Limited		Limited		Limited	
	~seepage	1.00	~slope	0.98	~slope	0.98	~large stones	0.83	~large stones	0.83
	(very limited)		(limited)		(limited)		(limited)		(limited)	
	~slope	0.30	~large stones	0.75	~droughty	0.35	~slope	0.30	~droughty	0.35
	(moderately limited)		(limited)		(moderately limited)		(moderately limited)		(moderately limited)	
									~slope	0.30
									(moderately limited)	
73050:										
Rock outcrop---	Not rated		Not rated		Not rated		Not rated		Not rated	
Bardley-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~slope	1.00	~slope	1.00	~slope	1.00	~slope	1.00	~slope	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~depth to bedrock	0.89	~large surface stones	1.00	~large surface stones	1.00	~depth to bedrock	1.00	~large surface stones	1.00
	(limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~seepage	0.50	~depth to bedrock	0.46	~droughty	0.66	~large surface stones	1.00	~depth to bedrock	0.89
	(moderately limited)		(moderately limited)		(limited)		(very limited)		(limited)	

Table 15.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas		Drainage		Irrigation		Terraces and diversions		Grassed waterways	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73112: Gunlock-----	Moderately limited ~slope (moderately limited)	0.30	Limited ~slope (limited) ~percs slowly (slightly limited)	0.98  0.13	Limited ~slope (limited) ~erodes easily (moderately limited) ~percs slowly (slightly limited)	0.98  0.60 0.13	Moderately limited ~erodes easily (moderately limited) ~wetness (moderately limited) ~slope (moderately limited)	0.60  0.58 0.30	Moderately limited ~erodes easily (moderately limited) ~wetness (moderately limited) ~slope (moderately limited)	0.60  0.58 0.30
73136: Union-----	Moderately limited ~seepage (moderately limited)	0.50	Not limited		Moderately limited ~erodes easily (moderately limited)	0.60	Moderately limited ~erodes easily (moderately limited) ~wetness (moderately limited)	0.60 0.58	Limited ~rooting depth (limited) ~erodes easily (moderately limited) ~wetness (moderately limited)	0.80  0.60 0.58
73137: Clafork-----	Moderately limited ~seepage (moderately limited) ~slope (slightly limited)	0.50  0.10	Moderately limited ~slope (moderately limited) ~percs slowly (slightly limited)	0.40  0.13	Moderately limited ~slope (moderately limited) ~percs slowly (slightly limited)	0.40  0.13	Moderately limited ~wetness (moderately limited) ~slope (slightly limited)	0.60  0.10	Moderately limited ~wetness (moderately limited) ~slope (slightly limited)	0.60  0.10
73138: Clafork-----	Slightly limited ~slope (slightly limited)	0.10	Moderately limited ~slope (moderately limited) ~percs slowly (slightly limited)	0.40  0.13	Moderately limited ~slope (moderately limited) ~percs slowly (slightly limited)	0.40  0.13	Moderately limited ~wetness (moderately limited) ~slope (slightly limited)	0.60  0.10	Moderately limited ~wetness (moderately limited) ~slope (slightly limited)	0.60  0.10
73190: Winnipeg-----	Moderately limited ~seepage (moderately limited) ~slope (moderately limited)	0.50  0.30	Limited ~slope (limited)	0.98	Limited ~slope (limited) ~erodes easily (moderately limited)	0.98  0.60	Moderately limited ~erodes easily (moderately limited) ~slope (moderately limited)	0.60  0.30	Moderately limited ~erodes easily (moderately limited) ~slope (moderately limited)	0.60  0.30
75376: Cedargap-----	Moderately limited ~seepage (moderately limited)	0.50	Limited ~flooding (limited)	0.90	Limited ~flooding (limited)	0.90	Not limited		Not limited	

Table 15.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas		Drainage		Irrigation		Terraces and diversions		Grassed waterways	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
75378: Sturkie-----	Moderately limited ~seepage (moderately limited)	0.50	Limited ~flooding (limited)	0.90	Limited ~flooding (limited) ~erodes easily (moderately limited)	0.90 0.60	Moderately limited ~erodes easily (moderately limited)	0.60	Moderately limited ~erodes easily (moderately limited)	0.60
75384: Healing-----	Moderately limited ~seepage (moderately limited)	0.50	Moderately limited ~flooding (moderately limited)	0.60	Moderately limited ~flooding (moderately limited) ~erodes easily (moderately limited)	0.60 0.60	Moderately limited ~erodes easily (moderately limited)	0.60	Moderately limited ~erodes easily (moderately limited)	0.60
75385: Gabriel-----	Not limited		Moderately limited ~flooding (moderately limited) ~percs slowly (slightly limited)	0.60 0.13	Moderately limited ~flooding (moderately limited) ~percs slowly (slightly limited)	0.60 0.13	Limited ~wetness (limited)	0.86	Limited ~wetness (limited)	0.86
75386: Speed-----	Moderately limited ~seepage (moderately limited)	0.50	Not limited		Not limited		Moderately limited ~wetness (moderately limited)	0.53	Moderately limited ~wetness (moderately limited)	0.53
75387: Hacreek-----	Not limited		Moderately limited ~flooding (moderately limited) ~percs slowly (slightly limited)	0.60 0.13	Moderately limited ~flooding (moderately limited) ~percs slowly (slightly limited)	0.60 0.13	Very limited ~wetness (very limited)	1.00	Very limited ~wetness (very limited)	1.00
75415: Jemerson-----	Moderately limited ~seepage (moderately limited)	0.50	Moderately limited ~flooding (moderately limited)	0.60	Moderately limited ~flooding (moderately limited) ~erodes easily (moderately limited)	0.60 0.60	Moderately limited ~erodes easily (moderately limited)	0.60	Moderately limited ~erodes easily (moderately limited)	0.60
75421: Racket-----	Very limited ~seepage (very limited)	1.00	Moderately limited ~flooding (moderately limited)	0.60	Moderately limited ~flooding (moderately limited)	0.60	Not limited		Not limited	

Table 15.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas		Drainage		Irrigation		Terraces and diversions		Grassed waterways	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
99000: Pits-----	Not rated		Not rated		Not rated		Not rated		Not rated	
99001: Water-----	Not rated		Not rated		Not rated		Not rated		Not rated	
99003: Miscellaneous water-----	Not rated		Not rated		Not rated		Not rated		Not rated	

Table 16.--Waste Management

(The information in this report indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 1.00. The larger the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Land application of manure and food processing waste		Land application of municipal sewage sludge		Disposal of wastewater by irrigation		Treatment of wastewater by slow rate process		Treatment of wastewater by rapid infiltration process	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
15002: McGirk-----	Very limited ~wetness (very limited) ~percs slowly (limited)	1.00  0.99	Very limited ~wetness (very limited) ~percs slowly (limited)	1.00  0.99	Very limited ~wetness (very limited) ~percs slowly (limited)	1.00  0.99	Very limited ~wetness (very limited) ~percs slowly (limited)	1.00  0.99	Very limited ~percs slowly (very limited) ~wetness (very limited) ~too acid (slightly limited)	1.00  1.00  0.01
66000: Moniteau-----	Very limited ~wetness (very limited) ~flooding (limited)	1.00  0.90	Very limited ~wetness (very limited) ~flooding (limited)	1.00  0.90	Very limited ~wetness (very limited) ~flooding (limited)	1.00  0.90	Very limited ~wetness (very limited) ~flooding (limited)	1.00  0.90	Very limited ~percs slowly (very limited) ~wetness (very limited) ~flooding (moderately limited)	1.00  1.00  0.60
70008: Goss-----	Slightly limited ~droughty (slightly limited)	0.19	Slightly limited ~droughty (slightly limited)	0.19	Moderately limited ~slope (moderately limited) ~droughty (slightly limited)	0.30  0.19	Moderately limited ~slope (moderately limited)	0.30	Limited ~slope (limited) ~percs slowly (moderately limited)	0.91  0.32
70009: Goss-----	Limited ~slope (limited) ~droughty (slightly limited)	0.76  0.19	Limited ~slope (limited) ~droughty (slightly limited)	0.76  0.19	Limited ~slope (limited) ~droughty (slightly limited)	0.99  0.19	Limited ~slope (limited)	0.99	Very limited ~slope (very limited) ~percs slowly (moderately limited)	1.00  0.32
70023: Eldon-----	Not limited		Not limited		Moderately limited ~slope (moderately limited)	0.30	Moderately limited ~slope (moderately limited)	0.30	Very limited ~percs slowly (very limited) ~slope (limited)	1.00  0.91

Table 16.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste		Land application of municipal sewage sludge		Disposal of wastewater by irrigation		Treatment of wastewater by slow rate process		Treatment of wastewater by rapid infiltration process	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
70024: Goss-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~slope (very limited)	1.00	~slope (very limited)	1.00	~slope (very limited)	1.00	~slope (very limited)	1.00	~slope (very limited)	1.00
	~large surface stones (limited)	0.80	~large surface stones (limited)	0.80	~large surface stones (limited)	0.80	~large surface stones (limited)	0.80	~large surface stones (limited)	0.80
	~droughty (moderately limited)	0.31	~droughty (moderately limited)	0.31	~droughty (moderately limited)	0.31			~percs slowly (moderately limited)	0.32
70028: Moko-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~droughty (very limited)	1.00	~droughty (very limited)	1.00	~droughty (very limited)	1.00	~depth to bedrock (very limited)	1.00	~percs slowly (very limited)	1.00
	~bedrock <20 in. (very limited)	1.00	~bedrock <20 in. (very limited)	1.00	~bedrock <20 in. (very limited)	1.00	~large surface stones (limited)	0.80	~depth to bedrock (very limited)	1.00
	~large surface stones (limited)	0.80	~large surface stones (limited)	0.80	~large surface stones (limited)	0.80	~slope (limited)	0.70	~slope (very limited)	1.00
Rock outcrop---	Not rated		Not rated		Not rated		Not rated		Not rated	
70046: Sacville-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~wetness (very limited)	1.00	~wetness (very limited)	1.00	~wetness (very limited)	1.00	~wetness (very limited)	1.00	~percs slowly (very limited)	1.00
	~percs slowly (limited)	0.60	~percs slowly (limited)	0.60	~percs slowly (limited)	0.60	~percs slowly (limited)	0.60	~wetness (very limited)	1.00
					~slope (slightly limited)	0.10	~slope (slightly limited)	0.10	~slope (moderately limited)	0.31
73012: Gravois-----	Limited		Limited		Limited		Limited		Very limited	
	~percs slowly (limited)	0.60	~percs slowly (limited)	0.60	~percs slowly (limited)	0.60	~percs slowly (limited)	0.60	~percs slowly (very limited)	1.00
	~wetness (moderately limited)	0.55	~wetness (moderately limited)	0.55	~wetness (moderately limited)	0.55	~wetness (moderately limited)	0.55	~wetness (very limited)	1.00
					~slope (moderately limited)	0.30	~slope (moderately limited)	0.30	~slope (limited)	0.91
73034: Gravois, eroded-----	Limited		Limited		Limited		Limited		Very limited	
	~percs slowly (limited)	0.60	~percs slowly (limited)	0.60	~percs slowly (limited)	0.60	~percs slowly (limited)	0.60	~percs slowly (very limited)	1.00
	~wetness (moderately limited)	0.55	~wetness (moderately limited)	0.55	~wetness (moderately limited)	0.55	~wetness (moderately limited)	0.55	~wetness (very limited)	1.00
					~slope (moderately limited)	0.30	~slope (moderately limited)	0.30	~slope (limited)	0.91

Table 16.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste		Land application of municipal sewage sludge		Disposal of wastewater by irrigation		Treatment of wastewater by slow rate process		Treatment of wastewater by rapid infiltration process	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73035:										
Gravois-----	Limited		Limited		Limited		Limited		Very limited	
	~slope	0.68	~slope	0.68	~slope	0.89	~slope	0.89	~percs slowly	1.00
	(limited)		(limited)		(limited)		(limited)		(very limited)	
	~percs slowly	0.60	~percs slowly	0.60	~percs slowly	0.60	~percs slowly	0.60	~slope	1.00
	(limited)		(limited)		(limited)		(limited)		(very limited)	
	~wetness	0.55	~wetness	0.55	~wetness	0.55	~wetness	0.55	~wetness	1.00
	(moderately limited)		(moderately limited)		(moderately limited)		(moderately limited)		(very limited)	
73036:										
Willowfork----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~wetness	1.00	~wetness	1.00	~wetness	1.00	~wetness	1.00	~percs slowly	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~percs slowly	0.60	~percs slowly	0.60	~percs slowly	0.60	~percs slowly	0.60	~wetness	1.00
	(limited)		(limited)		(limited)		(limited)		(very limited)	
73037:										
Friendly-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~wetness	1.00	~wetness	1.00	~wetness	1.00	~wetness	1.00	~percs slowly	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~percs slowly	0.99	~percs slowly	0.99	~percs slowly	0.99	~percs slowly	0.99	~wetness	1.00
	(limited)		(limited)		(limited)		(limited)		(very limited)	
73038, 73039:										
Glensted-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~droughty	1.00	~droughty	1.00	~droughty	1.00	~wetness	1.00	~wetness	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~wetness	1.00	~wetness	1.00	~wetness	1.00				
	(very limited)		(very limited)		(very limited)					
73040:										
Maplewood-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~wetness	1.00	~wetness	1.00	~wetness	1.00	~wetness	1.00	~percs slowly	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~droughty	0.14	~droughty	0.14	~droughty	0.14			~wetness	1.00
	(slightly limited)		(slightly limited)		(slightly limited)				(very limited)	
									~slope	0.08
									(slightly limited)	
73041:										
Maplewood-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~wetness	1.00	~wetness	1.00	~wetness	1.00	~wetness	1.00	~percs slowly	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~droughty	0.20	~droughty	0.20	~slope	0.45	~slope	0.45	~wetness	1.00
	(slightly limited)		(slightly limited)		(moderately limited)		(moderately limited)		(very limited)	
	~slope	0.15	~slope	0.15	~droughty	0.20			~slope	1.00
	(slightly limited)		(slightly limited)		(slightly limited)				(very limited)	

Table 16.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste		Land application of municipal sewage sludge		Disposal of wastewater by irrigation		Treatment of wastewater by slow rate process		Treatment of wastewater by rapid infiltration process	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73042:										
Niangua-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~slope	1.00	~large surface stones	1.00	~slope	1.00	~slope	1.00	~percs slowly	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~large surface stones	1.00	~slope	1.00	~large surface stones	1.00	~large surface stones	1.00	~slope	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
							~depth to bedrock	0.39	~depth to bedrock	1.00
							(moderately limited)		(very limited)	
Bardley-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~slope	1.00	~large surface stones	1.00	~slope	1.00	~slope	1.00	~percs slowly	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~large surface stones	1.00	~slope	1.00	~large surface stones	1.00	~depth to bedrock	1.00	~slope	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~droughty	0.66	~droughty	0.66	~droughty	0.66	~large surface stones	1.00	~depth to bedrock	1.00
	(limited)		(limited)		(limited)		(very limited)		(very limited)	
73043:										
Hartville-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~wetness	1.00	~wetness	1.00	~wetness	1.00	~wetness	1.00	~percs slowly	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~percs slowly	0.99	~percs slowly	0.99	~percs slowly	0.99	~percs slowly	0.99	~wetness	1.00
	(limited)		(limited)		(limited)		(limited)		(very limited)	
					~slope	0.30	~slope	0.30	~slope	0.91
					(moderately limited)		(moderately limited)		(limited)	
73044, 73045:										
Crestmeade-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~wetness	1.00	~wetness	1.00	~wetness	1.00	~wetness	1.00	~percs slowly	1.00
	(very limited)		(very limited)		(very limited)		(very limited)		(very limited)	
	~percs slowly	0.99	~percs slowly	0.99	~percs slowly	0.99	~percs slowly	0.99	~wetness	1.00
	(limited)		(limited)		(limited)		(limited)		(very limited)	
73046:										
Wrengart-----	Moderately limited		Moderately limited		Moderately limited		Moderately limited		Very limited	
	~wetness	0.31	~wetness	0.31	~wetness	0.31	~wetness	0.31	~percs slowly	1.00
	(moderately limited)		(moderately limited)		(moderately limited)		(moderately limited)		(very limited)	
					~slope	0.30	~slope	0.30	~wetness	1.00
					(moderately limited)		(moderately limited)		(very limited)	
									~slope	0.91
									(limited)	

Table 16.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste		Land application of municipal sewage sludge		Disposal of wastewater by irrigation		Treatment of wastewater by slow rate process		Treatment of wastewater by rapid infiltration process	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73047:										
Bardley-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~large surface stones (very limited)	1.00	~large surface stones (very limited)	1.00	~large surface stones (very limited)	1.00	~depth to bedrock (very limited)	1.00	~percs slowly (very limited)	1.00
	~droughty (limited)	0.66	~droughty (limited)	0.66	~slope (limited)	0.70	~large surface stones (very limited)	1.00	~depth to bedrock (very limited)	1.00
	~depth to bedrock (moderately limited)	0.46	~depth to bedrock (moderately limited)	0.46	~droughty (limited)	0.66	~slope (limited)	0.70	~slope (very limited)	1.00
Moko-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~droughty (very limited)	1.00	~droughty (very limited)	1.00	~droughty (very limited)	1.00	~depth to bedrock (very limited)	1.00	~percs slowly (very limited)	1.00
	~bedrock <20 in. (very limited)	1.00	~bedrock <20 in. (very limited)	1.00	~bedrock <20 in. (very limited)	1.00	~large surface stones (very limited)	1.00	~depth to bedrock (very limited)	1.00
	~large surface stones (very limited)	1.00	~large surface stones (very limited)	1.00	~large surface stones (very limited)	1.00	~slope (limited)	0.70	~slope (very limited)	1.00
73048:										
Rueter-----	Limited		Limited		Limited		Limited		Limited	
	~too acid (limited)	0.84	~too acid (limited)	0.84	~too acid (limited)	0.84	~too acid (limited)	0.84	~slope (limited)	0.91
	~droughty (moderately limited)	0.35	~droughty (moderately limited)	0.35	~droughty (moderately limited)	0.35	~slope (moderately limited)	0.30	~percs slowly (moderately limited)	0.32
					~slope (moderately limited)	0.30			~too cobbly (slightly limited)	0.11
73050:										
Rock outcrop---	Not rated		Not rated		Not rated		Not rated		Not rated	
Bardley-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~slope (very limited)	1.00	~slope (very limited)	1.00	~slope (very limited)	1.00	~slope (very limited)	1.00	~percs slowly (very limited)	1.00
	~large surface stones (very limited)	1.00	~large surface stones (very limited)	1.00	~large surface stones (very limited)	1.00	~depth to bedrock (very limited)	1.00	~slope (very limited)	1.00
	~droughty (limited)	0.66	~droughty (limited)	0.66	~droughty (limited)	0.66	~large surface stones (very limited)	1.00	~depth to bedrock (very limited)	1.00
73112:										
Gunlock-----	Moderately limited		Moderately limited		Moderately limited		Moderately limited		Very limited	
	~wetness (moderately limited)	0.58	~wetness (moderately limited)	0.58	~wetness (moderately limited)	0.58	~wetness (moderately limited)	0.58	~percs slowly (very limited)	1.00
					~slope (moderately limited)	0.30	~slope (moderately limited)	0.30	~wetness (very limited)	1.00
									~slope (limited)	0.91

Table 16.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste		Land application of municipal sewage sludge		Disposal of wastewater by irrigation		Treatment of wastewater by slow rate process		Treatment of wastewater by rapid infiltration process	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
73136: Union-----	Moderately limited ~wetness (moderately limited)	0.58	Moderately limited ~wetness (moderately limited)	0.58	Moderately limited ~wetness (moderately limited)	0.58	Moderately limited ~wetness (moderately limited)	0.58	Very limited ~percs slowly (very limited) ~wetness (very limited) ~too acid (moderately limited)	1.00 1.00 0.42
73137, 73138: Clafork-----	Moderately limited ~wetness (moderately limited)	0.60	Moderately limited ~wetness (moderately limited)	0.60	Moderately limited ~wetness (moderately limited) ~slope (slightly limited)	0.60 0.10	Moderately limited ~wetness (moderately limited) ~slope (slightly limited)	0.60 0.10	Very limited ~percs slowly (very limited) ~wetness (very limited) ~slope (moderately limited)	1.00 1.00 0.31
73190: Winnipeg-----	Not limited		Not limited		Moderately limited ~slope (moderately limited)	0.30	Moderately limited ~slope (moderately limited)	0.30	Very limited ~percs slowly (very limited) ~slope (limited)	1.00 0.91
75376: Cedargap-----	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~percs slowly (very limited) ~flooding (very limited)	1.00 1.00
75378: Sturkie-----	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~flooding (very limited)	1.00	Very limited ~percs slowly (very limited) ~flooding (very limited)	1.00 1.00
75384: Healing-----	Limited ~flooding (limited)	0.90	Limited ~flooding (limited)	0.90	Limited ~flooding (limited)	0.90	Limited ~flooding (limited)	0.90	Very limited ~percs slowly (very limited) ~flooding (moderately limited)	1.00 0.60

Table 16.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste		Land application of municipal sewage sludge		Disposal of wastewater by irrigation		Treatment of wastewater by slow rate process		Treatment of wastewater by rapid infiltration process	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
75385: Gabriel-----	Limited		Limited		Limited		Limited		Very limited	
	~flooding (limited)	0.90	~flooding (limited)	0.90	~flooding (limited)	0.90	~flooding (limited)	0.90	~percs slowly (very limited)	1.00
	~wetness (limited)	0.86	~wetness (limited)	0.86	~wetness (limited)	0.86	~wetness (limited)	0.86	~wetness (very limited)	1.00
	~percs slowly (limited)	0.60	~percs slowly (limited)	0.60	~percs slowly (limited)	0.60	~percs slowly (limited)	0.60	~flooding (moderately limited)	0.60
75386: Speed-----	Moderately limited		Moderately limited		Moderately limited		Moderately limited		Very limited	
	~wetness (moderately limited)	0.53	~wetness (moderately limited)	0.53	~wetness (moderately limited)	0.53	~wetness (moderately limited)	0.53	~percs slowly (very limited)	1.00
	~flooding (slightly limited)	0.30	~flooding (slightly limited)	0.30	~flooding (slightly limited)	0.30	~flooding (slightly limited)	0.30	~wetness (very limited)	1.00
75387: Hacreek-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~wetness (very limited)	1.00	~wetness (very limited)	1.00	~wetness (very limited)	1.00	~wetness (very limited)	1.00	~percs slowly (very limited)	1.00
	~flooding (limited)	0.90	~flooding (limited)	0.90	~flooding (limited)	0.90	~flooding (limited)	0.90	~wetness (very limited)	1.00
	~percs slowly (limited)	0.60	~percs slowly (limited)	0.60	~percs slowly (limited)	0.60	~percs slowly (limited)	0.60	~flooding (moderately limited)	0.60
75415: Jemerson-----	Limited		Limited		Limited		Limited		Very limited	
	~flooding (limited)	0.90	~flooding (limited)	0.90	~flooding (limited)	0.90	~flooding (limited)	0.90	~percs slowly (very limited)	1.00
									~wetness (limited)	0.89
									~flooding (moderately limited)	0.60
75421: Racket-----	Very limited		Very limited		Very limited		Very limited		Very limited	
	~poor filter (very limited)	1.00	~poor filter (very limited)	1.00	~poor filter (very limited)	1.00	~poor filter (very limited)	1.00	~percs slowly (very limited)	1.00
	~flooding (limited)	0.90	~flooding (limited)	0.90	~flooding (limited)	0.90	~flooding (limited)	0.90	~wetness (limited)	0.69
									~flooding (moderately limited)	0.60

Table 16.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste		Land application of municipal sewage sludge		Disposal of wastewater by irrigation		Treatment of wastewater by slow rate process		Treatment of wastewater by rapid infiltration process	
	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value	Limitation	Value
99000:										
Pits-----	Not rated		Not rated		Not rated		Not rated		Not rated	
99001:										
Water-----	Not rated		Not rated		Not rated		Not rated		Not rated	
99003:										
Miscellaneous water-----	Not rated		Not rated		Not rated		Not rated		Not rated	



# Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

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

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

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

## Engineering Index Properties

Table 17 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

*Depth* to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

*Texture* is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than

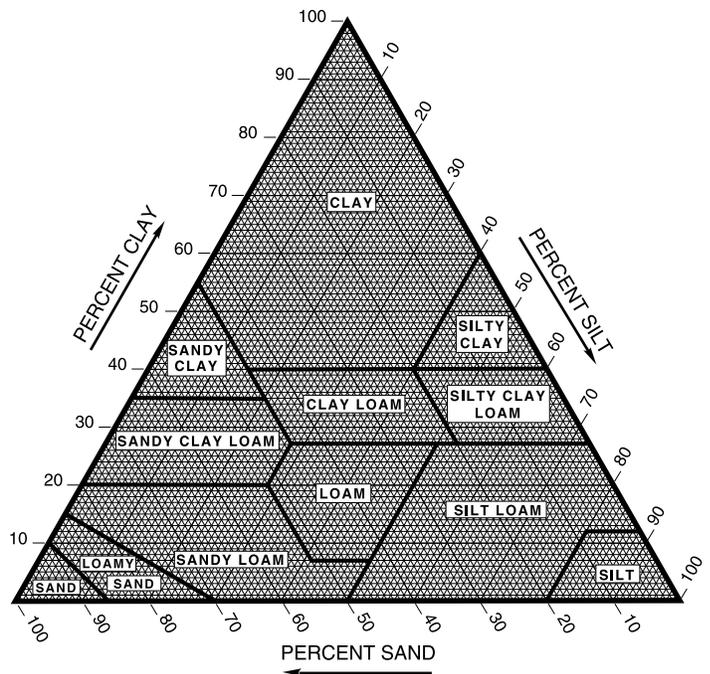


Figure 12.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

2 millimeters in diameter (fig. 12). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in

diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

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

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

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

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

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

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

## Physical and Chemical Properties

Table 18 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

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

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

*Moist bulk density* is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at  $\frac{1}{3}$ -bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

*Saturated hydraulic conductivity* refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity ( $K_{sat}$ ). The estimates in the table indicate the rate of water movement, in micrometers per second ( $\mu\text{m}/\text{sec}$ ), when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is

considered in the design of soil drainage systems and septic tank absorption fields.

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

*Linear extensibility* refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at  $1/3$ - or  $1/10$ -bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

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

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

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

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

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

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

*Erosion factor Kw* (formerly K factor) indicates the susceptibility of a soil to sheet and rill erosion by water. Factor Kw is one of six factors used in the Universal Soil Loss Equation (USLE), and may be used in the Revised Universal Soil Loss Equation (RUSLE), to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Factor Kw is adjusted for the effect of rock fragments. Values of Kw range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

*Erosion factor Kf* indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size. Factor Kf is one of the factors that may be used in the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year.

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

*Wind erodibility groups* are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.
- 4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

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

## Water Features

Table 19 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

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

The four hydrologic soil groups are:

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

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

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

Group D. Soils having a very slow infiltration rate

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

If a soil is assigned to two hydrologic groups in the table, the first letter is for drained areas and the second is for undrained areas.

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

The table gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year). *Common* is used when the occasional and frequent classes are grouped for certain purposes. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

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

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

*High water table* (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on observations of the water table at selected sites and on the evidence of a saturated zone, namely grayish colors or mottles

(redoximorphic features) in the soil. Indicated in the table are the depth to the seasonal high water table; the kind of water table—that is, perched, apparent, or artesian; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in the table.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone. An *artesian* water table is under hydrostatic head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

## Soil Features

Table 20 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

*Depth to bedrock* is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

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

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

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

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



Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth In	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
70046: Sacville-----	0-7	SIL	CL	A-6	0	0	100	100	90-100	70-90	30-45	15-25
	7-13	SIL	CL	A-6	0	0	100	100	90-100	70-90	35-45	15-25
	13-27	SICL	CL, CH	A-7, A-7-6	0	0	90-100	85-100	80-100	75-95	40-55	20-35
	27-60	SIC, SICL	CH	A-7, A-7-6	0	0	90-100	85-100	80-100	75-95	50-70	30-45
73012: Gravois-----	0-6	SIL	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	80-100	70-90	20-40	5-15
	6-25	SICL, SIL	CL	A-6, A-7	0	0	90-100	85-100	80-100	70-85	30-45	10-25
	25-35	SICL, GR-SICL, GRV-SIL	GC, CL, SC	A-6, A-7, A- 7-6	0	0-15	35-100	30-95	25-90	20-80	25-45	10-20
	35-50	GRV-SICL, SICL, GRV-SIL	SC, GC, GC-GM	A-7, A-6, A- 7-6	0	0-15	35-85	30-80	25-80	20-75	25-45	10-25
	50-80	CBV-C, GRV-SIC, GR-SIC	CL, GC	A-2-7, A-7, A-7-6	0	0-60	35-80	30-75	25-70	20-65	45-90	25-60
73034: Gravois, eroded-----	0-6	SIL	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	80-100	70-90	20-40	5-15
	6-25	SICL, SIL	CL	A-6, A-7	0	0	90-100	85-100	80-100	70-85	30-45	10-25
	25-35	SICL, GR-SICL, GRV-SIL	GC, CL, SC	A-6, A-7, A- 7-6	0	0-15	35-100	30-95	25-90	20-80	25-45	10-20
	35-50	GRV-SICL, SICL, GRV-SIL	SC, GC, GC-GM	A-7, A-6, A- 7-6	0	0-15	35-80	30-80	25-80	20-75	25-45	10-25
	50-80	CBV-C, GRV-SIC, GR-SIC	CL, GC	A-2-7, A-7, A-7-6	0	0-60	35-80	30-75	25-70	20-65	45-90	25-60
73035: Gravois-----	0-6	SIL	CL, CL-ML	A-4, A-6	0	0	90-100	85-100	80-100	70-90	20-40	5-15
	6-25	SICL, SIL	CL	A-6, A-7	0	0	90-100	85-100	80-100	70-85	30-45	10-25
	25-35	SICL, GR-SICL, GRV-SIL	GC, SC, CL	A-6, A-7-6, A-7	0	0-15	35-100	30-95	25-90	20-80	25-45	10-25
	35-50	GRV-SICL, SICL, GRV-SIL	SC, GC-GM, GC	A-7, A-6, A- 7-6	0	0-15	35-85	30-80	25-80	20-75	25-45	10-25
	50-80	CBV-C, GRV-SIC, GR-SIC	CL, GC	A-2-7, A-7-6, A-7	0	0-60	35-80	30-75	25-70	20-65	45-90	25-60
73036: Willowfork---	0-12	SIL	CL	A-6	0	0	100	100	90-100	70-90	25-35	10-20
	12-26	SIL	CL	A-6	0	0	100	100	90-100	70-90	25-35	10-20
	26-54	SICL	CH	A-7, A-7-6	0	0	100	100	95-100	85-95	50-55	25-35
	54-80	SICL, GR-SICL	CH, CL	A-7-6, A-7	0	0	55-100	50-100	45-100	40-90	45-55	25-35
73037: Friendly-----	0-6	SIL	CL, CL-ML	A-4, A-6	0	0-5	90-100	85-100	75-90	60-85	25-40	5-20
	6-13	SIC, SICL	CH, CL	A-7, A-7-6	0	0-5	90-100	85-100	80-95	75-90	40-60	20-35
	13-31	SICL, SIL	CL	A-6	0	0-5	90-100	85-100	80-95	70-85	35-50	15-25
	31-54	GRX-SICL, GRX- CL	GC	A-2, A-2-7	0	0-15	20-30	15-25	15-25	10-20	35-50	15-25
	54-80	C, SIC, GR-C	CH	A-7, A-7-6	0	0-15	75-95	70-90	65-85	60-80	50-90	25-65
73038: Glensted-----	0-9	SIL	CL	A-6	0	0	100	100	90-100	70-90	30-45	10-25
	9-14	SIC	CH	A-7-6	0	0	100	100	95-100	85-95	55-75	30-50
	14-33	SIC, SICL	CL, CH	A-7, A-7-6	0	0	85-100	80-100	75-95	65-90	45-65	20-40
	33-60	SICL	CL	A-7, A-7-6	0	0	85-100	80-100	75-95	65-90	40-50	20-30



Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing				Liquid	Plas-
			Unified	AASHTO	>10	3-10	sieve number--				limit	ticity
					inches	inches	4	10	40	200	Pct	index
	In				Pct	Pct						
73047:												
Bardley-----	0-4	GRV-SIL	GC, GC-GM	A-6	0-15	0-5	35-55	30-50	25-45	20-40	25-40	10-15
	4-8	GRX-SIL	GC	A-2-6	0-15	0-5	20-30	15-25	15-20	10-20	25-40	10-15
	8-27	C, GR-C	CH	A-7, A-7-6	0	0-10	75-100	70-100	65-95	60-85	65-95	40-70
	27-60	UWB			---	---	---	---	---	---	---	---
Moko-----												
0-3	GR-L	GC, SC, CL	A-4, A-6	0-5	0-15	55-80	50-75	45-70	35-60	15-35	2-15	
	3-8	GRV-L	GC, GM	A-4, A-6, A-2-4	0-5	0-15	35-55	30-50	25-45	20-40	15-35	2-15
	8-60	UWB			---	---	---	---	---	---	---	
73048:												
Rueter-----	0-3	GR-SIL	GC-GM, GM, GC, SC	A-6, A-4	0-5	0-10	55-80	50-75	45-70	40-60	10-35	2-15
	3-14	GRV-SIL, GRX-SIL	GC-GM, GM	A-2-4	0-5	0-10	25-55	20-50	15-45	15-40	10-35	2-15
	14-45	GRV-L, CBX-L, GRV-SCL	GC-GM, GC, GM	A-6, A-2-6	0-5	10-40	30-55	25-50	25-50	10-40	15-45	3-20
	45-86	GRX-SICL, GRV-C, CBV-C	GC-GM, SC	A-2-7, A-7	0-5	10-40	25-55	20-50	15-50	15-45	45-85	25-60
73050:												
Rock outcrop.												
Bardley-----	0-4	GRV-SIL	GC, GC-GM	A-6	0-15	0-5	35-55	30-50	25-45	20-40	25-40	10-15
	4-8	GRX-SIL	GC	A-2-6	0-15	0-5	20-30	15-25	15-20	10-20	25-40	10-15
	8-27	C, GR-C	CH	A-7, A-7-6	0	0-10	75-100	70-100	65-95	60-85	65-95	40-70
	27-60	UWB			---	---	---	---	---	---	---	
73112:												
Gunlock-----	0-5	SIL	CL, CL-ML	A-4, A-6	0	0	100	95-100	85-100	75-90	25-35	5-15
	5-25	SICL, SIC	CH, CL	A-7-6, A-7	0	0	90-100	85-100	80-100	75-95	35-55	15-30
	25-43	SICL, GR-SICL, GRV-SIL, SIL	CL, GC, SC	A-6, A-7	0	0-10	45-95	40-90	35-90	30-85	30-45	10-20
	43-55	GRX-SICL, GRX-SIC	GC	A-2-7	0	0-10	20-30	15-25	15-25	15-20	40-65	20-40
	55-80	C, GR-SIC, SIC	CH, CL	A-7, A-7-6	0	0-10	55-95	50-90	50-85	45-80	45-85	25-60
73136:												
Union-----	0-9	SIL	CL, CL-ML	A-4, A-6	0	0	95-100	90-100	85-95	65-85	20-35	5-15
	9-30	SICL, SIC	CH, CL	A-7-6, A-6, A-7	0	0	90-100	85-95	80-95	70-80	35-60	15-30
	30-53	GRX-SIL, CBX-L, SIL	GC, CL, SC	A-2, A-6	0	0-25	30-95	25-90	20-85	15-75	25-35	10-15
	53-80	C, GRV-C, GR-SIC	GC, CH, SC	A-7-6, A-7	0	0-15	55-95	50-85	50-80	45-70	50-85	25-60
73137:												
Clafork-----	0-8	SIL	CL	A-7, A-6	0	0	100	100	90-100	70-90	25-45	10-25
	8-36	SIC, SICL	CH, CL	A-7, A-7-6	0	0	100	100	95-100	85-95	45-65	25-40
	36-56	SIL, SICL	CL	A-7, A-6	0	0	95-100	90-100	85-90	75-85	30-50	10-30
	56-69	GRV-SIL, GRX-SICL	GC	A-7, A-6, A-2-6	0-5	0-10	25-55	20-50	20-50	15-45	25-50	10-30
	69-80	GRV-SIC, GRX-SICL	GC	A-7, A-2-7	0-5	0-15	25-55	20-50	20-50	20-45	45-70	25-45

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth <u>In</u>	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid	Plas-	
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200	limit Pct	ticity index	
73138:													
Clafork-----	0-8	SIL	CL	A-6	0	0	100	100	90-100	70-90	25-45	10-25	
	8-11	SIL	CL	A-6	0	0	100	100	90-100	70-90	25-45	10-25	
	11-39	SIC, SICL	CH, CL	A-7, A-7-6	0	0	100	100	95-100	85-95	45-65	25-40	
	39-59	SIL, SICL	CL	A-6	0	0	95-100	90-100	85-90	75-85	30-50	10-30	
	59-72	GRV-SIL, GRX-SICL	GC	A-7, A-6, A-2-6	0-5	0-10	25-55	20-50	20-50	15-45	25-50	10-30	
	72-80	GRV-SIC, GRX-SICL	GC	A-7, A-2-7	0-5	0-15	25-55	20-50	20-50	20-45	45-70	25-45	
73190:													
Winnipeg-----	0-6	SIL	CL	A-4	0	0	95-100	90-100	85-95	75-85	25-35	5-15	
	6-28	SIL, SICL	CL	A-6	0	0	95-100	90-100	85-95	75-90	30-40	10-20	
	28-48	GR-SIL, GRV-L, GR-SICL	CL, SC	A-6	0	0	40-75	35-70	30-65	25-60	30-45	15-20	
	48-80	GRX-SCL, GRV-SICL	GC	A-2-6	0	0	15-50	10-45	10-40	5-20	35-45	15-20	
75376:													
Cedargap-----	0-9	GR-SIL	CL-ML, CL	A-4, A-6	0	0-10	55-80	50-75	45-75	35-70	20-35	5-15	
	9-49	GRV-SCL, GRV-L	GC, GC-GM	A-2-6, A-2-4	0	0-10	30-55	25-50	20-50	10-30	20-45	5-25	
	49-60	C, GRV-C, GRV-SIC	GC	A-2-7, A-7-6	0	0-15	40-85	35-80	35-75	30-70	50-85	25-60	
75378:													
Sturkie-----	0-9	SIL	CL, CL-ML	A-4, A-6	0	0	95-100	90-100	85-95	70-90	25-35	5-15	
	9-19	SIL, SICL	CL	A-6	0	0	95-100	90-100	85-95	70-90	25-40	10-20	
	19-60	SIL, SICL	CL	A-6	0	0	95-100	90-100	85-90	70-90	25-40	10-20	
75384:													
Healing-----	0-15	SIL	CL, CL-ML	A-6, A-4	0	0	100	100	90-100	70-90	20-35	5-15	
	15-50	SICL, SIL	CL	A-6, A-7	0	0	100	100	95-100	85-95	30-45	10-25	
	50-60	SICL, SIL	CL	A-7, A-6	0	0	85-100	80-100	75-95	65-90	30-45	10-25	
75385:													
Gabriel-----	0-14	SIL	CL	A-6, A-4	0	0	100	100	90-100	70-90	20-35	5-15	
	14-29	SICL	CL	A-7, A-6	0	0	100	100	95-100	85-95	30-45	10-25	
	29-80	SICL, SIL	CL	A-6, A-7	0	0	100	100	90-100	70-95	30-45	10-25	
75386:													
Speed-----	0-14	SIL	CL, CL-ML	A-4, A-6	0	0	100	100	90-100	70-90	20-35	5-15	
	14-25	SIL	CL, CL-ML	A-4	0	0	100	100	90-100	70-90	20-30	5-10	
	25-35	SIL, SICL	CL	A-6	0	0	100	100	90-100	70-95	25-40	10-20	
	35-60	SICL, SIL	CL	A-6	0	0	100	100	90-100	70-95	30-40	10-20	
75387:													
Hacreek-----	0-9	SIL	CL	A-6	0	0	100	100	90-100	70-95	30-40	10-20	
	9-21	SICL	CL	A-6, A-7, A-7-6	0	0	100	100	95-100	85-95	40-45	15-25	
	21-28	SICL	CL	A-6, A-7, A-7-6	0	0	100	100	95-100	85-95	40-45	15-25	
	28-70	SICL	CL	A-6, A-7	0	0	100	100	95-100	85-95	35-45	15-25	
	70-81	SICL	CL	A-6, A-7	0	0	100	100	95-100	85-95	35-45	15-25	
75415:													
Jemerson-----	0-9	SIL	CL, CL-ML	A-4, A-6	0	0	100	100	90-100	70-90	20-35	5-15	
	9-50	SIL, SICL	CL	A-6	0	0	100	100	90-100	70-95	20-45	5-20	
	50-60	GR-L, SIL	CL, CL-ML	A-4, A-6	0	0	75-100	70-100	60-100	45-90	25-35	5-15	



Table 18.--Physical and Chemical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter	Cation exchange capacity	Effective	Soil reaction	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
									cation exchange capacity		Kw	Kf	T		
	In	Pct	g/cc	um/sec	In/in	Pct	Pct	meq/100g	meq/100g	pH					
15002: McGirk-----	0-8	15-27	1.30-1.45	4.00-14.00	0.22-0.24	0.1-2.9	1.0-2.0	8.0-16	8.0-16	5.1-7.3	.43	.43	3	6	48
	8-15	27-35	1.30-1.40	1.40-4.00	0.18-0.20	3.0-5.9	0.5-1.0	10-20	10-20	4.5-6.0	.43	.43			
	15-45	40-60	1.25-1.35	0.42-1.40	0.10-0.18	6.0-8.9	0.5-1.0	20-35	18-26	4.5-6.0	.32	.32			
	45-80	30-60	1.25-1.35	0.42-1.40	0.10-0.18	6.0-8.9	0.1-0.5	20-30	18-26	4.5-7.3	.32	.32			
66000: Moniteau-----	0-7	15-27	1.20-1.40	4.00-14.00	0.21-0.23	0.1-2.9	1.0-2.0	10-14	7.0-12	5.1-6.5	.37	.37	5	6	48
	7-14	12-25	1.20-1.40	4.00-14.00	0.18-0.22	0.1-2.9	0.5-1.0	6.0-12	4.0-10	5.1-6.5	.37	.37			
	14-80	22-35	1.30-1.50	1.40-4.00	0.17-0.20	3.0-5.9	0.1-0.8	12-20	10-17	4.5-6.0	.43	.43			
70008, 70009: Goss-----	0-6	12-27	1.10-1.30	14.00-42.00	0.14-0.16	0.1-2.9	1.0-3.0	10-31	7.0-23	4.5-6.5	.10	.37	3	8	0
	6-19	10-24	1.10-1.30	14.00-42.00	0.06-0.10	0.1-2.9	0.1-0.5	6.0-12	3.7-9.0	4.5-6.5	.10	.43			
	19-60	35-50	1.30-1.50	4.00-14.00	0.04-0.09	3.0-5.9	0.1-0.4	9.0-25	7.0-20	4.5-7.3	.10	.37			
	60-80	50-85	1.40-1.60	4.00-14.00	0.06-0.10	3.0-5.9	0.1-0.4	25-58	20-45	4.5-7.3	.24	.28			
70023: Eldon-----	0-9	15-27	1.40-1.55	14.00-42.00	0.13-0.18	0.1-2.9	1.0-3.0	8.0-25	6.0-19	4.5-7.3	.24	.28	3	8	0
	9-17	16-35	1.40-1.55	14.00-42.00	0.13-0.18	0.1-2.9	1.0-2.0	12-30	7.0-25	4.5-7.3	.24	.43			
	17-45	40-60	1.35-1.45	4.00-14.00	0.07-0.10	6.0-8.9	0.1-0.5	17-30	13-20	4.5-7.3	.24	.32			
	45-60	40-60	1.35-1.45	4.00-14.00	0.06-0.10	6.0-8.9	0.1-0.5	17-30	13-20	4.5-7.3	.24	.32			
70024: Goss-----	0-6	12-27	1.10-1.30	14.00-42.00	0.10-0.14	0.1-2.9	1.0-3.0	10-31	7.0-23	4.5-6.5	.10	.37	3	8	0
	6-19	10-24	1.10-1.30	14.00-42.00	0.06-0.10	0.1-2.9	0.1-0.5	6.0-12	3.7-9.0	4.5-6.5	.10	.43			
	19-60	35-50	1.30-1.50	4.00-14.00	0.04-0.09	3.0-5.9	0.1-0.4	9.0-25	7.0-20	4.5-7.3	.10	.37			
	60-80	50-85	1.40-1.60	4.00-14.00	0.06-0.10	3.0-5.9	0.1-0.4	25-58	20-45	4.5-7.3	.24	.28			
70028: Moko-----	0-3	18-27	1.25-1.50	4.00-14.00	0.07-0.13	0.1-2.9	2.0-6.0	15-40	15-45	6.6-7.8	.24	.43	1	8	0
	3-8	18-27	1.25-1.60	4.00-14.00	0.03-0.14	0.1-2.9	2.0-6.0	15-40	15-40	6.6-7.8	.28	.43			
	8-60	---	---	0.00-1.40	---	---	---	---	---	---	---	---			
Rock outcrop.															
70046: Sacville-----	0-7	17-27	1.30-1.50	4.00-14.00	0.22-0.24	0.1-2.9	2.0-6.0	14-40	10-35	5.6-7.3	.32	.32	4	6	48
	7-13	18-27	1.30-1.50	4.00-14.00	0.22-0.24	0.1-2.9	2.0-6.0	14-40	10-35	5.6-7.3	.32	.32			
	13-27	27-40	1.40-1.60	1.40-4.00	0.16-0.20	3.0-5.9	0.5-2.0	18-35	13-30	5.6-7.8	.37	.37			
	27-60	36-55	1.40-1.60	0.40-1.40	0.14-0.17	6.0-8.9	0.1-0.5	18-35	13-30	5.6-7.8	.37	.37			

Table 18.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter	Cation exchange capacity	Effective	Soil reaction	Erosion factors			Wind	Wind
									cation exchange capacity		Kw	Kf	T	erodi- bility group	erodi- bility index
	In	Pct	g/cc	um/sec	In/in	Pct	Pct	meq/100g	meq/100g	pH					
73012: Gravois-----	0-6	12-27	1.20-1.50	4.00-14.00	0.20-0.22	0.1-2.9	1.0-2.5	8.0-15	5.0-11	5.1-6.5	.37	.37	4	5	56
	6-25	20-35	1.30-1.50	1.40-4.20	0.12-0.18	3.0-5.9	0.3-1.0	10-24	6.0-19	4.5-6.5	.43	.43			
	25-35	15-35	1.50-1.70	0.42-1.40	0.08-0.12	0.1-2.9	0.1-0.5	10-18	6.0-14	4.5-6.5	.32	.43			
	35-50	15-35	1.45-1.65	1.40-4.20	0.10-0.13	3.0-5.9	0.1-0.5	10-18	6.0-14	4.5-6.5	.32	.43			
	50-80	40-80	1.30-1.50	1.40-4.20	0.04-0.10	6.0-8.9	0.1-0.5	25-36	25-40	6.6-7.8	.28	.32			
73034: Gravois, eroded-----	0-6	12-27	1.20-1.50	4.00-14.00	0.20-0.22	0.1-2.9	1.0-2.5	8.0-15	5.0-11	5.1-6.5	.37	.37	4	5	56
	6-25	20-35	1.30-1.50	1.40-4.20	0.12-0.18	3.0-5.9	0.3-1.0	10-24	6.0-19	4.5-6.5	.43	.43			
	25-35	15-35	1.50-1.70	0.42-1.40	0.08-0.12	0.1-2.9	0.1-0.5	10-18	6.0-14	4.5-6.5	.32	.43			
	35-50	15-35	1.45-1.65	1.40-4.20	0.10-0.13	3.0-5.9	0.1-0.5	10-18	6.0-14	4.5-6.5	.32	.43			
	50-80	40-80	1.30-1.50	1.40-4.20	0.04-0.10	6.0-8.9	0.1-0.5	25-36	25-40	6.6-7.8	.28	.32			
73035: Gravois-----	0-6	12-27	1.20-1.50	4.00-14.00	0.20-0.22	0.1-2.9	1.0-2.5	8.0-15	5.0-11	5.1-6.5	.37	.37	4	5	56
	6-25	20-35	1.30-1.50	1.40-4.20	0.12-0.18	3.0-5.9	0.3-1.0	10-24	6.0-19	4.5-6.5	.43	.43			
	25-35	15-35	1.50-1.70	0.42-1.40	0.08-0.12	0.1-2.9	0.1-0.5	10-18	6.0-14	4.5-6.5	.32	.43			
	35-50	15-35	1.45-1.65	1.40-4.20	0.10-0.13	3.0-5.9	0.1-0.5	10-18	6.0-14	4.5-6.5	.32	.43			
	50-80	40-80	1.30-1.50	1.40-4.20	0.04-0.10	6.0-8.9	0.1-0.5	25-36	25-40	6.6-7.8	.28	.32			
73036: Willowfork-----	0-12	12-20	1.25-1.45	4.00-14.00	0.22-0.24	0.1-2.9	2.0-4.0	12-24	9.0-20	5.1-7.3	.32	.32	5	5	56
	12-26	12-20	1.30-1.50	4.00-14.00	0.18-0.20	0.1-2.9	0.5-1.0	10-20	8.0-16	4.5-6.5	.43	.43			
	26-54	35-40	1.25-1.45	1.40-4.00	0.18-0.20	6.0-8.9	0.5-1.0	20-30	15-25	5.6-6.5	.43	.43			
	54-80	32-40	1.40-1.60	1.40-4.00	0.12-0.16	6.0-8.9	0.1-0.5	20-30	15-25	5.6-6.5	.32	.43			
73037: Friendly-----	0-6	15-27	1.20-1.50	4.20-14.00	0.17-0.22	0.1-2.9	1.0-3.0	12-25	8.0-20	5.6-7.3	.37	.37	3	6	48
	6-13	35-55	1.30-1.60	0.42-1.40	0.10-0.14	6.0-8.9	1.0-2.0	20-35	20-28	5.6-7.8	.32	.32			
	13-31	25-40	1.30-1.60	1.40-4.00	0.15-0.17	3.0-5.9	0.1-0.5	12-22	10-17	5.6-7.8	.43	.43			
	31-54	27-40	1.50-1.70	0.42-1.40	0.02-0.06	3.0-5.9	0.1-0.5	12-32	10-25	5.6-7.8	.32	.43			
	54-80	40-85	1.30-1.60	0.42-1.40	0.06-0.14	6.0-8.9	0.1-0.5	30-50	23-40	5.6-7.8	.24	.28			
73038, 73039: Glensted-----	0-9	15-27	1.30-1.50	4.00-14.00	0.22-0.24	0.1-2.9	2.0-3.0	11-17	8.0-13	5.1-7.3	.32	.32	3	6	48
	9-14	40-60	1.30-1.45	0.42-1.40	0.11-0.13	6.0-8.9	1.0-2.0	21-27	17-22	5.1-6.5	.32	.32			
	14-33	27-50	1.30-1.45	1.40-4.00	0.11-0.18	6.0-8.9	0.1-0.5	21-27	17-22	5.6-7.3	.32	.32			
	33-60	27-35	1.30-1.45	1.40-4.00	0.18-0.19	3.0-5.9	0.1-0.5	14-18	10-14	5.6-7.3	.32	.32			
73040: Maplewood-----	0-8	18-27	1.30-1.50	4.00-14.00	0.22-0.24	0.1-2.9	2.0-4.0	12-25	10-23	5.6-7.3	.37	.37	3	6	48
	8-17	35-55	1.30-1.60	1.40-4.00	0.12-0.19	6.0-8.9	1.0-2.0	18-34	13-29	5.1-7.3	.37	.43			
	17-32	25-40	1.50-1.70	0.40-1.40	0.13-0.20	3.0-5.9	0.5-1.0	12-25	9.0-23	5.6-7.8	.28	.43			
	32-60	40-85	1.20-1.50	1.40-4.00	0.08-0.10	6.0-8.9	0.1-0.5	15-30	14-30	5.6-7.8	.24	.32			

Table 18.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter	Cation exchange capacity	Effective	Soil reaction	Erosion factors			Wind	Wind
									cation exchange capacity		Kw	Kf	T	erodi- bility group	erodi- bility index
	In	Pct	g/cc	um/sec	In/in	Pct	Pct	meq/100g	meq/100g	pH					
73041: Maplewood-----	0-6	18-27	1.30-1.50	4.00-14.00	0.22-0.24	0.1-2.9	2.0-4.0	12-25	10-23	5.6-7.3	.37	.37	3	6	48
	6-17	35-55	1.30-1.60	1.40-4.00	0.12-0.19	6.0-8.9	1.0-2.0	18-34	13-29	5.1-7.3	.37	.43			
	17-32	25-40	1.50-1.70	0.40-1.40	0.13-0.20	3.0-5.9	0.5-1.0	12-25	9.0-23	5.6-7.8	.28	.43			
	32-60	40-85	1.20-1.50	1.40-4.00	0.08-0.10	6.0-8.9	0.1-0.5	15-30	14-30	5.6-7.8	.24	.32			
73042: Niangua-----	0-3	10-27	1.10-1.40	4.00-14.00	0.10-0.17	0.1-2.9	0.5-3.0	6.0-16	3.0-13	4.5-7.3	.24	.37	3	8	0
	3-14	10-27	1.10-1.40	4.00-14.00	0.09-0.14	0.1-2.9	0.5-1.0	6.0-15	3.0-12	4.5-6.0	.24	.43			
	14-52	60-85	1.10-1.30	1.40-4.00	0.07-0.10	3.0-5.9	0.5-1.0	30-55	23-45	5.1-7.3	.32	.32			
	52-60	---	---	0.42-0.70	---	---	---	---	---	---	---	---			
Bardley-----	0-4	18-27	1.40-1.55	4.00-14.00	0.12-0.17	0.1-2.9	2.0-4.0	20-30	15-25	4.5-6.5	.28	.37	2	8	0
	4-8	18-27	1.40-1.55	4.00-14.00	0.06-0.08	0.1-2.9	0.5-2.0	5.0-10	2.0-7.0	4.5-6.5	.28	.37			
	8-27	60-90	1.20-1.40	4.00-14.00	0.08-0.12	3.0-5.9	0.5-1.0	30-50	21-40	4.5-7.3	.24	.28			
	27-60	---	---	0.07-0.42	---	---	---	---	---	---	---	---			
73043: Hartville-----	0-6	20-27	1.10-1.30	4.00-14.00	0.22-0.24	0.1-2.9	1.0-3.0	10-16	9.0-15	4.5-7.3	.43	.43	5	6	48
	6-19	28-40	1.20-1.40	0.42-1.40	0.18-0.21	3.0-5.9	0.5-1.0	18-25	14-21	4.5-6.5	.43	.43			
	19-60	40-65	1.20-1.50	0.42-1.40	0.10-0.12	6.0-8.9	0.1-0.5	20-30	14-23	4.5-6.5	.32	.32			
73044: Crestmeade-----	0-8	15-27	1.35-1.50	4.00-14.00	0.22-0.24	0.1-2.9	2.0-4.0	10-15	6.0-12	5.6-7.3	.37	.37	3	6	48
	8-12	15-27	1.35-1.50	4.00-14.00	0.18-0.22	0.1-2.9	0.5-1.0	10-18	6.0-14	5.1-7.3	.43	.43			
	12-50	38-60	1.30-1.45	0.42-1.40	0.14-0.17	6.0-8.9	1.0-4.0	30-45	25-40	5.1-6.5	.32	.32			
	50-60	27-42	1.35-1.50	1.40-4.00	0.14-0.20	2.9-5.9	1.0-2.0	20-30	18-28	5.1-7.3	.32	.32			
73045: Crestmeade-----	0-8	28-40	1.35-1.50	1.40-4.00	0.16-0.20	2.9-5.9	1.0-3.0	10-20	7.0-17	5.6-7.3	.37	.37	3	6	48
	8-50	42-60	1.30-1.45	0.42-1.40	0.14-0.17	6.0-8.9	1.0-3.0	30-45	25-40	5.1-6.5	.32	.32			
	50-60	27-42	1.35-1.50	1.40-4.00	0.14-0.20	2.9-5.9	1.0-2.0	20-30	18-28	5.1-7.3	.32	.32			
73046: Wrengart-----	0-6	12-27	1.30-1.50	4.00-14.00	0.20-0.22	0.1-2.9	1.0-2.0	8.0-15	5.0-12	5.6-7.3	.37	.37	4	5	56
	6-26	20-35	1.30-1.50	4.00-14.00	0.18-0.20	3.0-5.9	0.5-1.0	11-20	10-19	4.5-6.5	.43	.43			
	26-45	18-32	1.50-1.70	1.40-4.00	0.10-0.15	0.1-2.9	0.1-0.5	11-22	7.0-18	4.5-7.3	.43	.43			
	45-60	28-34	1.30-1.50	4.00-14.00	0.05-0.10	3.0-5.9	0.1-0.5	11-22	7.0-18	4.5-7.3	.10	.43			
	60-80	40-80	1.30-1.50	1.40-4.00	0.08-0.12	6.0-8.9	0.1-0.5	25-40	23-38	5.1-7.8	.17	.28			
73047: Bardley-----	0-4	18-27	1.40-1.55	4.00-14.00	0.12-0.17	0.1-2.9	2.0-4.0	20-30	15-25	4.5-6.5	.28	.37	2	8	0
	4-8	18-27	1.40-1.55	4.00-14.00	0.06-0.08	0.1-2.9	0.5-2.0	5.0-10	2.0-7.0	4.5-6.5	.28	.37			
	8-27	60-90	1.20-1.40	4.00-14.00	0.08-0.12	3.0-5.9	0.5-1.0	30-50	21-40	4.5-7.3	.24	.28			
	27-60	---	---	0.07-0.42	---	---	---	---	---	---	---	---			

Table 18.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter	Cation exchange capacity	Effective cation exchange capacity	Soil reaction	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	um/sec	In/in	Pct	Pct	meq/100g	meq/100g	pH	Kw	Kf	T		
73047: Moko-----	0-3	18-27	1.25-1.50	4.00-14.00	0.07-0.13	0.1-2.9	2.0-6.0	15-40	15-45	6.6-7.8	.24	.43	1	8	0
	3-8	18-27	1.25-1.60	4.00-14.00	0.03-0.14	0.1-2.9	2.0-6.0	15-40	15-40	6.6-7.8	.28	.43			
	8-60	---	---	0.00-1.40	---	---	---	---	---	---	---	---			
73048: Rueter-----	0-3	4-27	1.20-1.40	14.00-42.00	0.10-0.13	0.1-2.9	0.5-2.0	2.0-11	1.0-8.0	3.5-6.0	.28	.37	3	8	0
	3-14	4-27	1.20-1.40	14.00-42.00	0.07-0.12	0.1-2.9	0.5-1.0	4.0-10	1.0-6.0	4.5-6.0	.37	.43			
	14-45	7-35	1.30-1.50	14.00-42.00	0.05-0.10	0.1-2.9	0.1-0.5	2.0-12	1.0-10	4.5-6.0	.32	.43			
	45-86	33-80	1.20-1.40	4.00-14.00	0.02-0.05	6.0-8.9	0.1-0.5	10-32	7.0-29	4.5-6.0	.20	.32			
73050: Rock outcrop-----	---	---	---	0.00-0.00	---	---	---	---	---	---	---	---	---	---	---
Bardley-----	0-4	18-27	1.40-1.55	4.00-14.00	0.12-0.17	0.1-2.9	2.0-4.0	20-30	15-25	4.5-6.5	.28	.37	2	8	0
	4-8	18-27	1.40-1.55	4.00-14.00	0.06-0.08	0.1-2.9	0.5-2.0	5.0-10	2.0-7.0	4.5-6.5	.28	.37			
	8-27	60-90	1.20-1.40	4.00-14.00	0.08-0.12	3.0-5.9	0.5-1.0	30-50	21-40	4.5-7.3	.24	.28			
	27-60	---	---	0.07-0.42	---	---	---	---	---	---	---	---			
73112: Gunlock-----	0-5	15-27	1.20-1.50	4.00-14.00	0.20-0.22	0.1-2.9	1.0-2.0	8.0-15	5.0-12	5.1-7.3	.37	.37	4	5	56
	5-25	27-45	1.30-1.50	1.40-4.00	0.12-0.18	3.0-5.9	0.5-1.0	18-24	14-20	4.5-6.5	.37	.43			
	25-43	20-35	1.50-1.70	0.42-1.40	0.08-0.14	0.1-2.9	0.1-0.5	10-18	7.0-14	5.1-6.5	.37	.43			
	43-55	35-60	1.30-1.50	1.40-4.00	0.06-0.13	6.0-8.9	0.1-0.5	18-34	14-29	4.5-6.5	.37	.43			
	55-80	40-80	1.30-1.50	1.40-4.00	0.06-0.18	6.0-8.9	0.1-0.5	25-36	20-40	4.5-6.5	.37	.37			
73136: Union-----	0-9	10-27	1.35-1.45	4.00-14.00	0.18-0.22	0.1-2.9	0.5-2.0	6.0-16	4.0-14	5.6-6.5	.43	.43	4	5	56
	9-30	27-50	1.30-1.40	4.00-14.00	0.14-0.19	3.0-5.9	0.5-1.0	14-24	10-20	4.5-5.5	.43	.43			
	30-53	15-27	1.60-1.90	0.42-1.40	0.01-0.05	0.1-2.9	0.1-0.5	8.0-18	5.0-15	3.5-5.0	.10	.43			
	53-80	40-80	1.30-1.45	1.40-4.00	0.02-0.06	6.0-8.9	0.1-0.5	20-40	15-35	4.5-6.0	.17	.28			
73137: Clafork-----	0-8	12-27	1.30-1.50	4.00-14.00	0.18-0.22	0.1-2.9	1.0-3.0	12-22	9.0-19	5.1-7.3	.32	.32	3	6	48
	8-36	32-50	1.25-1.50	1.40-4.00	0.12-0.17	6.0-8.9	0.5-1.5	20-33	17-30	4.5-6.5	.43	.43			
	36-56	15-35	1.50-1.70	1.40-4.00	0.10-0.14	0.1-2.9	0.1-0.5	7.0-22	5.0-20	5.1-7.8	.43	.43			
	56-69	12-35	1.50-1.70	1.40-4.00	0.08-0.11	0.1-2.9	0.1-0.5	6.0-12	5.0-10	5.6-7.8	.32	.37			
	69-80	30-55	1.20-1.60	4.00-14.00	0.06-0.09	6.0-8.9	0.1-0.5	28-40	23-30	5.6-7.8	.32	.37			
73138: Clafork-----	0-8	12-27	1.30-1.50	4.00-14.00	0.18-0.22	0.1-2.9	1.0-3.0	12-22	9.0-19	5.1-7.3	.32	.32	3	6	48
	8-11	12-27	1.30-1.50	4.00-14.00	0.16-0.20	0.1-2.9	0.5-2.0	11-21	8.0-17	5.1-7.3	.32	.32			
	11-39	32-50	1.25-1.50	1.40-4.00	0.12-0.17	6.0-8.9	0.5-1.5	20-33	17-30	4.5-6.5	.43	.43			
	39-59	15-35	1.50-1.70	1.40-4.00	0.10-0.14	0.1-2.9	0.1-0.5	7.0-22	5.0-20	5.1-7.8	.43	.43			
	59-72	12-35	1.50-1.70	1.40-4.00	0.08-0.11	0.1-2.9	0.1-0.5	6.0-12	5.0-10	5.6-7.8	.32	.37			
	72-80	30-55	1.20-1.60	4.00-14.00	0.06-0.09	6.0-8.9	0.1-0.5	28-40	23-30	5.6-7.8	.32	.37			

Table 18.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter	Cation exchange capacity	Effective cation exchange capacity	Soil reaction	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	um/sec	In/in	Pct	Pct	meq/100g	meq/100g	pH	Kw	Kf	T		
73190: Winnipeg-----	0-6	15-25	1.20-1.40	4.00-14.00	0.20-0.22	0.1-2.9	0.5-2.0	7.0-12	4.0-10	5.1-7.3	.37	.37	5	5	56
	6-28	20-30	1.20-1.40	4.00-14.00	0.18-0.22	0.1-2.9	0.5-1.0	5.0-12	3.0-10	4.5-7.3	.43	.43			
	28-48	23-35	1.20-1.50	4.00-14.00	0.10-0.16	0.1-2.9	0.1-0.5	12-18	8.0-14	4.5-7.3	.32	.43			
	48-80	25-35	1.30-1.55	4.00-14.00	0.07-0.10	3.0-5.9	0.1-0.5	10-20	7.0-15	4.5-7.3	.28	.32			
75376: Cedargap-----	0-9	12-27	1.20-1.45	4.00-14.00	0.16-0.18	0.1-2.9	1.0-4.0	7.0-17	7.0-17	5.6-7.3	.24	.32	5	8	0
	9-49	12-35	1.30-1.50	4.00-14.00	0.08-0.10	0.1-2.9	0.5-1.0	10-18	10-18	5.6-7.3	.32	.43			
	49-60	40-80	1.20-1.40	1.40-4.00	0.04-0.10	6.0-8.9	0.5-1.0	18-40	18-40	5.6-7.3	.20	.32			
75378: Sturkie-----	0-9	15-25	1.30-1.40	4.00-14.00	0.20-0.24	0.1-2.9	2.0-4.0	10-30	10-30	5.6-7.3	.37	.37	5	5	56
	9-19	18-30	1.30-1.40	4.00-14.00	0.20-0.22	0.1-2.9	1.0-3.0	10-30	10-30	5.6-7.3	.37	.37			
	19-60	18-30	1.35-1.45	4.00-14.00	0.18-0.20	0.1-2.9	0.5-2.0	10-30	10-30	5.6-7.3	.37	.37			
75384: Healing-----	0-15	10-25	1.35-1.50	4.00-14.00	0.16-0.24	0.1-2.9	2.0-4.0	10-20	8.0-18	5.6-7.3	.37	.37	5	5	56
	15-50	20-35	1.35-1.45	4.00-14.00	0.16-0.24	3.0-5.9	0.5-2.0	10-20	8.0-18	5.6-7.3	.37	.37			
	50-60	20-35	1.35-1.45	4.00-14.00	0.16-0.24	3.0-5.9	0.5-1.0	10-20	10-20	5.6-7.3	.37	.43			
75385: Gabriel-----	0-14	12-27	1.25-1.45	4.00-14.00	0.22-0.24	0.1-2.9	2.0-4.0	15-25	10-19	6.1-7.3	.32	.32	5	6	48
	14-29	27-35	1.20-1.40	1.40-4.00	0.18-0.20	3.0-5.9	2.0-4.0	15-25	10-19	5.1-6.5	.37	.37			
	29-80	22-35	1.25-1.45	1.40-4.00	0.18-0.20	3.0-5.9	0.1-1.0	15-25	10-22	5.1-6.5	.37	.37			
75386: Speed-----	0-14	12-22	1.25-1.45	4.00-14.00	0.22-0.24	0.1-2.9	1.0-3.0	12-17	8.0-13	5.6-7.3	.32	.32	5	5	56
	14-25	12-20	1.30-1.50	4.00-14.00	0.20-0.22	0.1-2.9	1.0-2.0	7.0-14	4.0-11	4.5-7.3	.43	.43			
	25-35	18-30	1.30-1.50	4.00-14.00	0.20-0.22	3.0-5.9	0.5-1.0	12-17	8.0-13	4.5-7.3	.43	.43			
	35-60	20-32	1.30-1.50	4.00-14.00	0.18-0.20	3.0-5.9	0.5-1.0	16-21	12-16	4.5-7.3	.43	.43			
75387: Hacreek-----	0-9	20-27	1.20-1.35	4.00-14.00	0.22-0.24	0.1-2.9	2.0-4.0	20-30	20-30	6.1-7.3	.32	.32	5	6	48
	9-21	30-36	1.30-1.50	1.40-4.00	0.18-0.20	3.0-5.9	1.0-2.0	25-35	25-35	6.1-7.8	.43	.43			
	21-28	30-35	1.30-1.50	1.40-4.00	0.18-0.20	3.0-5.9	0.1-1.0	20-30	20-30	6.1-7.8	.43	.43			
	28-70	30-35	1.30-1.50	1.40-4.00	0.16-0.20	3.0-5.9	0.1-1.0	20-30	20-30	6.1-7.8	.43	.43			
	70-81	28-35	1.35-1.55	1.40-4.00	0.16-0.18	3.0-5.9	0.1-1.0	20-30	20-30	6.1-7.8	.43	.43			
75415: Jemerson-----	0-9	12-27	1.25-1.40	4.00-14.00	0.22-0.24	0.1-2.9	0.5-2.0	8.0-16	3.0-12	5.1-7.3	.37	.37	5	6	48
	9-50	12-35	1.30-1.50	4.00-14.00	0.18-0.22	3.0-5.9	0.1-1.0	12-18	8.0-15	5.1-7.3	.37	.37			
	50-60	15-27	1.30-1.45	4.00-14.00	0.17-0.22	0.1-2.9	0.1-0.5	12-18	6.0-15	5.1-7.3	.37	.37			

Table 18.--Physical and Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter	Cation exchange capacity	Effective cation exchange capacity	Soil reaction	Erosion factors			Wind	Wind
											Kw	Kf	T	erodi- bility group	erodi- bility index
	In	Pct	g/cc	um/sec	In/in	Pct	Pct	meq/100g	meq/100g	pH					
75421: Racket-----	0-10	15-27	1.25-1.45	4.00-14.00	0.18-0.24	0.1-2.9	1.0-4.0	8.0-18	5.0-14	6.1-7.3	.32	.32	5	6	48
	10-38	15-30	1.25-1.45	4.00-14.00	0.16-0.20	3.0-5.9	1.0-3.0	10-20	7.0-15	6.1-7.3	.32	.32			
	38-60	5-15	1.35-1.55	42.00-141.00	0.02-0.08	0.1-2.9	0.5-2.0	6.0-16	4.0-10	6.1-7.3	.10	.17			
99000: Pits-----	---	---	---	---	---	---	---	---	---	---	---	---	---	8	0
99001. Water															
99003. Miscellaneous water															

Table 19.--Water Features

(The symbol > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydro- logic group	Flooding			High water table		
		Frequency	Duration	Months	Depth Ft	Kind	Months
15002: McGirk-----	C	None-----	---	---	0.5-2.0	Apparent	Nov-May
66000: Moniteau-----	C/D	Occasional	Brief-----	Nov-May	0-1.0	Apparent	Nov-May
70008, 7009: Goss-----	B	None-----	---	---	>6.0	---	---
70023: Eldon-----	B	None-----	---	---	>6.0	---	---
70024: Goss-----	B	None-----	---	---	>6.0	---	---
70028: Moko-----	D	None-----	---	---	>6.0	---	---
Rock outcrop.							
70046: Sacville-----	D	None-----	---	---	0-1.0	Perched	Nov-May
73012: Gravois-----	C	None-----	---	---	1.5-3.0	Perched	Nov-May
73034: Gravois, eroded-----	C	None-----	---	---	1.5-3.0	Perched	Nov-May
73035: Gravois-----	C	None-----	---	---	1.5-3.0	Perched	Nov-May
73036: Willowfork-----	D	None-----	---	---	0.5-1.5	Perched	Nov-May
73037: Friendly-----	D	None-----	---	---	1.0-2.0	Perched	Nov-Apr
73038, 73039: Glensted-----	D	None-----	---	---	0.5-1.5	Perched	Nov-May
73040, 73041: Maplewood-----	C	None-----	---	---	1.0-2.0	Perched	Nov-Apr
73042: Niangua-----	C	None-----	---	---	>6.0	---	---
Bardley-----	B	---	---	---	>6.0	---	---
73043: Hartville-----	C	None-----	---	---	1.0-2.0	Perched	Nov-Apr
73044, 73045: Crestmeade-----	D	None-----	---	---	0.5-1.5	Perched	Nov-May
73046: Wrengart-----	C	None-----	---	---	2.0-3.5	Perched	Nov-Apr

Table 19.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Flooding			High water table		
		Frequency	Duration	Months	Depth Ft	Kind	Months
73047: Bardley-----	B	None-----	---	---	>6.0	---	---
Moko-----	D	None-----	---	---	>6.0	---	---
73048: Rueter-----	B	None-----	---	---	>6.0	---	---
73050: Rock outcrop.							
Bardley-----	B	None-----	---	---	>6.0	---	---
73112: Gunlock-----	C	None-----	---	---	1.5-3.0	Perched	Nov-May
73136: Union-----	C	None-----	---	---	1.5-3.0	Perched	Nov-May
73137, 73138: Clafork-----	C	None-----	---	---	1.0-2.0	Perched	Nov-Apr
73190: Winnipeg-----	B	None-----	---	---	>6.0	---	---
75376: Cedargap-----	B	Frequent---	Very brief	Oct-Jun	>6.0	---	---
75378: Sturkie-----	B	Frequent---	Brief----	Nov-May	>6.0	---	---
75384: Healing-----	B	Occasional	Brief----	Nov-Apr	>6.0	---	---
75385: Gabriel-----	B/D	Occasional	Brief----	Nov-May	1.0-2.5	Apparent	Nov-May
75386: Speed-----	C	Rare-----	Brief----	Jan-Dec	1.0-2.5	Apparent	Nov-May
75387: Hacreek-----	B	Occasional	Brief----	Nov-May	1.0-2.0	Apparent	Nov-May
75415: Jemerson-----	B	Occasional	Brief----	Oct-Apr	3.5-5.0	Apparent	Nov-Apr
75421: Racket-----	B	Occasional	Very brief	Nov-May	3.5-6.0	Apparent	Nov-May
99000. Pits							
99001. Water							
99003. Miscellaneous water							

Table 20.--Soil Features

Map symbol and soil name	Restrictions				Potential frost action	Risk of corrosion	
	Depth	Kind	Thickness	Hardness		Uncoated steel	Concrete
	In		In				
15002: McGirk-----	---	---	---	---	High	High	High
66000: Moniteau-----	---	---	---	---	High	High	High
70008, 70009: Goss-----	---	---	---	---	Moderate	Moderate	Moderate
70023: Eldon-----	---	---	---	---	Moderate	Moderate	Moderate
70024: Goss-----	---	---	---	---	Moderate	Moderate	Moderate
70028: Moko-----	4-20	Bedrock (lithic)	---	Indurated	Moderate	Low	Low
Rock outcrop----	---	Bedrock (lithic)	---	Indurated	---	---	---
70046: Sacville-----	---	---	---	---	High	High	Low
73012: Gravois-----	18-40	Dense material	10-35	Noncemented	Moderate	Moderate	High
73034: Gravois, eroded-----	18-40	Dense material	10-35	Noncemented	Moderate	Moderate	High
73035: Gravois-----	18-40	Dense material	10-35	Noncemented	Moderate	Moderate	High
73036: Willowfork-----	---	---	---	---	High	High	Moderate
73037: Friendly-----	20-40	Dense material	14-40	Noncemented	Moderate	High	Moderate
73038, 73039: Glensted-----	6-10	Abrupt textural change	16-34	Noncemented	High	High	Moderate
73040, 73041: Maplewood-----	16-40	Dense material	8-20	Noncemented	Moderate	High	Moderate
73042: Niangua-----	40-60	Bedrock (lithic)	---	Indurated	Moderate	High	Moderate
Bardley-----	20-40	Bedrock (lithic)	---	Indurated	Moderate	Moderate	Moderate
73043: Hartville-----	---	---	---	---	High	Moderate	Moderate
73044, 73045: Crestmeade-----	---	---	---	---	High	High	Moderate
73046: Wrengart-----	20-40	Dense material	5-35	Noncemented	Moderate	Moderate	Moderate

Table 20.--Soil Features--Continued

Map symbol and soil name	Restrictions				Potential frost action	Risk of corrosion	
	Depth	Kind	Thickness	Hardness		Uncoated steel	Concrete
	In		In				
73047: Bardley-----	20-40	Bedrock (lithic)	---	Indurated	Moderate	Moderate	Moderate
Moko-----	4-20	Bedrock (lithic)	---	Indurated	None	Low	Low
73048: Rueter-----	---	---	---	---	Moderate	Low	High
73050: Rock outcrop----	---	Bedrock (lithic)	---	Indurated	---	---	---
Bardley-----	20-40	Bedrock (lithic)	---	Indurated	Moderate	Moderate	Moderate
73112: Gunlock-----	20-34	Dense material	10-30	Noncemented	Moderate	Moderate	High
73136: Union-----	18-36	Fragipan	9-25	Noncemented	Moderate	High	High
73137, 73138: Clafork-----	30-40	Dense material	10-45	Noncemented	Moderate	High	Moderate
73190: Winnipeg-----	---	---	---	---	Low	Moderate	Moderate
75376: Cedargap-----	---	---	---	---	Moderate	Low	Low
75378: Sturkie-----	---	---	---	---	None	Low	Low
75384: Healing-----	---	---	---	---	None	Low	Moderate
75385: Gabriel-----	---	---	---	---	High	High	Moderate
75386: Speed-----	---	---	---	---	High	High	Moderate
75387: Hacreek-----	---	---	---	---	High	High	Low
75415: Jemerson-----	---	---	---	---	High	Moderate	Moderate
75421: Racket-----	---	---	---	---	Moderate	Moderate	Low
99000: Pits-----	---	---	---	---	None	---	---
99001. Water							
99003. Miscellaneous water							



# Classification of the Soils

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The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA, 1998 and 1999). 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 21 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

**ORDER.** Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is 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; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalf*, the suborder of the Alfisols that has a udic moisture regime).

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

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

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

## Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (USDA, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (USDA, 1999) and in "Keys to Soil Taxonomy" (USDA, 1998). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

### **Bardley Series**

The Bardley series consists of moderately deep, well drained, moderately permeable soils on uplands. These soils formed in gravelly colluvium and clayey residuum weathered from dolostone. Slopes range from 3 to 99 percent slopes.

Soils of the Bardley series are very-fine, mixed, active, mesic Typic Hapludalfs.

Typical pedon of Bardley very gravelly silt loam, in an area of Niangua-Bardley complex, 15 to 50 percent slopes, extremely stony; USGS Gravois Mills topographic quadrangle; latitude 38 degrees 15 minutes 55 seconds N.; longitude 92 degrees 52 minutes 20 seconds W.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) very gravelly silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; common very fine and fine roots throughout; common very fine and fine vesicular pores; 40 percent subangular chert gravel; neutral; clear smooth boundary.

E—3 to 9 inches; brown (10YR 5/3) very gravelly silt loam; weak fine granular structure; friable; common very fine and fine roots throughout; common very fine and fine vesicular pores; 45 percent subangular chert gravel; moderately acid; clear smooth boundary.

2Bt1—9 to 16 inches; red (2.5YR 4/6) clay; moderate fine and medium subangular blocky structure; firm; common very fine and fine roots throughout; common very fine and fine vesicular pores; few prominent continuous reddish brown (5YR 4/4) clay films on faces of peds; common medium red (2.5YR 4/8) irregular soft masses of iron accumulation throughout; 5 percent subangular chert gravel; very strongly acid; clear smooth boundary.

2Bt2—16 to 31 inches; red (2.5YR 4/6) gravelly clay; moderate fine and medium subangular blocky structure; firm; few very fine and fine roots throughout; common very fine and fine vesicular pores; few prominent continuous reddish brown (5YR 4/4) clay films on faces of peds; common medium yellowish red (5YR 4/6) and dark red (2.5YR 3/6) irregular soft masses of iron accumulation throughout; 20 percent subangular chert gravel; moderately acid; gradual smooth boundary.

2Bt3—31 to 37 inches; yellowish red (5YR 4/6) clay; moderate fine and medium subangular blocky structure; firm; common very fine and fine vesicular pores; few distinct continuous reddish brown (5YR 4/4) clay films on faces of peds; few medium dark yellowish brown (10YR 3/6) irregular soft masses of iron accumulation throughout; 5 percent subangular chert gravel; slightly acid; abrupt wavy boundary.

2R—37 inches; unweathered dolostone.

The depth to bedrock ranges from 20 to 40 inches.

The A horizon has value of 3 or 4 and chroma of 2 or 3. It is gravelly to extremely gravelly silt loam.

The E horizon has value of 5 or 6 and chroma of 3 or 4. It is very gravelly or extremely gravelly silt loam.

The 2Bt horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 4 or 6. It is silty clay, clay, or the gravelly analogues of these textures.

Some pedons have 2C horizons.

### ***Cedargap Series***

The Cedargap series consists of very deep, well drained, moderately slowly permeable soils formed in gravelly alluvium on flood plains. These soils are along small streams near active channels. Slopes range from 0 to 3 percent.

Soils of the Cedargap series are loamy-skeletal, mixed, superactive, mesic Cumulic Hapludolls.

Typical pedon of Cedargap gravelly silt loam, 0 to 3 percent slopes, frequently flooded; USGS Gravois Mills topographic quadrangle; latitude 38 degrees 20 minutes 17 seconds N.; longitude 92 degrees 47 minutes 17 seconds W.

A1—0 to 6 inches; very dark grayish brown (10YR 3/2) gravelly silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many very fine and fine roots throughout; common very fine and fine tubular pores; 20 percent subangular chert gravel; slightly acid; abrupt smooth boundary.

A2—6 to 26 inches; very dark grayish brown (10YR 3/2) gravelly loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many very fine and fine roots throughout; common very fine and fine tubular pores; 30 percent subangular chert gravel and 3 percent subangular chert cobbles; neutral; gradual smooth boundary.

Bw1—26 to 34 inches; very dark grayish brown (10YR 3/2) very gravelly clay loam; weak fine subangular blocky structure; friable; common very fine and fine roots throughout; common very fine and fine tubular pores; 45 percent subangular chert gravel and 15 percent subangular chert cobbles; neutral; gradual wavy boundary.

Bw2—34 to 43 inches; very dark grayish brown (10YR 3/2) very gravelly clay loam; weak fine subangular blocky structure; friable; common very fine and fine roots throughout; common very fine and fine tubular pores; few fine brown (10YR 4/3) irregular soft masses of iron accumulation throughout; 40 percent subangular chert gravel; neutral; gradual wavy boundary.

Bw3—43 to 55 inches; very dark grayish brown (10YR 3/2) extremely gravelly clay loam; weak fine subangular blocky structure; firm; common very fine and fine tubular pores; 70 percent subangular chert gravel; slightly acid; gradual wavy boundary.

Bw4—55 to 60 inches; very dark gray (10YR 3/1) very gravelly silty clay loam; weak fine subangular blocky structure; firm; common very fine and fine tubular pores; common medium brown (10YR 4/3) irregular soft masses of iron accumulation throughout; 40 percent subangular chert gravel; neutral.

The A1 or AP horizon has value of 2 or 3 and chroma of 1 to 3.

The A2 or A horizon is similar in color as the A1 or AP horizon. It is gravelly or very gravelly loam or very gravelly sandy clay loam.

The Bw horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 1 to 4. It is silt loam, clay loam, silty clay loam, or the gravelly to extremely gravelly analogues of these textures.

The 2C horizon, where present, has hue of 10YR or 7.5YR, value of 2 to 5, and chroma of 1 to 4. It is silty clay loam, clay loam, clay, or the gravelly to extremely gravelly analogues of these textures.

### ***Clafork Series***

The Clafork series consists of very deep, somewhat poorly drained, moderately slowly permeable soils on uplands. These soils formed in loess over gravelly residuum weathered from cherty limestone. Slopes range from 2 to 5 percent.

Soils of the Clafork series are fine, smectitic, mesic Aquertic Hapludalfs.

Typical pedon of Clafork silt loam, 2 to 5 percent slopes; USGS Clarksburg quadrangle; latitude 38 degrees 41 minutes 45 seconds N.; longitude 92 degrees 42 minutes 51 seconds W.; in Cooper County.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many very fine roots; few fine iron and manganese oxide accumulations; neutral; abrupt smooth boundary.

E—8 to 11 inches; brown (10YR 5/3) silt loam; weak medium platy structure parting to weak very fine subangular blocky; friable; many very fine roots; few fine prominent strong brown (7.5YR 5/8) masses of iron accumulation throughout; few fine iron and manganese oxide accumulations;

common distinct clay depletions on faces of peds; slightly acid; clear smooth boundary.

Bt—11 to 16 inches; dark yellowish brown (10YR 4/4) and grayish brown (10YR 5/2) silty clay loam, moderate very fine subangular blocky structure; firm; common very fine roots; common distinct clay films on faces of peds; common fine prominent red (2.5YR 4/8) masses of iron accumulation throughout; few fine iron and manganese oxide accumulations; few distinct clay depletions on faces of peds; strongly acid; clear smooth boundary.

Btg1—16 to 23 inches; dark grayish brown (10YR 4/2) and dark yellowish brown (10YR 4/4) silty clay; strong very fine subangular blocky structure; very firm; few very fine roots; many prominent clay films on faces of peds; common fine prominent red (2.5YR 4/8) masses of iron accumulation throughout; few fine iron and manganese oxide accumulations; strongly acid; gradual smooth boundary.

Btg2—23 to 31 inches; dark grayish brown (10YR 4/2) and dark yellowish brown (10YR 4/4) silty clay; strong very fine subangular blocky structure; very firm; few very fine roots; many distinct clay films on faces of peds; common fine prominent strong brown (7.5YR 4/6) masses of iron accumulation throughout; few fine iron and manganese oxide accumulations; moderately acid; gradual smooth boundary.

Btg3—31 to 39 inches; grayish brown (10YR 5/2) and dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; firm; few very fine roots; common distinct clay films on faces of peds; common fine prominent strong brown (7.5YR 4/8) masses of iron accumulation throughout; common fine iron and manganese oxide accumulations; slightly acid; gradual smooth boundary.

2Btgx1—39 to 49 inches; grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) silty clay loam; moderate medium prismatic structure; very firm; 40 percent brittle; few very fine roots; few distinct clay films on vertical faces of peds; common fine prominent strong brown (7.5YR 5/8) masses of iron accumulation throughout; few fine iron and manganese oxide accumulations; few distinct clay depletions on vertical faces of peds; neutral; clear smooth boundary.

2Btgx2—49 to 59 inches; grayish brown (10YR 5/2) silt loam; weak coarse prismatic structure; very firm; 50 percent brittle; few very fine roots; few distinct clay films in root channels and vertical faces of peds; common fine prominent strong

brown (7.5YR 4/8) and common fine distinct yellowish brown (10YR 5/4) masses of iron accumulation throughout; few fine iron and manganese oxide accumulations; 4 percent chert gravel; many distinct clay depletions on vertical faces of peds; slightly alkaline; clear smooth boundary.

3Btgx3—59 to 72 inches; grayish brown (10YR 5/2) very gravelly silt loam; weak fine subangular blocky structure; firm; 40 percent brittle; few very fine roots; few distinct clay films on faces of peds; common fine prominent strong brown (7.5YR 4/8) masses of iron accumulation throughout; few fine iron and manganese oxide accumulations; 50 percent chert gravel; slightly alkaline; clear smooth boundary.

4Bt—72 to 80 inches; red (2.5YR 4/8) and dark red (2.5YR 3/6) very gravelly silty clay; strong very fine subangular blocky structure; very firm; few very fine roots; common pressure faces; many prominent clay films on faces of peds; few fine iron and manganese oxide stains; 45 percent chert gravel; 10 percent chert cobbles; slightly alkaline; gradual smooth boundary.

The depth to the dense material ranges from 30 to 40 inches.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3 (4 or 5 dry), and chroma of 2 or 3.

The E horizon has hue of 10YR or 7.5YR, value of 4 to 7, and chroma of 2 to 4.

The Bt and Btg horizons have hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2, 3, 4, or 6. Texture is silty clay loam or silty clay.

The 2Btgx horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. It is silt loam or silty clay loam.

The 3Btgx horizon has hue of 2.5YR to 10YR, value of 3 to 6, and chroma of 1, 2, 3, 4, or 6. It is very gravelly or extremely gravelly silt loam or silty clay loam.

The 4Bt horizon has hue of 2.5YR to 7.5YR, value of 3 to 6, and chroma of 1, 2, 3, 4, 6, or 8. It is very gravelly or extremely gravelly silty clay loam or silty clay.

### ***Crestmeade Series***

The Crestmeade series consists of very deep, somewhat poorly drained, slowly permeable soils formed in loess on uplands. Slopes range from 0 to 3 percent.

Soils of the Crestmeade series are fine, smectitic, mesic Vertic Argialbolls.

Typical pedon of Crestmeade silt loam, 0 to 2 percent slopes; USGS Tipton topographic quadrangle; latitude 38 degrees 40 minutes 23 seconds N.; longitude 92 degrees 51 minutes 12 seconds W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common very fine and fine roots throughout; many very fine and fine tubular pores; moderately acid; abrupt smooth boundary.

E—8 to 12 inches; grayish brown (10YR 5/2) silt loam; weak fine granular structure; friable; common very fine and fine roots throughout; common very fine and fine tubular pores; few fine yellowish brown (10YR 5/4) irregular soft masses of iron accumulation throughout; strongly acid; abrupt smooth boundary.

Btg1—12 to 20 inches; very dark gray (10YR 3/1) silty clay, gray (10YR 5/1) dry; moderate medium subangular blocky structure; firm; common very fine and fine roots throughout; common very fine and fine tubular pores; very few faint discontinuous dark gray (10YR 4/1) clay films on faces of peds; few fine dark yellowish brown (10YR 4/4) irregular soft masses of iron accumulation throughout; strongly acid; gradual smooth boundary.

Btg2—20 to 27 inches; 85 percent dark grayish brown (10YR 4/2) and 15 percent very dark grayish brown (10YR 3/2) silty clay; moderate medium subangular blocky structure; firm; few very fine and fine roots throughout; common very fine and fine tubular pores; very few faint discontinuous dark gray (10YR 4/1) clay films on faces of peds; common fine brown (10YR 4/3) irregular soft masses of iron accumulation throughout; moderately acid; gradual smooth boundary.

Btg3—27 to 35 inches; dark grayish brown (10YR 4/2) silty clay; weak medium subangular blocky structure; firm; common very fine and fine tubular pores; few faint continuous dark gray (10YR 4/1) clay films on faces of peds; common medium dark yellowish brown (10YR 4/4) irregular soft masses of iron accumulation throughout; slightly acid; gradual smooth boundary.

Btg4—35 to 50 inches; 85 percent grayish brown (10YR 5/2) and 15 percent gray (10YR 5/1) silty clay loam; weak medium subangular blocky structure; firm; common very fine and fine tubular pores; few faint continuous dark gray (10YR 4/1) clay films on faces of peds and few distinct discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; many medium

dark yellowish brown (10YR 4/4) irregular soft masses of iron accumulation throughout; slightly acid; gradual smooth boundary.

Cg—50 to 60 inches; gray (10YR 5/1) silty clay loam; massive parting to weak medium subangular blocky structure; firm; common very fine and fine tubular pores; very few faint discontinuous dark gray (10YR 4/1) clay films in root channels and/or pores; common medium dark yellowish brown (10YR 4/4, 4/6) irregular soft masses of iron accumulation throughout; neutral.

The combined thickness of the mollic epipedon is 10 to 20 inches.

The Ap horizon has value of 2 or 3 (4 or 5 dry) and chroma of 1 to 3. It is silt loam or silty clay loam.

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

The upper part of the Btg horizon has value of 2 or 3 and chroma of 1 or 2.

The lower part of the Btg horizon has value of 4 to 6 and chroma of 1 or 2. It is silty clay or silty clay loam.

The Cg horizon is similar in color as the Btg horizon and is silty clay loam or silt loam.

Map unit 73045, Crestmeade silty clay loam, 1 to 3 percent slopes, eroded is a taxadjunct to the Crestmeade series because it lacks an albic horizon. This difference has a minor affect on the use and management of these soils.

### ***Eldon Series***

The Eldon series consists of very deep, well drained, moderately permeable soils on uplands. These soils formed in residuum weathered from cherty dolostone interbedded with shale and sandstone. Slopes range from 3 to 8 percent.

Soils of the Eldon series are clayey-skeletal, mixed, active, mesic Mollic Paleudalfs.

Typical pedon of Eldon silt loam, 3 to 8 percent slopes; USGS Barnett topographic quadrangle; latitude 38 degrees 24 minutes 57 seconds N.; longitude 92 degrees 42 minutes 58 seconds W.

A—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable; many very fine and fine roots; many very fine and fine vesicular pores; 10 percent angular chert gravel; strongly acid; clear smooth boundary.

BA—9 to 17 inches; brown (10YR 4/3) very gravelly silt loam; weak fine subangular blocky structure parting to weak fine granular; firm; common very

fine and fine roots; common very fine and fine vesicular pores; 59 percent angular chert gravel; strongly acid; gradual smooth boundary.

Bt1—17 to 27 inches; dark red (2.5YR 3/6) extremely gravelly clay; common fine prominent grayish brown (10YR 5/2) irregular mottles throughout; moderate fine and medium subangular blocky structure; firm; common very fine and fine roots; common very fine and fine vesicular pores; few distinct continuous yellowish red (5YR 5/6) clay films on faces of peds; common fine strong brown (7.5YR 5/6) irregular soft masses of iron accumulation throughout; 65 percent angular chert gravel; very strongly acid; clear smooth boundary. The 10YR 5/2 colors are relic.

Bt2—27 to 39 inches; red (2.5YR 4/6) gravelly silty clay; common medium prominent grayish brown (10YR 5/2) irregular mottles throughout; moderate fine and medium subangular blocky structure; firm; common fine roots; common very fine and fine vesicular pores; few distinct continuous yellowish red (5YR 5/6) clay films throughout; 25 percent angular chert gravel; very strongly acid; clear smooth boundary. The 10YR 5/2 colors are relic.

Bt3—39 to 45 inches; red (2.5YR 4/6) very gravelly silty clay; many medium prominent grayish brown (10YR 5/2) irregular mottles throughout; moderate fine and medium subangular blocky structure; firm; common very fine and fine vesicular pores; few distinct continuous yellowish red (5YR 5/6) clay films on faces of peds; common medium strong brown (7.5YR 5/8) irregular soft masses of iron accumulation throughout; 40 percent angular chert gravel; strongly acid; clear smooth boundary. The 10YR 5/2 colors are relic.

2Bt4—45 to 60 inches; reddish yellow (7.5YR 6/8) very gravelly silty clay; many medium prominent gray (10YR 5/1) irregular mottles throughout; moderate fine and medium subangular blocky structure; firm; common very fine and fine vesicular pores; few prominent continuous yellowish red (5YR 5/6) clay films throughout; common fine yellowish red (5YR 5/8) irregular soft masses of iron accumulation throughout; 55 percent angular chert gravel; strongly acid. The 10YR 5/1 colors are relic.

The A or Ap horizon has value of 2 or 3 and chroma of 2 or 3.

The BA horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 3, 4, or 6. It is gravelly or very gravelly silt loam or silty clay loam.

The Bt and 2Bt horizons have hue of 2.5YR to 7.5YR, value of 3 to 6, and chroma of 3, 4, 6, or 8. Texture is gravelly to extremely gravelly silty clay or clay.

### ***Friendly Series***

The Friendly series consists of very deep, somewhat poorly drained, slowly permeable soils on uplands. These soils formed in a thin mantle of loess and the underlying clayey residuum weathered from dolostone. Slopes range from 1 to 3 percent.

Soils of the Friendly series are fine, mixed, active, mesic Albaquic Hapludalfs.

Typical pedon of Friendly silt loam, 1 to 3 percent slopes; USGS Barnett topographic quadrangle; latitude 38 degrees 24 minutes 22 seconds N.; longitude 92 degrees 43 minutes 10 seconds W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; friable; many very fine and fine roots throughout; many very fine and fine vesicular pores; slightly acid; abrupt smooth boundary.

Bt1—7 to 14 inches; 75 percent dark grayish brown (10YR 4/2) and 25 percent dark gray (10YR 4/1) silty clay; moderate fine and medium subangular blocky structure; firm; common very fine and fine roots throughout; common very fine and fine vesicular pores; few faint continuous gray (10YR 5/1) clay films on faces of peds; common medium strong brown (7.5YR 4/6) irregular soft masses of iron accumulation throughout; moderately acid; abrupt smooth boundary.

Bt2—14 to 22 inches; yellowish brown (10YR 5/6) silty clay loam; firm; common very fine and fine roots throughout; common very fine and fine vesicular pores; few prominent continuous gray (10YR 5/1) clay films on faces of peds; very few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; many medium prominent light brownish gray (10YR 6/2) irregular iron depletions throughout; slightly acid; clear smooth boundary.

2Btx1—22 to 33 inches; dark yellowish brown (10YR 4/6) silty clay loam; moderate fine and medium prismatic structure parting to weak fine and medium subangular blocky; very firm; 50 percent brittle; few very fine and fine roots in vertical seams; common very fine and fine vesicular pores; very few distinct discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; very few prominent discontinuous black

(10YR 2/1) manganese or iron-manganese stains throughout; few fine dark yellowish brown (10YR 4/4) irregular soft masses of iron accumulation throughout; common medium grayish brown (10YR 5/2) irregular iron depletions between peds; 5 percent subangular chert gravel; slightly acid; clear smooth boundary.

2Btx2—33 to 43 inches; yellowish brown (10YR 5/6) very gravelly silty clay loam; weak medium prismatic structure parting to weak fine and medium subangular blocky; very firm; 50 percent brittle; common very fine and fine vesicular pores; very few faint discontinuous dark yellowish brown (10YR 4/6) clay films on faces of peds; common coarse prominent grayish brown (10YR 5/2) irregular iron depletions in cracks; 50 percent subangular chert gravel; neutral; clear smooth boundary.

3Bt1—43 to 54 inches; yellowish brown (10YR 5/6) extremely gravelly silty clay; moderate fine subangular blocky structure; firm; common very fine and fine vesicular pores; few faint continuous dark yellowish brown (10YR 4/6) clay films on faces of peds; many medium dark red (2.5YR 3/6) soft masses of iron accumulation throughout; 70 percent subangular chert gravel and 5 percent subangular chert cobbles; neutral; gradual smooth boundary.

3Bt2—54 to 60 inches; dark red (2.5YR 3/6) gravelly clay; moderate fine and medium subangular blocky structure; firm; common very fine and fine vesicular pores; few prominent continuous light brownish gray (10YR 6/2) clay films on faces of peds; common fine yellowish brown (10YR 5/6) irregular soft masses of iron accumulation throughout; 30 percent subangular chert gravel; neutral.

The depth to the dense material ranges from 20 to 40 inches.

The Ap horizon has value of 2 or 3.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 6, and chroma of 1, 2, 3, 4, or 6. It is silty clay loam or silty clay.

The 2Btx horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 1, 2, 3, 4, or 6. It is silt loam, silty clay loam, or the gravelly to extremely gravelly analogues of these textures.

The 3Bt horizon has hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 3, 4, 6, or 8. It is silty clay, clay, or the gravelly to extremely gravelly analogues of these textures.

### ***Gabriel Series***

The Gabriel series consists of very deep, poorly drained, moderately slowly permeable soils formed in silty alluvium on stream terraces. Slopes range from 0 to 2 percent.

Soils of the Gabriel series are fine-silty, mixed, superactive, mesic Typic Argiaquolls.

Typical pedon of Gabriel silt loam, 0 to 2 percent slopes, occasionally flooded; USGS Florence topographic quadrangle; latitude 38 degrees 37 minutes 6 seconds N.; longitude 92 degrees 56 minutes 8 seconds W.

Ap—0 to 6 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak fine granular structure; friable; common very fine and fine roots throughout; common very fine and fine tubular pores; slightly acid; abrupt smooth boundary.

A—6 to 14 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak fine granular structure; friable; few very fine and fine roots throughout; common very fine and fine tubular pores; common fine dark yellowish brown (10YR 3/4) irregular soft masses of iron accumulation throughout; slightly acid; clear smooth boundary.

Btg1—14 to 20 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; weak fine subangular blocky structure; friable; few very fine and fine roots throughout; few very fine and fine tubular pores; very few faint discontinuous dark gray (10YR 4/1) clay films and distinct discontinuous pale brown (10YR 6/3) clay depletions on faces of peds; common fine dark yellowish brown (10YR 4/4) irregular soft masses of iron accumulation throughout; moderately acid; clear smooth boundary.

Btg2—20 to 29 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; moderate fine subangular blocky structure; firm; few very fine and fine roots throughout; few very fine and fine tubular pores; very few faint discontinuous dark gray (10YR 4/1) clay films on faces of peds; very few faint discontinuous light brownish gray (10YR 6/2) clay depletions on faces of peds and in pores; common fine dark yellowish brown (10YR 3/4) irregular soft masses of iron accumulation throughout; strongly acid; gradual smooth boundary.

Btg3—29 to 37 inches; dark gray (10YR 4/1) silty clay loam; moderate fine subangular blocky structure; firm; few very fine and fine tubular pores; very few faint discontinuous gray (10YR

5/1) clay films on faces of peds; very few faint discontinuous light brownish gray (10YR 6/2) clay depletions on faces of peds and in pores; few medium dark yellowish brown (10YR 3/4) irregular soft masses of iron accumulation throughout; moderately acid; gradual smooth boundary.

Btg4—37 to 46 inches; dark gray (10YR 4/1) silty clay loam; moderate fine subangular blocky structure; firm; few very fine and fine tubular pores; very few faint discontinuous gray (10YR 5/1) clay films and very few faint discontinuous light brownish gray (10YR 6/2) clay depletions on faces of peds; very few faint discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; common medium dark yellowish brown (10YR 4/4) irregular soft masses of iron accumulation throughout; moderately acid; clear smooth boundary.

Btg5—46 to 55 inches; dark grayish brown (10YR 4/2) silty clay loam; weak fine subangular blocky structure; firm; few very fine and fine tubular pores; very few faint discontinuous gray (10YR 5/1) clay films on faces of peds; common medium yellowish brown (10YR 5/6) and dark yellowish brown (10YR 3/4) irregular soft masses of iron accumulation throughout; moderately acid; gradual smooth boundary.

Btg6—55 to 67 inches; dark grayish brown (10YR 4/2) silty clay loam; weak fine subangular blocky structure; firm; few very fine tubular pores; very few faint discontinuous gray (10YR 5/1) clay films on faces of peds; common medium strong brown (7.5YR 4/6) and dark yellowish brown (10YR 3/4) irregular soft masses of iron accumulation throughout; moderately acid; gradual smooth boundary.

Btg7—67 to 80 inches; dark grayish brown (10YR 4/2) silty clay loam; weak fine subangular blocky structure; firm; few very fine tubular pores; very few faint discontinuous gray (10YR 5/1) clay films on faces of peds; many medium strong brown (7.5YR 5/6) irregular soft masses of iron accumulation throughout; moderately acid.

The mollic epipedon is 24 to 30 inches thick.

The A horizon has value of 2 or 3 and chroma of 1 or 2.

The upper part of the Btg horizon is similar in color as the A horizon.

The lower part of the Btg horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. It is silt loam or silty clay loam.

### ***Glensted Series***

The Glensted series consists of very deep, poorly drained, slowly permeable soils on uplands. These soils formed in loess and in the underlying residuum weathered from cherty limestone. Slopes range from 0 to 3 percent.

Soils of the Glensted series are fine, smectitic, mesic Vertic Albaqualfs.

Typical pedon of Glensted silt loam, 1 to 3 percent slopes; latitude 38 degrees 28 minutes 57 seconds N.; longitude 92 degrees 46 minutes 27 seconds W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many very fine and fine roots throughout; many very fine and fine vesicular pores; moderately acid; abrupt smooth boundary.

Btg1—8 to 14 inches; dark grayish brown (10YR 4/2) silty clay; moderate fine subangular blocky structure; firm; common very fine roots throughout; common fine vesicular pores; few faint continuous dark gray (10YR 4/1) clay films on faces of peds; few faint discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; few fine brown (10YR 4/3) irregular soft masses of iron accumulation throughout; moderately acid; clear smooth boundary.

Btg2—14 to 25 inches; dark grayish brown (10YR 4/2) silty clay; moderate fine and medium subangular blocky structure; firm; common very fine and fine roots throughout; common very fine and fine vesicular pores; few faint continuous dark gray (10YR 4/1) clay films on faces of peds; very few faint discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; few fine dark yellowish brown (10YR 4/4) irregular soft masses of iron accumulation throughout; slightly acid; clear smooth boundary.

Btg3—25 to 30 inches; dark grayish brown (10YR 4/2) silty clay loam; moderate fine subangular blocky structure; firm; common very fine roots throughout; common fine vesicular pores; few faint continuous dark gray (10YR 4/1) clay films on faces of peds; very few distinct discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; many fine yellowish brown (10YR 5/6) irregular soft masses of iron accumulation throughout; neutral; gradual smooth boundary.

2Btg4—30 to 45 inches; grayish brown (10YR 5/2) silty clay loam; weak fine subangular blocky

structure; firm; common very fine and fine vesicular pores; very few faint discontinuous dark gray (10YR 4/1) clay films on faces of peds; very few faint discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; many fine dark yellowish brown (10YR 4/4) irregular soft masses of iron accumulation throughout; 2 percent subangular chert gravel; neutral; gradual smooth boundary.

2Btg5—45 to 51 inches; grayish brown (10YR 5/2) silty clay loam; weak fine subangular blocky structure; firm; common very fine and fine vesicular pores; very few faint discontinuous dark gray (10YR 4/1) clay films on faces of peds; very few distinct discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; common fine dark yellowish brown (10YR 4/4) irregular soft masses of iron accumulation throughout; 2 percent subangular chert gravel; neutral; clear smooth boundary.

2Btg6—51 to 60 inches; light brownish gray (10YR 6/2) silty clay loam; weak fine subangular blocky structure; firm; common very fine and fine vesicular pores; very few faint discontinuous dark gray (10YR 4/1) clay films on faces of peds; common fine yellowish brown (10YR 5/6) irregular soft masses of iron accumulation throughout; 12 percent subangular chert gravel; neutral.

The depth to the abrupt textural change is 6 to 10 inches.

The Ap horizon has value of 2 or 3 and chroma of 1 to 3.

The Btg and 2Btg horizons have value of 4 to 6 and chroma of 1 or 2. Texture is silty clay or silty clay loam.

The 2BCg and 2Cg horizons, where present, have hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Texture is silty clay loam or silty clay.

### ***Goss Series***

The Goss series consists of very deep, well drained, moderately permeable soils on uplands. These soils formed in gravelly colluvium over residuum weathered from cherty dolostone. Slopes range from 3 to 35 percent slopes.

Soils of the Goss series are clayey-skeletal, mixed, active, mesic Typic Paleudalfs.

Typical pedon of Goss gravelly silt loam, 8 to 15 percent slopes; USGS Crockerville topographic quadrangle; latitude 38 degrees 25 minutes

7 seconds N.; longitude 93 degrees 3 minutes 14 seconds W.

- A—0 to 5 inches; dark grayish brown (10YR 4/2) gravelly silt loam; weak fine granular structure; friable; many very fine and fine roots; many very fine and fine vesicular pores; 25 percent angular chert gravel; strongly acid; clear smooth boundary.
- E1—5 to 11 inches; brown (10YR 4/3) extremely gravelly silt loam; weak fine granular structure; friable; many very fine and fine roots; many very fine and fine vesicular pores; 60 percent angular chert gravel and 10 percent angular chert cobbles; very strongly acid; clear smooth boundary.
- E2—11 to 19 inches; brown (7.5YR 5/4) extremely gravelly silt loam; weak fine granular structure; friable; common very fine and fine roots; common very fine and fine vesicular pores; 60 percent angular chert gravel and 10 percent angular chert cobbles; very strongly acid; clear smooth boundary.
- Bt1—19 to 31 inches; red (2.5YR 4/6) very gravelly silty clay loam; moderate fine and medium subangular blocky structure; firm; common very fine and fine roots; common very fine and fine vesicular pores; very few distinct discontinuous reddish brown (2.5YR 4/4) clay films on faces of peds; common medium reddish yellow (5YR 6/6) irregular soft masses of iron accumulation throughout; 40 percent angular chert gravel and 10 percent angular chert cobbles; very strongly acid; clear smooth boundary.
- Bt2—31 to 41 inches; dark red (2.5YR 3/6) very gravelly clay; moderate fine and medium subangular blocky structure; firm; common very fine and fine roots; common very fine and fine vesicular pores; few faint continuous dark reddish brown (2.5YR 3/4) clay films on faces of peds; common medium pink (7.5YR 7/4) irregular soft masses of iron accumulation throughout; 40 percent angular chert gravel; very strongly acid; clear smooth boundary.
- Bt3—41 to 51 inches; dark red (2.5YR 3/6) extremely gravelly clay; moderate fine and medium subangular blocky structure; firm; common very fine and fine vesicular pores; few distinct discontinuous dark reddish brown (2.5YR 3/4) clay films on faces of peds; common medium pink (7.5YR 7/4) irregular soft masses of iron accumulation throughout; common medium prominent light brownish gray (10YR 6/2) irregular iron depletions throughout; 70 percent

angular chert gravel and 5 percent angular chert cobbles; very strongly acid; gradual smooth boundary.

- 2Bt4—51 to 60 inches; dark red (2.5YR 3/6) clay; weak fine and medium subangular blocky structure; firm; common very fine and fine vesicular pores; very few distinct discontinuous reddish brown (2.5YR 4/4) clay films on faces of peds; common medium pink (7.5YR 7/4) irregular soft masses of iron accumulation throughout; common medium prominent light brownish gray (10YR 6/2) irregular iron depletions throughout; 2 percent angular chert gravel; very strongly acid.

The A horizon has value of 2 to 4 and chroma of 2 to 4. It is gravelly or very gravelly silt loam.

The E horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3 or 4. It is very gravelly or extremely gravelly loam or silt loam.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 4, 6, or 8. It is very gravelly or extremely gravelly silty clay loam, silty clay, or clay.

The 2Bt horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 4, 6, or 8.

### ***Gravois Series***

The Gravois series consists of very deep, moderately well drained, slowly permeable soils on uplands. These soils formed in a thin mantle of loess and residuum weathered from cherty dolostone. Slopes range from 3 to 15 percent.

Soils of the Gravois series are fine-silty, mixed, active, mesic Aquic Paleudalfs.

Typical pedon of Gravois silt loam, 3 to 8 percent slopes; USGS Toronto topographic quadrangle; latitude 38 degrees 6 minutes 26 seconds N.; longitude 92 degrees 33 minutes 18 seconds W.

- Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; many very fine and medium roots throughout; strongly acid; clear smooth boundary.
- Bt1—6 to 12 inches; yellowish brown (10YR 5/6) silt loam; weak fine subangular blocky structure; firm; many fine and medium roots throughout; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; common prominent pale brown (10YR 6/3) clay depletions on faces of peds; strongly acid; clear smooth boundary.
- Bt2—12 to 18 inches; yellowish brown (10YR 5/6)

silty clay loam; moderate fine subangular blocky structure; firm; common fine roots throughout; few distinct brown (10YR 4/3) clay films on faces of peds; common distinct pale brown (10YR 6/3) clay depletions on faces of peds; strongly acid; clear smooth boundary.

- Bt3—18 to 25 inches; yellowish brown (10YR 5/6) silty clay loam; moderate fine subangular block structure; firm; common fine roots; few distinct brown (10YR 4/3) clay films on faces of peds; common distinct strong brown (7.5YR 5/6) masses of iron-manganese; strongly acid; clear smooth boundary.
- 2Btx—25 to 35 inches; yellowish brown (10YR 5/6) silty clay loam; weak medium and coarse prismatic structure parting to weak fine and medium subangular blocky; very firm; 40 percent brittle; common very fine roots between peds; few distinct dark grayish brown (10YR 4/2) clay films on vertical faces of peds, in roots channels, and in pores; common prominent black (10YR 2/1) iron-manganese stains; many distinct grayish brown (10YR 5/2) iron depletions; common prominent yellowish red (5YR 4/6) masses of iron accumulation; 5 percent chert gravel; strongly acid; gradual smooth boundary.
- 3Bt1—35 to 50 inches; yellowish brown (10YR 5/6) very gravelly silty clay loam; moderate medium subangular blocky structure; firm; few fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few prominent grayish brown (10YR 5/2) iron depletions; common prominent yellowish red (5YR 4/6) masses of iron accumulation; 40 percent chert gravel and 10 percent chert cobbles; strongly acid; gradual smooth boundary.
- 4Bt2—50 to 80 inches; red (2.5YR 4/6) very cobbly clay; moderate medium subangular blocky structure; firm; common prominent brown (7.5YR 4/3) clay films on faces of peds; few prominent black (10YR 2/1) iron-manganese stains; common yellowish red (5YR 4/6) masses of iron accumulation; 30 percent chert gravel and 20 percent chert cobbles; slightly alkaline.

The depth to the dense material ranges from 18 to 40 inches.

The Ap or A horizon has value of 3 or 4 and chroma of 2 to 3.

The E horizon, where present, has value of 5 or 6 and chroma of 2 to 4.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 3, 4, or 6. It is silt loam or silty clay loam.

The 2Btx horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2, 3, 4, or 6. It is silt loam, silty clay loam, or the gravelly to extremely gravelly analogues of these textures.

The 3Bt horizon has hue of 2.5YR to 10YR, value of 3 to 6, and chroma of 3, 4, 6, or 8. It is silty clay loam, silty clay, or the gravelly or very gravelly analogues of these textures.

The 4Bt horizon has hue of 2.5YR to 10YR, value of 3 to 6, and chroma of 2, 3, 4, 6, or 8. It is silty clay, clay, or the gravelly to extremely gravelly or cobbly to extremely cobbly analogues of these textures.

### ***Gunlock Series***

The Gunlock series consists of very deep, moderately well drained, slowly permeable soils on uplands. These soils formed in a thin mantle of loess over gravelly residuum weathered from cherty dolostone. Slopes range from 3 to 8 percent.

Soils of the Gunlock series are fine, mixed, active, mesic Fragic Oxyaquic Hapludalfs.

Typical pedon of Gunlock silt loam, 3 to 8 percent slopes; USGS Fortuna topographic quadrangle; latitude 38 degrees 37 minutes 03 seconds N.; longitude 92 degrees 51 minutes 01 second W.

- Ap—0 to 7 inches; brown (10YR 4/3) silt loam; weak fine subangular blocky structure; friable; many very fine and fine roots throughout; many very fine and fine vesicular pores; moderately acid; clear smooth boundary.
- Bt1—7 to 11 inches; brown (7.5YR 4/4) silty clay loam; moderate fine subangular blocky structure; firm; common very fine and fine roots throughout; many very fine and fine vesicular pores; very few distinct discontinuous strong brown (7.5YR 4/6) clay films on faces of peds; common fine strong brown (7.5YR 5/6) irregular soft masses of iron accumulation throughout; few fine black (10YR 2/1) irregular soft masses of iron-manganese accumulation throughout; moderately acid; clear smooth boundary.
- Bt2—11 to 17 inches; brown (7.5YR 4/4) silty clay loam; moderate fine subangular blocky structure; firm; common very fine and fine roots throughout; common very fine and fine vesicular pores; very few distinct continuous strong brown (7.5YR 4/6) clay films on faces of peds; few prominent discontinuous light brownish gray (10YR 6/2) clay depletions on faces of peds; common fine brown (10YR 5/3) irregular soft masses of iron accumulation throughout; few fine black (10YR 2/1) irregular soft masses of iron-manganese

accumulation throughout; moderately acid; clear smooth boundary.

Bt3—17 to 23 inches; strong brown (7.5YR 5/6) silty clay; moderate fine subangular blocky structure; firm; common very fine and fine roots throughout; common very fine and fine vesicular pores; few prominent continuous grayish brown (10YR 5/2) clay films on faces of peds; very few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; few prominent continuous light brownish gray (10YR 6/2) clay depletions on faces of peds; moderately acid; clear smooth boundary.

Bt4—23 to 32 inches; strong brown (7.5YR 5/6) silty clay loam; moderate fine and medium subangular blocky structure; firm; common fine roots throughout; common very fine and fine vesicular pores; few prominent continuous grayish brown (10YR 5/2) clay films on faces of peds; few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; 5 percent subangular chert gravel; moderately acid; clear smooth boundary.

2Btx—32 to 50 inches; brown (7.5YR 4/4) silty clay loam; weak medium prismatic structure parting to weak medium subangular blocky; very firm; 50 percent brittle; few very fine roots in vertical ped faces; common very fine and fine vesicular pores; very few distinct discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; common medium brown (10YR 4/3) irregular soft masses of iron accumulation throughout; 10 percent subangular chert gravel; slightly acid; clear smooth boundary.

3Bt—50 to 60 inches; yellowish red (5YR 5/6) gravelly silty clay; moderate fine and medium subangular blocky structure; firm; common very fine and fine vesicular pores; common distinct continuous strong brown (7.5YR 5/6) clay films on faces of peds; few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; 25 percent angular chert gravel; slightly acid.

The depth to the dense material ranges from 20 to 34 inches.

The Ap or A horizon has value of 4 to 6 and chroma of 2 to 4.

The E horizon, where present, has value of 5 or 6, and chroma of 3, 4, or 6.

The Bt horizon has hue of 10YR or 7.5YR, value of

4 to 6, and chroma of 3, 4, or 6. It is silty clay loam or silty clay.

The 2Btx horizon has hue of 10YR or 7.5YR, value of 2 to 6, and chroma of 2, 3, 4, or 6. It is silt loam, silty clay loam, or the gravelly to extremely gravelly analogues of these textures.

The 3Bt horizon has hue of 2.5YR to 10YR, value of 3 to 6, and chroma of 3, 4, 6, or 8. It is silty clay loam, silty clay, clay, or the gravelly to extremely gravelly analogues of these textures.

### ***Hacreek Series***

The Hacreek series consists of very deep, somewhat poorly drained, moderately slowly permeable soils. These soils formed in alluvium on stream terraces. Slopes range from 0 to 2 percent.

Soils of the Hacreek series are fine-silty, mixed, superactive, mesic Aquic Argiudolls.

Typical pedon of Hacreek silt loam, 0 to 2 percent slopes, occasionally flooded; USGS Pymont topographic quadrangle; latitude 38 degrees 35 minutes 48 seconds N.; longitude 93 degrees 01 minute 25 seconds W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common very fine and fine roots throughout; common very fine and fine tubular pores; neutral; clear smooth boundary.

Btg1—9 to 21 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure; firm; few very fine and fine roots throughout; few very fine and fine tubular pores; few faint continuous dark gray (10YR 4/1) clay films on faces of peds; neutral; gradual smooth boundary.

Btg2—21 to 28 inches; dark grayish brown (10YR 4/2) silty clay loam; weak fine subangular blocky structure; firm; few very fine and fine roots throughout; few very fine tubular pores; few faint continuous dark gray (10YR 4/1) clay films on faces of peds; common medium brown (10YR 5/3) and few fine yellowish brown (10YR 5/8) irregular soft masses of iron accumulation throughout; neutral; gradual smooth boundary.

Btg3—28 to 36 inches; gray (10YR 5/1) silty clay loam; weak fine subangular blocky structure; firm; few very fine and fine roots throughout; few very fine tubular pores; few faint continuous dark gray (10YR 4/1) clay films on faces of peds; very few distinct discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout;

common fine brown (10YR 5/3) and few fine yellowish brown (10YR 5/8) irregular soft masses of iron accumulation throughout; neutral; gradual smooth boundary.

Btg4—36 to 47 inches; gray (10YR 5/1) silty clay loam; weak fine subangular blocky structure; firm; few very fine and fine roots throughout; few very fine tubular pores; few faint continuous dark gray (10YR 4/1) clay films on faces of peds; common fine yellowish brown (10YR 5/8) irregular soft masses of iron accumulation throughout; neutral; clear smooth boundary.

Btg5—47 to 70 inches; gray (10YR 5/1) silty clay loam; weak fine subangular blocky structure; firm; few very fine tubular pores; few faint discontinuous dark gray (10YR 4/1) clay films on faces of peds; few fine yellowish brown (10YR 5/8) irregular soft masses of iron accumulation throughout; neutral; gradual smooth boundary.

Btg6—70 to 80 inches; dark gray (10YR 4/1) silty clay loam; weak fine subangular blocky structure; firm; few very fine tubular pores; few faint discontinuous gray (10YR 5/1) clay films on faces of peds; few fine yellowish brown (10YR 5/8) irregular soft masses of iron accumulation throughout; neutral.

The thickness of the mollic epipedon is 12 to 24 inches. The mollic epipedon includes the upper part of the Bt horizon, although some pedons have an A1 horizon.

The Ap horizon has value is 2 or 3 and chroma of 1 to 3.

The A1 horizon, where present, is similar in color and texture as the Ap horizon.

The upper part of the Bt horizon typically has value of 2 or 3 and chroma of 1 to 3. In pedons with an A1 horizon, the upper part of the Bt horizon typically does not have mollic colors. The lower part of the Bt horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 or 2.

### ***Hartville Series***

The Hartville series consists of very deep, somewhat poorly drained, slowly permeable soils that formed in colluvium on footslopes. Slopes range from 3 to 8 percent.

Soils of the Hartville series are fine, mixed, active, mesic Aquic Hapludalfs.

Typical pedon of Hartville silt loam, 3 to 8 percent slopes, eroded; USGS Florence topographic quadrangle; latitude 38 degrees 36 minutes

41 seconds N.; longitude 92 degrees 56 minutes 46 seconds W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; many very fine and fine roots throughout; common very fine and fine vesicular pores; neutral; abrupt smooth boundary.

Bt1—6 to 11 inches; brown (10YR 4/3) silty clay loam; weak fine subangular blocky structure; firm; common very fine and fine roots throughout; common very fine and fine vesicular pores; few faint discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; very few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; neutral; clear smooth boundary.

Bt2—11 to 19 inches; grayish brown (10YR 5/2) silty clay loam; weak fine subangular blocky structure; firm; common very fine and fine roots throughout; common very fine and fine vesicular pores; few faint continuous gray (10YR 5/1) clay films on faces of peds; very few distinct discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; common medium yellowish brown (10YR 5/4) and few fine strong brown (7.5YR 5/8) irregular soft masses of iron accumulation throughout; slightly acid; clear smooth boundary.

Bt3—19 to 28 inches; grayish brown (10YR 5/2) silty clay; moderate fine and medium subangular blocky structure; firm; common very fine and fine roots throughout; common very fine and fine vesicular pores; few faint continuous gray (10YR 5/1) clay films on faces of peds; very few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; common fine brownish yellow (10YR 6/6) and few fine strong brown (7.5YR 5/8) irregular soft masses of iron accumulation throughout; moderately acid; clear smooth boundary.

Bt4—28 to 36 inches; yellowish brown (10YR 5/6) silty clay; moderate fine subangular blocky structure; firm; few very fine roots throughout; common very fine and fine vesicular pores; few prominent continuous dark grayish brown (10YR 4/2) clay films on faces of peds; very few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; common medium prominent gray (10YR 5/1) irregular iron depletions throughout; moderately acid; gradual smooth boundary.

Bt5—36 to 48 inches; grayish brown (10YR 5/2) silty clay; moderate fine and medium subangular

blocky structure; firm; common very fine and fine vesicular pores; few faint continuous dark gray (10YR 4/1) clay films on faces of peds; very few distinct discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; common fine yellowish brown (10YR 5/4) and few medium strong brown (7.5YR 5/8) irregular soft masses of iron accumulation throughout; moderately acid; gradual smooth boundary.

Bt6—48 to 60 inches; grayish brown (10YR 5/2) silty clay; moderate fine subangular blocky structure; firm; common very fine and fine vesicular pores; few faint discontinuous dark gray (10YR 4/1) clay films on faces of peds; many fine yellowish brown (10YR 5/4) irregular soft masses of iron accumulation throughout; moderately acid.

The Ap horizon has value of 4 or 5 and chroma of 2 to 4.

The upper part of the Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3, 4, or 6.

The lower part of the Bt horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 1, 2, 3, 4, 6, or 8. It is silty clay loam, silty clay, or clay.

### ***Healing Series***

The Healing series consists of very deep, well drained, moderately permeable soils that formed in alluvium on stream terraces. Slopes range from 0 to 3 percent.

Soils of the Healing series are fine-silty, mixed, superactive, mesic Typic Argiudolls.

Typical pedon of Healing silt loam, 0 to 3 percent slopes, occasionally flooded; USGS Pyrmont topographic quadrangle; latitude 38 degrees 32 minutes 39 seconds N.; longitude 93 degrees 03 minutes 43 seconds W.

A1—0 to 10 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many very fine and fine roots throughout; many very fine and fine tubular pores; neutral; clear smooth boundary.

A2—10 to 15 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common very fine and fine roots throughout; common very fine and fine tubular pores; neutral; clear smooth boundary.

Bt1—15 to 23 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine subangular blocky structure; firm; common very fine and fine roots throughout; common very fine and fine tubular

pores; very few distinct discontinuous very dark grayish brown (10YR 3/2) clay films on faces of peds; neutral; gradual smooth boundary.

Bt2—23 to 39 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak fine subangular blocky structure; firm; common very fine and fine roots throughout; common very fine and fine tubular pores; few distinct continuous very dark grayish brown (10YR 3/2) clay films on faces of peds; neutral; gradual smooth boundary.

Bt3—39 to 50 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak fine subangular blocky structure; firm; common very fine and fine tubular pores; few distinct continuous dark grayish brown (10YR 4/2) clay films on faces of peds; common medium dark brown (10YR 3/3) irregular soft masses of iron accumulation throughout; neutral; gradual smooth boundary.

Bt4—50 to 60 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak fine subangular blocky structure; firm; common very fine and fine tubular pores; few distinct continuous dark grayish brown (10YR 4/2) clay films on faces of peds; common medium dark brown (10YR 3/3) and few fine dark yellowish brown (10YR 4/6) irregular soft masses of iron accumulation throughout; neutral.

The thickness of the mollic epipedon is 10 to 20 inches.

The A horizon has chroma of 1 to 3.

The Bt horizon has value of 4 or 5 and chroma of 3 or 4. Texture is silt loam or silty clay loam.

### ***Jemerson Series***

The Jemerson series consists of very deep, well drained, moderately permeable soils that formed in alluvium on stream terraces. Slopes range from 0 to 3 percent.

Soils of the Jemerson series are fine-silty, mixed, superactive, mesic Typic Hapludalfs.

Typical pedon of Jemerson silt loam, 0 to 3 percent slopes, occasionally flooded; USGS Gravois Mills topographic quadrangle; latitude 38 degrees 15 minutes 15 seconds N.; longitude 92 degrees 50 minutes 54 seconds W.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak very fine granular structure; friable; many very fine and fine roots; many very fine and fine vesicular pores; strongly acid; clear smooth boundary.

Bt1—8 to 15 inches; brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure parting to

weak fine granular; firm; many very fine and fine roots; common very fine and fine vesicular pores; very few faint discontinuous brown (7.5YR 4/3) clay films on faces of peds; moderately acid; gradual smooth boundary.

Bt2—15 to 26 inches; brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure; firm; common very fine and fine roots; common very fine and fine vesicular pores; very few faint discontinuous brown (7.5YR 4/3) clay films on faces of peds; moderately acid; gradual smooth boundary.

Bt3—26 to 39 inches; brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure; firm; common very fine and fine roots; common very fine and fine vesicular pores; very few faint discontinuous brown (7.5YR 4/3) clay films on faces of peds; very few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; strongly acid; gradual smooth boundary.

Bt4—39 to 60 inches; brown (7.5YR 4/4) silt loam; weak medium subangular blocky structure; firm; common very fine and fine vesicular pores; very few faint discontinuous brown (7.5YR 4/3) clay films on faces of peds; few distinct discontinuous brown (10YR 5/3) clay depletions on faces of peds and in pores; very few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; strongly acid.

The Ap horizon has value of 3 or 4 and chroma of 2 or 3.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 or 4. Texture is silt loam or silty clay loam, but may be loam in the lower part.

The 2C horizon, where present, is similar in color as the Bt horizon and is gravelly loam.

### **Maplewood Series**

The Maplewood series consists of very deep, somewhat poorly drained, slowly permeable soils on uplands. These soils formed in a thin mantle of loess and clayey residuum weathered from dolostone. Slopes range from 2 to 9 percent.

Soils of the Maplewood series are fine, mixed, active, mesic Aquollic Hapludalfs.

Typical pedon of Maplewood silt loam, 2 to 5 percent slopes, eroded; USGS Barnett topographic quadrangle; latitude 38 degrees 24 minutes 09 seconds N.; longitude 92 degrees 41 minutes 09 seconds W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many very fine and fine roots throughout; many very fine and fine vesicular pores; common fine strong brown (7.5YR 4/6) irregular soft masses of iron accumulation throughout; slightly acid; clear smooth boundary.

Bt1—8 to 16 inches; brown (7.5YR 4/4) silty clay loam; moderate fine subangular blocky structure; firm; common very fine and fine roots throughout; common very fine and fine vesicular pores; few prominent continuous dark grayish brown (10YR 4/2) clay films on faces of peds; few fine yellowish red (5YR 4/6) irregular soft masses of iron accumulation throughout; neutral; clear smooth boundary.

Bt2—16 to 20 inches; strong brown (7.5YR 4/6) silty clay; moderate fine subangular blocky structure; firm; common very fine and fine roots throughout; common very fine and fine vesicular pores; few prominent continuous dark grayish brown (10YR 4/2) clay films on faces of peds; few prominent discontinuous pale brown (10YR 6/3) clay depletions on faces of peds; few fine red (2.5YR 4/6) irregular soft masses of iron accumulation throughout; few fine prominent grayish brown (10YR 5/2) irregular iron depletions throughout; 5 percent subangular chert gravel; strongly acid; clear smooth boundary.

Bt3—20 to 28 inches; strong brown (7.5YR 4/6) silty clay; moderate coarse subangular blocky structure parting to weak fine subangular blocky; firm; common very fine and fine roots throughout; common very fine and fine vesicular pores; few prominent continuous dark grayish brown (10YR 4/2) clay films on faces of peds; very few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; few prominent discontinuous pale brown (10YR 6/3) clay depletions throughout; few fine prominent grayish brown (10YR 5/2) irregular iron depletions throughout; 5 percent subangular chert gravel; very strongly acid; clear wavy boundary.

2Btx—28 to 36 inches; yellowish brown (10YR 5/6) very gravelly silty clay loam; moderate coarse prismatic structure parting to weak fine subangular blocky; very firm; 40 percent brittle; few very fine roots in vertical ped faces; common very fine and fine vesicular pores; few prominent discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; many medium

prominent grayish brown (10YR 5/2) irregular iron depletions throughout; 55 percent subangular chert gravel; moderately acid; gradual smooth boundary.

3Bt1—36 to 48 inches; strong brown (7.5YR 4/6) very gravelly clay; moderate fine subangular blocky structure; firm; common very fine and fine vesicular pores; few prominent continuous dark grayish brown (10YR 4/2) clay films on faces of peds; very few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; many fine prominent grayish brown (10YR 5/2) irregular iron depletions throughout; 50 percent subangular chert gravel; slightly acid; gradual smooth boundary.

3Bt2—48 to 60 inches; yellowish brown (10YR 5/6) very gravelly clay; weak fine subangular blocky structure; firm; common very fine and fine vesicular pores; few prominent continuous dark grayish brown (10YR 4/2) clay films on faces of peds; common medium red (2.5YR 4/6) irregular soft masses of iron accumulation throughout; common fine prominent grayish brown (10YR 5/2) irregular iron depletions throughout; 50 percent subangular chert gravel; neutral.

The depth to the dense material ranges from 16 to 40 inches.

The Ap horizon has value of 2 or 3 and chroma of 2 or 3.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2, 3, 4, or 6. It is silty clay loam or silty clay.

The 2Btx horizon has hue of 5YR to 10YR, value of 4 to 7 and chroma of 2, 3, 4, 6, or 8. It is silt loam, silty clay loam, or the gravelly to extremely gravelly analogues of these textures.

The 3Bt horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4, 6, or 8 with low chroma redoximorphic depletions. It is silty clay, clay, or the gravelly or very gravelly or cobbly to very cobbly analogues of these textures.

### **McGirk Series**

The McGirk series consists of very deep, poorly drained, slowly permeable soils on toeslopes. These soils formed in alluvium and clayey colluvium. Slopes range from 1 to 3 percent.

Soils of the McGirk series are fine, smectitic, mesic Chromic Vertic Endoaqualfs.

Typical pedon of McGirk silt loam, 1 to 3 percent slopes; latitude 38 degrees 33 minutes

08 seconds N.; longitude 92 degrees 58 minutes 12 seconds W.

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; common very fine and fine roots throughout; many very fine and fine moderate continuity vesicular pores; neutral; clear smooth boundary.

BEg—10 to 15 inches; light brownish gray (10YR 6/2) silty clay loam; weak fine subangular blocky structure; firm; many very fine and fine roots throughout; common very fine and fine moderate continuity vesicular pores; few faint continuous light gray (10YR 7/2) clay depletions on faces of peds and in pores; moderately acid; clear smooth boundary.

Btg1—15 to 24 inches; gray (10YR 5/1) silty clay; moderate fine subangular blocky structure; firm; common very fine and fine roots throughout; common very fine and fine moderate continuity vesicular pores; few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; few faint continuous dark grayish brown (10YR 4/2) clay films on faces of peds; common fine and medium black (10YR 2/1) irregular soft masses of iron-manganese accumulation throughout; common dark yellowish brown (10YR 4/6) iron masses; slightly acid; clear smooth boundary.

Btg2—24 to 32 inches; gray (10YR 5/1) silty clay; moderate fine subangular blocky structure; firm; common very fine and fine roots throughout; common very fine and fine moderate continuity vesicular pores; few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; few faint continuous dark grayish brown (10YR 4/2) clay films on faces of peds; common fine and medium black (10YR 2/1) irregular soft masses of iron-manganese accumulation throughout; many dark yellowish brown (10YR 4/6) iron masses; very strongly acid; gradual smooth boundary.

Btg3—32 to 44 inches; gray (10YR 5/1) silty clay; moderate fine and medium subangular blocky structure; firm; common very fine and fine moderate continuity vesicular pores; few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; few faint continuous dark grayish brown (10YR 4/2) clay films on faces of peds; common fine and medium black (10YR 2/1) irregular soft masses

of iron-manganese accumulation throughout; very strongly acid; gradual smooth boundary.

BCg—44 to 60 inches; 70 percent gray (10YR 6/1) and 30 percent dark yellowish brown (10YR 4/6) silty clay loam; weak fine subangular blocky structure; firm; very few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; slightly acid.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3.

The BEg horizon has value of 4 to 6 and chroma of 2.

The Btg horizon has value of 4 to 6 and chroma of 1 or 2. Texture is silty clay loam or silty clay.

The BCg or Cg horizon has value of 4 to 6 and chroma of 1, 2, 3, 4, or 6. Texture is silty clay loam or silty clay.

### ***Moko Series***

The Moko series consists of very shallow and shallow, well drained, moderately permeable soils on uplands. These soils are in glade areas and formed in gravelly residuum weathered from the underlying dolostone. Slopes range from 3 to 15 percent.

Soils of the Moko series are loamy-skeletal, mixed, superactive, mesic Lithic Hapludolls.

Typical pedon of Moko gravelly loam, in an area of Moko-Rock outcrop complex, 3 to 15 percent slopes, very stony; latitude 38 degrees 22 minutes 40 seconds N.; longitude 92 degrees 42 minutes 49 seconds W.

A1—0 to 2 inches; very dark gray (10YR 3/1) gravelly loam, gray (10YR 5/1) dry; weak very fine granular structure; very friable; common very fine and fine roots throughout; common very fine and fine tubular pores; 20 percent subangular chert gravel; neutral; clear smooth boundary.

A2—2 to 8 inches; very dark gray (10YR 3/1) very gravelly loam, gray (10YR 5/1) dry; very friable; common very fine and fine roots throughout; common very fine and fine tubular pores; 45 percent subangular chert gravel and 10 percent subangular chert cobbles; slightly alkaline; abrupt smooth boundary.

R—8 inches; unweathered dolostone.

The depth to bedrock ranges from 4 to 20 inches.

The A horizon has value of 2 or 3 and chroma of 1 to 3. It is gravelly to extremely gravelly loam, sandy clay loam, or silty clay loam.

### ***Moniteau Series***

The Moniteau series consists of very deep, poorly drained, moderately slowly permeable soils formed in alluvium on stream terraces. Slopes range from 0 to 2 percent.

Soils of the Moniteau series are fine-silty, mixed, superactive, mesic Typic Endoaqualfs.

Typical pedon of Moniteau silt loam, 0 to 2 percent slopes, occasionally flooded; USGS Otterville East topographic quadrangle; latitude 38 degrees 40 minutes 19 seconds N.; longitude 92 degrees 57 minutes 43 seconds W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; many very fine and fine roots; many very fine and fine vesicular pores; slightly acid; clear smooth boundary.

E—8 to 20 inches; light brownish gray (10YR 6/2) silt loam; moderate medium platy structure parting to weak fine subangular blocky; friable; many very fine and fine roots; many very fine and fine vesicular pores; common fine dark yellowish brown (10YR 4/4) irregular soft masses of iron accumulation; moderately acid; clear smooth boundary.

Btg1—20 to 32 inches; grayish brown (10YR 5/2) silty clay loam; weak fine subangular blocky structure; firm; common very fine and fine roots throughout; common very fine and fine moderate continuity vesicular pores; very few faint discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; common medium black (10YR 2/1) irregular soft masses of iron-manganese accumulation throughout; strongly acid; gradual smooth boundary.

Btg2—32 to 48 inches; grayish brown (10YR 5/2) silty clay loam; weak fine subangular blocky structure; firm; common very fine and fine roots; common very fine and fine vesicular pores; few faint discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains; common medium dark yellowish brown (10YR 4/4) irregular soft masses of iron accumulation throughout; strongly acid; gradual smooth boundary.

Btg3—48 to 60 inches; grayish brown (10YR 5/2) silty clay loam; weak fine subangular blocky structure; firm; common very fine and fine low continuity vesicular pores; few prominent discontinuous dark yellowish brown (10YR 4/4) manganese or iron-manganese stains throughout; few faint

discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; many fine and medium dark yellowish brown (10YR 4/4) irregular soft masses of iron accumulation throughout; common medium black (10YR 2/1) irregular soft masses of iron-manganese accumulation throughout; strongly acid.

The Ap horizon has value of 4 or 5 and chroma of 1 or 2.

The E horizon has value of 4 to 7 and chroma of 1 or 2.

The Btg horizon has value of 4 to 6 and chroma of 1 or 2. Texture is silty clay loam or silt loam.

### ***Niangua Series***

The Niangua series consists of deep, well drained, moderately slowly permeable soils on uplands. These soils formed in gravelly colluvium and clayey residuum weathered from dolostone. Slopes range from 15 to 50 percent.

Soils of the Niangua series are very-fine, mixed, active, mesic Typic Hapludalfs.

Typical pedon of Niangua very gravelly silt loam, in an area of Niangua-Bardley complex, 15 to 50 percent slopes, extremely stony; USGS Gravois Mills topographic quadrangle; latitude 38 degrees 15 minutes 57 seconds N.; longitude 92 degrees 52 minutes 19 seconds W.

A—0 to 2 inches; dark grayish brown (10YR 4/2) very gravelly silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; common fine, medium, and coarse roots throughout; many very fine and fine vesicular pores; 40 percent subangular chert gravel; strongly acid; abrupt smooth boundary.

E—2 to 11 inches; brown (10YR 5/3) very gravelly silt loam; weak fine granular structure; friable; common fine, medium, and coarse roots throughout; common very fine and fine vesicular pores; 50 percent subangular chert gravel; moderately acid; clear smooth boundary.

2Bt1—11 to 21 inches; red (2.5YR 4/8) clay; moderate fine and medium subangular blocky structure; firm; common medium roots throughout; common very fine and fine vesicular pores; few prominent continuous dark reddish gray (5YR 4/2) clay films on faces of peds; 10 percent subangular chert gravel; moderately acid; clear smooth boundary.

2Bt2—21 to 32 inches; red (2.5YR 4/6) clay; moderate fine and medium subangular blocky

structure; firm; common medium roots throughout; common very fine and fine vesicular pores; few prominent continuous dark reddish gray (5YR 4/2) clay films on faces of peds; 10 percent subangular chert gravel; strongly acid; gradual smooth boundary.

2Bt3—32 to 55 inches; red (2.5YR 4/6) gravelly clay; moderate fine and medium subangular blocky structure; firm; common very fine and fine vesicular pores; few prominent continuous dark reddish gray (5YR 4/2) clay films on faces of peds; many medium yellowish brown (10YR 5/8) and few medium light brown (7.5YR 6/4) irregular soft masses of iron accumulation throughout; 20 percent subangular chert gravel; neutral; abrupt wavy boundary.

2R—55 inches; unweathered dolostone.

The depth to bedrock ranges from 40 to 60 inches.

The A horizon has value of 2 to 4 and chroma of 1 to 4.

The E horizon has value of 5 or 6 and chroma of 3 or 4.

The 2Bt horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4, 6, or 8. It is clay or gravelly clay.

### ***Racket Series***

The Racket series consists of very deep, well drained, moderately permeable soils on flood plains. These soils formed in loamy alluvium. Slopes range from 0 to 3 percent.

Soils of the Racket series are fine-loamy, mixed, superactive, mesic Cumulic Hapludolls.

Typical pedon of Racket silt loam, 0 to 3 percent slopes, occasionally flooded; USGS Florence topographic quadrangle; latitude 38 degrees 31 minutes 44 seconds N.; longitude 92 degrees 54 minutes 18 seconds W.

A1—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common very fine and fine roots throughout; common very fine and fine tubular pores; 5 percent subangular chert gravel; neutral; clear smooth boundary.

A2—10 to 24 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common very fine and fine roots throughout; common very fine and fine tubular pores; 5 percent subangular chert gravel; neutral; gradual smooth boundary.

Bw—24 to 44 inches; very dark grayish brown (10YR

3/2) loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; common very fine and fine roots throughout; common very fine and fine tubular pores; 5 percent subangular chert gravel; neutral; gradual smooth boundary.

2C—44 to 60 inches; brown (10YR 4/3) very gravelly loamy sand; massive; friable; common very fine and fine tubular pores; few fine and medium yellowish brown (10YR 5/6) irregular soft masses of iron accumulation throughout; 50 percent subangular chert gravel; neutral.

The A horizon has value of 2 or 3 (4 or 5 dry) and chroma of 2 or 3.

The Bw horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2, 3, 4, or 6. It is loam, silt loam, or silty clay loam.

The 2C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2, 3, 4, or 6. It is sandy loam, loam, loamy sand, or sand, and may be gravelly to extremely gravelly.

### ***Rueter Series***

The Rueter series consists of very deep, somewhat excessively drained, moderately permeable soils on uplands. These soils formed in gravelly colluvium and residuum weathered from dolostone. Slopes range from 3 to 8 percent.

Soils of the Rueter series are loamy-skeletal, siliceous, active, mesic Typic Paleudalfs.

Typical pedon of Rueter gravelly silt loam, 3 to 8 percent slopes; USGS Gravois Mills topographic quadrangle; latitude 38 degrees 20 minutes 42 seconds N.; longitude 92 degrees 47 minutes 19 seconds W.

A—0 to 3 inches; dark grayish brown (10YR 4/2) gravelly silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; common fine and medium roots throughout; many very fine and fine tubular pores; 35 percent subangular chert gravel; moderately acid; clear smooth boundary.

E—3 to 15 inches; pale brown (10YR 6/3) extremely gravelly silt loam; weak fine granular structure; friable; common fine and medium roots throughout; common very fine and fine tubular pores; 65 percent subangular chert gravel; moderately acid; gradual smooth boundary.

Bt1—15 to 26 inches; brown (7.5YR 5/4) extremely gravelly silty clay loam; weak fine subangular blocky structure; firm; common fine and medium roots throughout; common very fine and fine

tubular pores; very few faint discontinuous brown (7.5YR 4/4) clay films on faces of peds; 65 percent subangular chert gravel and 5 percent subangular chert cobbles; strongly acid; gradual wavy boundary.

Bt2—26 to 42 inches; brown (7.5YR 5/4) extremely gravelly silty clay loam; weak fine subangular blocky structure; firm; common fine and medium roots throughout; common very fine and fine tubular pores; very few faint discontinuous brown (7.5YR 4/4) clay films on faces of peds; common medium red (2.5YR 4/6) irregular soft masses of iron accumulation throughout; 70 percent subangular chert gravel and 10 percent subangular chert cobbles; strongly acid; gradual wavy boundary.

Bt3—42 to 57 inches; brown (7.5YR 5/4) very gravelly silty clay loam; moderate fine subangular blocky structure; firm; common very fine and fine tubular pores; very few faint discontinuous brown (7.5YR 4/4) clay films on faces of peds; common medium reddish yellow (5YR 6/6) irregular soft masses of iron accumulation throughout; 45 percent subangular chert gravel and 10 percent subangular chert cobbles; very strongly acid; gradual smooth boundary.

Bt4—57 to 65 inches; light yellowish brown (10YR 6/4) extremely gravelly silty clay loam; moderate fine subangular blocky structure; firm; common very fine and fine tubular pores; very few faint discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; common medium very pale brown (10YR 7/4) irregular soft masses of iron accumulation throughout; 70 percent subangular chert gravel and 10 percent subangular chert cobbles; extremely acid.

The A horizon has value of 3 to 5 and chroma of 1 to 3.

The E horizon has value of 4 to 7 and chroma of 2 to 4. It is very gravelly or extremely gravelly silt loam or loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 or 6. It is silt loam, loam, silty clay loam, or the gravelly to extremely gravelly or cobbly to extremely cobbly analogues of these textures.

The 2Bt horizon, where present, has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 or 6. It is silty clay loam, silty clay, clay, or the gravelly to extremely gravelly or cobbly to extremely cobbly analogues of these textures.

### ***Sacville Series***

The Sacville series consists of very deep, poorly drained, slowly permeable soils on toeslopes. These soils formed in colluvium derived from dolostone. Slopes range from 2 to 5 percent.

Soils of the Sacville series are fine, smectitic, mesic Vertic Argiaquolls.

Typical pedon of Sacville silt loam, 2 to 5 percent slopes; USGS Pymont topographic quadrangle; latitude 38 degrees 33 minutes 18 seconds N.; longitude 93 degrees 03 minutes 23 seconds W.

Ap—0 to 7 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak fine granular structure; friable; many very fine and fine roots; many very fine and fine vesicular pores; slightly acid; abrupt smooth boundary.

AB—7 to 13 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine subangular blocky structure; firm; common very fine and fine roots; common very fine and fine vesicular pores; very few faint discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; slightly acid; clear smooth boundary.

Btg1—13 to 18 inches; dark gray (10YR 4/1) silty clay loam; weak fine subangular blocky structure; firm; common very fine and fine roots; common very fine and fine vesicular pores; few faint discontinuous gray (10YR 5/1) clay films on faces of peds; few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; common medium dark yellowish brown (10YR 4/4) irregular soft masses of iron accumulation throughout; moderately acid; clear smooth boundary.

Btg2—18 to 27 inches; 85 percent dark grayish brown (10YR 4/2) and 15 percent dark gray (10YR 4/1) silty clay loam; moderate fine subangular blocky structure; firm; common very fine and fine vesicular pores; few faint discontinuous gray (10YR 5/1) clay films on faces of peds; common fine dark yellowish brown (10YR 4/4) irregular soft masses of iron accumulation throughout; moderately acid; clear smooth boundary.

Btg3—27 to 36 inches; dark gray (10YR 4/1) silty clay; moderate fine and medium subangular blocky structure; firm; common very fine and fine vesicular pores; few faint discontinuous gray (10YR 5/1) clay films on faces of peds; many medium dark yellowish brown (10YR 4/4) irregular soft masses of iron accumulation throughout; slightly acid; clear smooth boundary.

Btg4—36 to 48 inches; gray (10YR 5/1) silty clay; moderate fine and medium subangular blocky structure; firm; common very fine and fine vesicular pores; few faint discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; many medium yellowish brown (10YR 5/4) irregular soft masses of iron accumulation throughout; neutral; clear smooth boundary.

Btg5—48 to 60 inches; gray (10YR 5/1) silty clay loam; moderate fine and medium subangular blocky structure; firm; common very fine and fine vesicular pores; few faint discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; many medium strong brown (7.5YR 5/8) irregular soft masses of iron accumulation throughout; neutral.

The thickness of the mollic epipedon ranges from 10 to 24 inches.

The A horizon has value of 2 or 3 and chroma of 1 or 2.

The Btg horizon has value of 4 or 5 and chroma of 1 or 2. It is silty clay loam or silty clay.

### ***Speed Series***

The Speed series consists of very deep, somewhat poorly drained, moderately permeable soils formed in alluvium on stream terraces. Slopes range from 0 to 3 percent.

Soils of the Speed series are fine-silty, mixed, superactive, mesic Argiaquic Argialbolls.

Typical pedon of Speed silt loam, 0 to 3 percent slopes, rarely flooded; USGS Versailles topographic quadrangle; latitude 38 degrees 26 minutes 34 seconds N.; longitude 92 degrees 45 minutes 31 seconds W.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common very fine and fine roots throughout; common very fine and fine tubular pores; neutral; clear smooth boundary.

A—6 to 14 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common very fine and fine roots throughout; common very fine and fine tubular pores; moderately acid; clear smooth boundary.

E—14 to 25 inches; dark grayish brown (10YR 4/2) silt loam; weak medium platy structure parting to weak fine subangular blocky; friable; common very fine and fine roots throughout; common very

fine and fine tubular pores; common medium dark yellowish brown (10YR 4/4) irregular soft masses of iron accumulation throughout; moderately acid; abrupt smooth boundary.

Btg1—25 to 35 inches; dark grayish brown (10YR 4/2) silt loam; weak fine subangular blocky structure; firm; few very fine and fine roots throughout; common very fine and fine tubular pores; few faint continuous dark gray (10YR 4/1) clay films on faces of peds; few fine dark yellowish brown (10YR 4/4) irregular soft masses of iron accumulation throughout; very strongly acid; clear smooth boundary.

Btg2—35 to 46 inches; grayish brown (10YR 5/2) silty clay loam; weak fine subangular blocky structure; firm; common very fine and fine tubular pores; few faint continuous dark gray (10YR 4/1) clay films on faces of peds; very few distinct discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; common medium dark yellowish brown (10YR 4/4) and few fine yellowish red (5YR 4/6) irregular soft masses of iron accumulation throughout; strongly acid; gradual smooth boundary.

Btg3—46 to 60 inches; grayish brown (10YR 5/2) silty clay loam; weak fine subangular blocky structure; firm; common very fine and fine tubular pores; few faint continuous dark gray (10YR 4/1) clay films on faces of peds; very few distinct discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; common medium yellowish brown (10YR 5/6) and few fine strong brown (7.5YR 5/6) irregular soft masses of iron accumulation throughout; moderately acid.

The thickness of the mollic epipedon ranges from 10 to 24 inches.

The A and Ap horizons have value of 2 or 3 and chroma of 1 to 3.

The E horizon has value of 3 to 6 and chroma of 1 or 2.

The Btg horizon has value of 4 to 6 and chroma of 1 to 4. It is silt loam or silty clay loam.

Some pedons have Cg horizons with similar color and texture as the Btg horizon.

### **Sturkie Series**

The Sturkie series consists of very deep, well drained, moderately permeable soils formed in silty alluvium on flood plains. Slopes range from 0 to 2 percent.

Soils of the Sturkie series are fine-silty, mixed, superactive, mesic Cumulic Hapludolls.

Typical pedon of Sturkie silt loam, 0 to 2 percent slopes, frequently flooded; USGS Otterville East topographic quadrangle; latitude 38 degrees 38 minutes 57 seconds N.; longitude 92 degrees 55 minutes 22 seconds W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; many very fine and fine roots throughout; many very fine and fine tubular pores; neutral; clear smooth boundary.

A1—7 to 16 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common very fine and fine roots throughout; common very fine and fine tubular pores; neutral; gradual smooth boundary.

A2—16 to 31 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common very fine and fine roots throughout; common very fine and fine tubular pores; neutral; gradual smooth boundary.

Bw—31 to 48 inches; brown (10YR 4/3) silt loam; weak fine subangular blocky structure; friable; common very fine and fine tubular pores; common medium dark brown (10YR 3/3) irregular soft masses of iron accumulation throughout; neutral; gradual smooth boundary.

C—48 to 60 inches; dark brown (10YR 3/3) silt loam; massive; friable; common very fine and fine vesicular pores; common medium brown (10YR 5/3) irregular soft masses of iron accumulation throughout; neutral.

The A and Ap horizons have chroma of 2 or 3.

The Bw horizon has value of 4 or 5 and chroma of 3 or 4. It is silt loam or silty clay loam.

The C horizon has value of 3 to 5 and chroma of 3 or 4. It is silt loam, loam, or the gravelly analogues of these textures.

### **Union Series**

The Union series consists of very deep, moderately well drained, slowly permeable soils on uplands. These soils formed in a layer of loess that contains a fragipan horizon and in clayey residuum weathered from cherty dolostone. Slopes range from 1 to 3 percent.

Soils of the Union series are fine, mixed, active, mesic Oxyaquic Fragiudalfs.

Typical pedon of Union silt loam, 1 to 3 percent

slopes; USGS Stover topographic quadrangle; latitude 38 degrees 28 minutes 16 seconds N.; longitude 92 degrees 56 minutes 11 seconds W.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; common very fine and fine roots throughout; many very fine and fine tubular pores; moderately acid; clear smooth boundary.

Bt1—5 to 8 inches; yellowish brown (10YR 5/6) silt loam; weak fine subangular blocky structure; friable; common very fine and fine roots throughout; common very fine and fine tubular pores; very few distinct discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; many medium brown (10YR 5/3) irregular soft masses of iron accumulation throughout; very strongly acid; abrupt smooth boundary.

Bt2—8 to 18 inches; strong brown (7.5YR 4/6) silty clay loam; moderate fine subangular blocky structure; firm; common very fine and fine roots throughout; common very fine and fine tubular pores; few distinct continuous brown (7.5YR 4/4) clay films on faces of peds; common medium brown (7.5YR 5/4) and few fine red (2.5YR 4/6) irregular soft masses of iron accumulation throughout; very strongly acid; clear smooth boundary.

Bt3—18 to 24 inches; yellowish red (5YR 4/6) silty clay; moderate fine subangular blocky structure; firm; common very fine and fine roots throughout; common very fine and fine tubular pores; few prominent continuous brown (7.5YR 4/4) clay films on faces of peds; common medium reddish brown (5YR 5/4) and brown (10YR 5/3) irregular soft masses of iron accumulation throughout; very strongly acid; clear smooth boundary.

Bt4—24 to 31 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine subangular blocky structure; firm; common very fine and fine roots throughout; common very fine and fine tubular pores; few faint continuous dark grayish brown (10YR 4/2) clay films on faces of peds; common medium strong brown (7.5YR 5/6) and yellowish red (5YR 4/6) irregular soft masses of iron accumulation throughout; common medium grayish brown (10YR 5/2) irregular iron depletions throughout; very strongly acid; abrupt smooth boundary.

2Btx1—31 to 38 inches; 60 percent dark yellowish brown (10YR 4/4) and 40 percent grayish brown (10YR 5/2) silt loam; moderate coarse prismatic structure parting to weak fine subangular blocky;

very firm; 65 percent brittle; common very fine and fine vesicular pores; very few distinct discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; 10 percent subangular chert gravel; very strongly acid; clear smooth boundary.

2Btx2—38 to 48 inches; dark yellowish brown (10YR 4/4) gravelly silt loam; weak coarse prismatic structure parting to weak fine subangular blocky; very firm; 65 percent brittle; common very fine and fine vesicular pores; very few distinct discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; many medium grayish brown (10YR 5/2) irregular iron depletions throughout; 25 percent subangular chert gravel; strongly acid; gradual smooth boundary.

3Bt—48 to 60 inches; brown (7.5YR 4/4) extremely gravelly silty clay loam; weak fine subangular blocky structure; firm; common very fine and fine vesicular pores; very few distinct discontinuous dark grayish brown (10YR 4/2) clay films on faces of peds; few fine yellowish brown (10YR 5/6) irregular soft masses of iron accumulation throughout; 70 percent subangular chert gravel and 10 percent subangular chert cobbles; strongly acid.

The depth to the fragipan ranges from 18 to 36 inches.

The Ap horizon has value of 4 or 5 and chroma of 2 or 3.

The Bt horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 3, 4, or 6. It is silt loam or silty clay loam in the upper part and silty clay loam or silty clay in the lower part.

The 2Btx horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2, 3, 4, or 6. It is silt loam, silty clay loam, or the gravelly to extremely gravelly or cobbly to extremely cobbly analogues of these textures.

The 3Bt horizon has hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 4 or 6. It is silty clay loam, silty clay, clay, or the gravelly to extremely gravelly analogues of these textures.

### ***Willowfork Series***

The Willowfork series consists of very deep, poorly drained, slowly permeable soils on toeslopes. These soils formed in loess over alluvial sediments. Slopes range from 0 to 3 percent.

Soils of the Willowfork series are fine, smectitic, mesic Typic Argialbolls.

Typical pedon of Willowfork silt loam, 0 to 3 percent slopes; USGS Versailles topographic quadrangle; latitude 38 degrees 27 minutes 09 seconds N.; longitude 92 degrees 48 minutes 48 seconds W.

- Ap—0 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak fine granular structure; common very fine and fine roots throughout; common very fine vesicular pores; neutral; clear smooth boundary.
- Eg—12 to 26 inches; light brownish gray (10YR 6/2) silt loam; weak coarse platy structure parting to weak fine granular; few very fine and fine roots throughout; common very fine vesicular pores; common medium brown (10YR 5/3) irregular soft masses of iron accumulation throughout; moderately acid; clear smooth boundary.
- Btg1—26 to 34 inches; grayish brown (10YR 5/2) silty clay loam; moderate fine and medium subangular blocky structure; few very fine and fine roots throughout; common very fine vesicular pores; very few faint continuous gray (10YR 5/1) clay films on faces of peds; few distinct discontinuous light gray (10YR 7/2) clay depletions on faces of peds; many medium dark yellowish brown (10YR 4/4) irregular soft masses of iron accumulation throughout; moderately acid; gradual smooth boundary.
- Btg2—34 to 54 inches; dark gray (10YR 4/1) silty clay loam; moderate fine and medium subangular blocky structure; few very fine and fine roots throughout; few very fine vesicular pores; very few faint continuous gray (10YR 5/1) clay films on faces of peds; common medium dark yellowish brown (10YR 4/4) irregular soft masses of iron accumulation throughout; slightly acid; gradual smooth boundary.
- 2Btg3—54 to 80 inches; gray (10YR 5/1) silty clay loam; weak fine subangular blocky structure; common very fine vesicular pores; very few faint discontinuous grayish brown (10YR 5/2) clay films on faces of peds; few fine black (10YR 2/1) irregular soft masses of iron-manganese accumulation throughout; common medium dark yellowish brown (10YR 3/4) irregular soft masses of iron accumulation throughout; 10 percent subangular chert gravel; neutral.

The thickness of the mollic epipedon ranges from 12 to 16 inches.

The A or Ap horizon has chroma of 1 or 2.

The Eg horizon has value of 5 or 6.

The Btg horizon has value of 4 or 5 and chroma of 1 or 2.

The 2Btg horizon has hue of 2.5YR or 10YR, value of 4 or 5, and chroma of 1 or 2. It is silt loam, loam, silty clay loam, or the gravelly analogues of these textures.

### ***Winnipeg Series***

The Winnipeg series consists of very deep, well drained, moderately permeable soils on footslopes. These soils formed in loess and silty colluvium. Slopes range from 3 to 8 percent.

Soils of the Winnipeg series are fine-silty, mixed, active, mesic Typic Paleudalfs.

Typical pedon of Winnipeg silt loam, 3 to 8 percent slopes, eroded; USGS Gravois Mill topographic quadrangle; latitude 38 degrees 15 minutes 45 seconds N.; longitude 92 degrees 52 minutes 29 seconds W.

- A—0 to 6 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; many very fine and fine roots; many very fine and fine vesicular pores; 5 percent angular chert gravel; very strongly acid; clear smooth boundary.
- Bt1—6 to 12 inches; brown (7.5YR 4/4) silt loam; weak fine granular structure; friable; common very fine and fine roots; common very fine and fine vesicular pores; very few distinct discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; common medium reddish brown (5YR 4/4) irregular soft masses of iron accumulation throughout; 5 percent angular chert gravel; moderately acid; gradual smooth boundary.
- Bt2—12 to 20 inches; brown (7.5YR 4/4) silt loam; weak fine subangular blocky structure; friable; common very fine and fine roots; common very fine and fine vesicular pores; very few distinct discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; many fine reddish brown (5YR 4/4) irregular soft masses of iron accumulation throughout; 5 percent angular chert gravel; moderately acid; gradual smooth boundary.
- Bt3—20 to 28 inches; strong brown (7.5YR 4/6) silt loam; weak fine and medium subangular blocky structure; friable; common very fine and fine vesicular pores; very few prominent discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; common fine yellowish red (5YR 4/6) irregular soft masses of iron accumulation throughout; 5 percent angular chert gravel; strongly acid; gradual smooth boundary.

2Bt4—28 to 41 inches; brown (7.5YR 4/4) gravelly silt loam; weak fine subangular blocky structure; friable; common very fine and fine vesicular pores; very few distinct discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; very few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; common fine dark reddish brown (2.5YR 3/4) irregular soft masses of iron accumulation throughout; 25 percent angular chert gravel; strongly acid; gradual smooth boundary.

2Bt5—41 to 48 inches; strong brown (7.5YR 4/6) very gravelly loam; weak fine granular structure; friable; common very fine and fine vesicular pores; very few prominent discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; common fine yellowish red (5YR 4/6) and brown (7.5YR 5/3) irregular soft masses of iron accumulation throughout; 50 percent angular chert gravel; strongly acid; gradual smooth boundary.

2Bt6—48 to 60 inches; brown (7.5YR 4/4) extremely gravelly sandy clay loam; weak fine granular structure; friable; common very fine and fine vesicular pores; very few distinct discontinuous dark yellowish brown (10YR 4/4) clay films on faces of peds; very few prominent discontinuous black (10YR 2/1) manganese or iron-manganese stains throughout; common fine dark yellowish brown (10YR 4/6) irregular soft masses of iron accumulation throughout; 70 percent angular chert gravel and 10 percent angular chert cobbles; strongly acid.

The A horizon has hue of value of 3 or 4 and chroma of 3 or 4.

The Bt horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 or 6. It is silt loam or silty clay loam.

The 2Bt horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 or 6. It is gravelly to extremely gravelly silt loam, loam, silty clay loam, or sandy clay loam.

The 3Bt, where present, has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 or 6. It is silty clay or clay.

## **Wrengart Series**

The Wrengart series consists of very deep, moderately well drained, moderately slowly permeable soils on uplands. These soils formed in loess and residuum weathered from cherty dolostone. Slopes range from 3 to 8 percent.

Soils of the Wrengart series are fine-silty, mixed, active, mesic Fragic Oxyaquic Hapludalfs.

Typical pedon of Wrengart silt loam, 3 to 8 percent slopes, eroded; Bunceton USGS quadrangle; latitude 38 degrees 52 minutes 18 seconds N.; longitude 92 degrees 46 minutes 57 seconds W.; in Cooper County.

Ap—0 to 6 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; many very fine roots; few distinct organic coatings; neutral; abrupt smooth boundary.

Bt1—6 to 9 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; firm; many very fine roots; few distinct clay films on faces of peds; few fine prominent black iron and manganese accumulations; few faint clay depletions; neutral; clear smooth boundary.

Bt2—9 to 16 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate very fine subangular blocky structure; firm; common very fine roots; common distinct clay films on faces of peds; few fine prominent black iron and manganese accumulations; few distinct clay depletions; moderately acid; gradual smooth boundary.

Bt3—16 to 26 inches; dark yellowish brown (10YR 4/6) silty clay loam; strong very fine subangular blocky structure; firm; common very fine roots; many distinct clay films on faces of peds; few fine distinct grayish brown (10YR 5/2) iron depletions in ped interiors; few fine prominent black iron and manganese accumulations; few distinct clay depletions; moderately acid; gradual smooth boundary.

2Btx1—26 to 34 inches; dark yellowish brown (10YR 4/4) silt loam; weak coarse subangular blocky structure; very firm; 50 percent brittle; few very fine roots; common distinct clay films on faces of peds; few fine distinct dark yellowish brown (10YR 4/6) masses of iron accumulation in ped interiors; few fine prominent black iron and manganese stains; common distinct clay depletions; moderately acid; gradual smooth boundary.

2Btx2—34 to 45 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium prismatic structure; very firm; 55 percent brittle; few very fine roots; common distinct clay films on vertical faces of peds; few fine prominent black iron and manganese stains; few prominent clay depletions; moderately acid; clear smooth boundary.

3Bt1—45 to 60 inches; yellowish brown (10YR 5/6) extremely gravelly silty clay loam; weak fine subangular blocky structure; firm; common very fine roots; few distinct clay films on faces of peds; few fine distinct yellowish brown (10YR 5/8) masses of iron accumulation; few fine prominent black iron and manganese stains; many prominent clay depletions; 60 percent chert gravel; 10 percent chert cobbles; 5 percent chert stones; moderately acid.

4Bt2—60 to 80 inches; red (2.5YR 4/6) gravelly silty clay; strong fine subangular blocky structure; firm; few very fine roots; few distinct clay films on faces of peds; few fine distinct yellowish brown (10YR 5/6) masses of iron accumulation; few fine prominent black iron and manganese stains; many prominent clay depletions; 20 percent chert gravel, 5 percent chert cobbles, and 5 percent chert stones; slightly acid.

The depth to the dense material ranges from 20 to 40 inches.

The Ap or A horizon has value of 3 to 5 and chroma of 2 to 4.

The E horizon, where present, has value of 4 to 6 and chroma of 3 or 4. It is silt loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3, 4, or 6 in the upper part, but may have chroma of 2 in the lower part. It is silty clay loam or silt loam.

The 2Btx horizon has hue of 7.5YR or 10YR, value of 4 to 6 and chroma of 2, 3, 4, or 6. It is silt loam, loam, or silty clay loam.

The 3Bt horizon has hue of 2.5YR to 10YR, value of 3 to 6, and chroma of 2, 3, 4, or 6. It is silty clay loam, silty clay, or the very gravelly or extremely gravelly analogues of these textures.

The 4Bt horizon has hue of 2.5YR to 7.5YR, value of 3 to 8, and chroma of 2, 3, 4, 6, or 8. It is silty clay, clay, or the gravelly to extremely gravelly or very cobbly or extremely cobbly analogues of these textures.

Table 21.--Classification of the Soils

(An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series.)

Soil name	Family or higher taxonomic class
Bardley-----	Very-fine, mixed, active, mesic Typic Hapludalfs
Cedargap-----	Loamy-skeletal, mixed, superactive, mesic Cumulic Hapludolls
Clafork-----	Fine, smectitic, mesic Aquertic Hapludalfs
Crestmeade-----	Fine, smectitic, mesic Vertic Argialbolls
*Crestmeade-----	Fine, smectitic, mesic Aquertic Argiudolls
Eldon-----	Clayey-skeletal, mixed, active, mesic Mollic Paleudalfs
Friendly-----	Fine, mixed, active, mesic Albaquic Hapludalfs
Gabriel-----	Fine-silty, mixed, superactive, mesic Typic Argiaquolls
Glensted-----	Fine, smectitic, mesic Vertic Albaqualfs
Goss-----	Clayey-skeletal, mixed, active, mesic Typic Paleudalfs
Gravois-----	Fine-silty, mixed, active, mesic Aquic Paleudalfs
Gunlock-----	Fine, mixed, active, mesic Fragic Oxyaquic Hapludalfs
Hacreek-----	Fine-silty, mixed, superactive, mesic Aquic Argiudolls
Hartville-----	Fine, mixed, active, mesic Aquic Hapludalfs
Healing-----	Fine-silty, mixed, superactive, mesic Typic Argiudolls
Jemerson-----	Fine-silty, mixed, superactive, mesic Typic Hapludalfs
Maplewood-----	Fine, mixed, active, mesic Aquollic Hapludalfs
McGirk-----	Fine, smectitic, mesic Chromic Vertic Endoaqualfs
Moko-----	Loamy-skeletal, mixed, superactive, mesic Lithic Hapludolls
Moniteau-----	Fine-silty, mixed, superactive, mesic Typic Endoaqualfs
Niangua-----	Very-fine, mixed, active, mesic Typic Hapludalfs
Racket-----	Fine-loamy, mixed, superactive, mesic Cumulic Hapludolls
Rueter-----	Loamy-skeletal, siliceous, active, mesic Typic Paleudalfs
Sacville-----	Fine, smectitic, mesic Vertic Argiaquolls
Speed-----	Fine-silty, mixed, superactive, mesic Argiaquic Argialbolls
Sturkie-----	Fine-silty, mixed, superactive, mesic Cumulic Hapludolls
Union-----	Fine, mixed, active, mesic Oxyaquic Fragiudalfs
Willowfork-----	Fine, smectitic, mesic Typic Argialbolls
Winnipeg-----	Fine-silty, mixed, active, mesic Typic Paleudalfs
Wrengart-----	Fine-silty, mixed, active, mesic Fragic Oxyaquic Hapludalfs



# Formation of the Soils

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This section relates the soils in the survey area to the major factors of soil formation.

Soil is the product of soil-forming processes acting on accumulated or deposited geologic material. The characteristics of the soil are determined by the type of parent material; the plant and animal life on and in the soil; the climate under which the soil-forming factors were active; topography, or lay of the land; and the length of time these forces have been active.

The parent material affects the kind of soil profile that is formed and, in extreme cases, determines it almost entirely. Plant and animal life are the active factors of soil formation. The climate determines the amount of water available for leaching and the amount of heat for physical and chemical changes. Together, climate and plant and animal life act on the parent material and slowly change it to a natural body that has genetically related horizons. Topography often modifies these other factors. Finally, time is required for changes in the parent material to result in the formation of a soil. Generally, a long time is required for the development of distinct soil horizons.

These factors of soil formation are all so closely interrelated in their effects on the soil that few generalizations can be made about the effect of any one factor unless conditions are specified for the other four. Soil formation is complex, and many processes of soil development are still unknown.

## Parent Material

Parent material is the unconsolidated mass in which a soil forms. It determines the limits of the chemical and mineral composition of the soil. The soils in Morgan County formed in residual material, cherty sediments (colluvium), loess, residuum, and alluvium, or in a combination of these materials.

Residual material in Morgan County consists primarily of material weathered from cherty dolostone, dolostone, and sandstone. Moko soils formed in residuum.

Cherty sediments (colluvium) are lag concentrations of chert and finer sediments associated with an erosional surface. On the steeper

slopes, this material is the surface layer of the present soil. Goss, Niangua, and Rueter soils formed in cherty sediments (colluvium) and the underlying cherty dolostone and sandstone residuum.

Loess is silty material deposited by the wind. Most of the uplands in the survey area have deposits of loess or have had them in the past. The loess has been eroded from or mixed with the surface layer on the steep side slopes. The more stable ridgetops and a few areas of gently sloping to moderately sloping head slopes have loess caps ranging from 18 to 40 inches thick. Crestmeade, Friendly, Glensted, Gravois, Gunlock, Maplewood, and Union soils formed in loess and material weathered from cherty dolostone or dolostone.

Alluvium is material transported by water and deposited in the nearly level or gently sloping flood plains along streams and rivers. The major streams in Morgan County are Richland Creek and Flatcreek Creek. The flood plain along the Osage River has been inundated by the creation of the Lake of the Ozarks. The alluvial material was washed from the watersheds of these rivers and streams and their tributaries. It ranges from silt to sand and gravel. Gabriel, Hacreek, Healing, Jemerson, and Sturkie soils formed in silty material, and Cedargap soils formed in silty material that had high gravel content.

Stream terraces are older flood plains that are now higher than the immediate flood plain because of the downcutting of stream channels to a lower elevation. The alluvial material on these stream terraces is clayey or silty. Gabriel, Hacreek, Healing, Moniteau, and Speed soils formed on these stream terraces.

## Living Organisms

Plants and animals living on or in the soil are active in the soil-forming process. Plants furnish organic matter to the soil and bring up plant nutrients from underlying layers to the surface layer. As plants die and decay, they contribute organic matter to the soil. Bacteria and fungi decompose the plant remains and help to incorporate the organic matter into the soil.

The kind of native vegetation is one factor that has greatly influenced soil formation in Morgan County. The basic kinds of native vegetation were prairie grasses and forest vegetation. Additions of organic matter to soils that formed under prairie grasses are largely a result of the yearly decomposition of plant materials. Plant tops decompose at the surface, and the roots decompose at various depths in the soil. As a result, soils that formed under prairie grasses have a thick, dark surface layer.

Additions of organic matter to soils that formed under forest vegetation are mostly the result of leaves and twigs that decompose on the surface. These soils have a thin, dark surface layer.

Insects, worms, humans, and other animals affect soil formation. Bacteria and fungi cause rotting of organic materials, fix nitrogen, and improve tilth. Burrowing animals and insects loosen and mix various soil horizons.

In a relatively short time, human activities have greatly affected the processes of soil formation. The major alterations have resulted in vegetation, drainage of wet areas, and accelerated erosion. Row crops have replaced native grasses and many forested areas. Nearly all of the flood plains and much of the upland areas are now farmed. These changes have increased food production but have had an adverse effect in terms of sustained productivity. Accelerated erosion continues to reduce the potential of many upland soils, and the loss of cropland to urban development is virtually irreversible.

## Climate

Climate has been and still is an important factor of soil formation. Geologic erosion; plant and animal life; and, in more recent times, accelerated erosion all have varied with the climate.

Local conditions can modify the influence of the climate in a region. Variations in temperature from high to low elevations have had only a slight influence on soil development. The effects of temperature differences resulting from aspect are more evident. For example, south- and west-facing slopes are warmer and dryer than north- and east-facing slopes. Shallower soils, inferior tree species, and slower growth of trees are evident on the warmer and dryer south- and west-facing slopes.

The glacial periods that so greatly affected the soil-forming processes were a result of climatic changes. Thousands of years of cold temperatures resulted in glaciers that moved into the area. Several soil-forming periods have occurred since the last ice

sheet left northern Missouri. Geologic evidence indicates that the climate was colder and wetter than the present climate during some soil-forming periods and was warmer during others. The warmer weather and high winds resulted in severe geologic erosion, and much of the area was covered by loess.

High temperatures and adequate rainfall encourage rapid chemical and physical changes. This type of climate is conducive to the breakdown of minerals and the relocation of clay within the soil. The clay is moved downward into the soil profile, and this downward movement results in the formation of the subsoil. Nearly all of the upland soils in the county show evidence of this illuviation.

## Topography

Topography, or relief, affects soil formation through its influence on drainage, runoff, the rate of water infiltration, and geologic erosion. Topography is characterized by the length, shape, aspect, and degree of slope. It is important in determining the pattern and distribution of soils.

The amount of water entering the soil depends on steepness of slope, permeability, and the intensity of rainfall. Because runoff is rapid in steep areas, very little water passes through the soil and soil formation is slow. Geologic erosion almost keeps pace with the soil-forming processes. In gently sloping areas, runoff is slow, erosion is minimal, and most of the water passes through the soil. Leaching, the translocation of clay, and other soil-forming processes are intensified in these areas. Soils in these areas generally show maximum profile development.

Soils on steep, south-facing slopes receive more direct sunlight and are drier than similar soils on north-facing slopes. Drier conditions influence soil formation by affecting the kind of vegetation, the susceptibility to erosion, and the cycles of freezing and thawing.

## Time

The degree of profile development is dependent on the length of time that the parent material has been in place and subject to the soil-forming processes. Older soils show the effects of leaching and clay movement and have developed distinct horizons. Young soils show little profile development.

The youngest soils in Morgan County are those that formed in alluvium. Cedargap and Racket soils, for example, show little profile development. Alluvial material is added to the surface nearly every year.

Gabriel, Hacreek, Moniteau, and Speed are older alluvial soils. They are on stream terraces and show moderate profile development.

The oldest soils in the survey area formed in nearly level or gently sloping areas at the highest elevations in the county. Crestmeade, Glensted, and Union soils are examples. They have well developed, distinct horizons. The carbonates originally present in their parent material have been leached to a great depth, leaving the soils quite acid throughout. Clay has been concentrated in distinct subsoil horizons through translocation by water. Union soils have a distinct fragipan. Although the genesis of the fragipan is obscure, it is clear that some time is required for its formation.

Most of the soils in Morgan County are intermediate in age. Goss and Rueter soils formed in cherty sediments (colluvium) and the underlying dolostone or limestone residuum on steep side slopes in the uplands. They have an eluviated subsurface horizon and translocated clay in the subsoil horizons.

The age of a soil, as expressed in profile characteristics, is not necessarily a reflection of time in years but is a result of the interaction of various soil-forming factors over periods of time. The age is influenced by topography and climate. It is determined by the degree of profile development and not by the years the soil material has existed.



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# Glossary

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**ABC soil.** A soil having an A, a B, and a C horizon.

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

**Aggregate, soil.** Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

**Alluvial fan.** The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

**Alluvium.** Material, such as sand, silt, or clay, deposited on land by streams.

**Alpha,alpha-dipyridyl.** A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

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

**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.

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

**Aspect.** The direction in which a slope faces.

**Association, soil.** A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

**Available water capacity (available moisture capacity).** The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity,

in inches, in a 60-inch profile or to a limiting layer is expressed as:

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

**Backslope.** The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Backslopes in profile are commonly steep, are linear, and may or may not include cliff segments.

**Basal area.** The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

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

**Base slope.** A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

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

**Bedrock-controlled topography.** A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

**Board foot.** A unit of measure of the wood in lumber, logs, or trees. The amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick before finishing.

**Bottomland.** The normal flood plain of a stream, subject to flooding.

- Boulders.** Rock fragments larger than 2 feet (60 centimeters) in diameter.
- Breast height.** An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.
- Brush management.** Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.
- Canopy.** The leafy crown of trees or shrubs. (See Crown.)
- Capillary water.** Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.
- Catena.** A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.
- Cation.** An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.
- Cation-exchange capacity.** The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.
- Channeled.** Refers to a drainage area in which natural meandering or repeated branching and convergence of a streambed have created deeply incised cuts, either active or abandoned, in alluvial material
- Channery soil material.** Soil material that is, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a chanter.
- Chemical treatment.** Control of unwanted vegetation through the use of chemicals.
- Chiseling.** Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.
- Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.
- Clay depletions.** Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.
- 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.
- Clayey soil.** Silty clay, sandy clay, or clay.
- Claypan.** A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.
- Clearcut.** A method of forest harvesting that removes the entire stand of trees in one cutting. Reproduction is achieved artificially or by natural seeding from the adjacent stands.
- Climax plant community.** The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.
- Coarse fragments.** Mineral or rock particles larger than 2 millimeters in diameter.
- Coarse textured soil.** Sand or loamy sand.
- Cobble (or cobblestone).** A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.
- Cobbly soil material.** Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.
- Codominant trees.** Trees whose crowns form the general level of the forest canopy and that receive full light from above but comparatively little from the sides.
- COLE (coefficient of linear extensibility).** See Linear extensibility.
- Colluvium.** Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.
- Complex slope.** Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.
- Complex, soil.** A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

- Compressible** (in tables). Excessive decrease in volume of soft soil under load.
- Concretions.** Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.
- Conservation cropping system.** Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.
- Conservation tillage.** A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.
- Consistence, soil.** Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."
- Contour stripcropping.** Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.
- Control section.** The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.
- Corrosion.** Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.
- Cover crop.** A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.
- Cropping system.** Growing crops according to a planned system of rotation and management practices.
- Crop residue management.** Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.
- Crown.** The upper part of a tree or shrub, including the living branches and their foliage.
- Cutbanks cave** (in tables). The walls of excavations tend to cave in or slough.
- Decreasers.** The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.
- Deep soil.** A soil that is 40 to 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.
- Deep to water** (in tables). Deep to permanent water during the dry season.
- Dense layer** (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.
- Depth, soil.** Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.
- Depth to bedrock** (in tables). Bedrock is too near the surface for the specified use.
- Diversion (or diversion terrace).** A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.
- Dominant trees.** Trees whose crowns form the general level of the forest canopy and that receive full light from above and from the sides.
- Drainage class** (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained*, *somewhat excessively drained*, *well drained*, *moderately well drained*, *somewhat poorly drained*, *poorly drained*, and *very poorly drained*. These classes are defined in the "Soil Survey Manual."
- Drainage, surface.** Runoff, or surface flow of water, from an area.

- Drainageway.** An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.
- Droughty** (in tables). Soil holds too little water for plants during dry periods.
- Duff.** A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.
- Eluviation.** The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.
- Endosaturation.** A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.
- Ephemeral stream.** A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.
- Episaturation.** A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.
- Erodes easily** (in tables). Soil is easily eroded by water.
- Erosion.** The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
- Erosion** (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
- Erosion** (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.
- Escarpment.** A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.
- Even aged.** Refers to a stand of trees in which only small differences in age occur between individual trees. A range of 20 years is allowed.
- Excess fines** (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.
- Fast intake** (in tables). The rapid movement of water into the soil.
- Fertility, soil.** The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.
- Field moisture capacity.** The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.
- Fine textured soil.** Sandy clay, silty clay, or clay.
- Firebreak.** Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.
- First bottom.** The normal flood plain of a stream, subject to frequent or occasional flooding.
- Flaggy soil material.** Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.
- Flagstone.** A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.
- Flooding** (in tables). Soil flooded by moving water from stream overflow or runoff.
- Flood plain.** A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.
- Fluvial.** Of or pertaining to rivers; produced by river action, as a fluvial plain.
- Footslope.** The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).
- Forb.** Any herbaceous plant not a grass or a sedge.
- Forest cover.** All trees and other woody plants (underbrush) covering the ground in a forest.
- Forest type.** A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

- Fragipan.** A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.
- Frost action** (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.
- Genesis, soil.** The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.
- Grassed waterway.** A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.
- Gravel.** Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.
- Gravelly soil material.** Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.
- Green manure crop** (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.
- Ground water.** Water filling all the unblocked pores of the material below the water table.
- Gully.** A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.
- Hard bedrock.** Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.
- Hard to pack** (in tables). Difficult to compact using regular earthwork construction equipment.
- Head slope.** A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.
- Highly erodible** (in tables). Soil has an erodibility index greater than 8 and is very susceptible to erosion by water.
- High-residue crops.** Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.
- Hill.** A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.
- Horizon, soil.** A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:
- O horizon.*—An organic layer of fresh and decaying plant residue.
- A horizon.*—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.
- E horizon.*—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.
- B horizon.*—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.
- C horizon.*—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.
- Cr horizon.*—Soft, consolidated bedrock beneath the soil.
- R layer.*—Consolidated bedrock beneath the soil.

The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

**Humus.** The well decomposed, more or less stable part of the organic matter in mineral soils.

**Hydrologic soil groups.** Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

**Illuviation.** The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

**Increasesers.** Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasesers commonly are the shorter plants and the less palatable to livestock.

**Infiltration.** The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

**Infiltration capacity.** The maximum rate at which water can infiltrate into a soil under a given set of conditions.

**Infiltration rate.** The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

**Infrequent flooding** (in tables). Flooding occurs at an interval that limits riparian plant species.

**Intake rate.** The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2 .....	very low
0.2 to 0.4 .....	low
0.4 to 0.75 .....	moderately low
0.75 to 1.25 .....	moderate
1.25 to 1.75 .....	moderately high
1.75 to 2.5 .....	high
More than 2.5 .....	very high

**Interfluve.** An elevated area between two drainageways that sheds water to those drainageways.

**Intermittent stream.** A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

**Invaders.** On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

**Iron depletions.** Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

**Karst** (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

**Landslide.** The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

**Large stones** (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

**Leaching.** The removal of soluble material from soil or other material by percolating water.

**Linear extensibility.** Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at  $1/3$ - or  $1/10$ -bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

**Liquid limit.** The moisture content at which the soil passes from a plastic to a liquid state.

**Loam.** Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

**Loamy soil.** Coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, or silty clay loam.

**Loess.** Fine grained material, dominantly of silt-sized particles, deposited by wind.

**Low adsorption** (in tables). Low amounts of cations are adsorbed from wastes applied to the soil.

**Low-residue crops.** Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

**Low strength.** The soil is not strong enough to support loads.

**Masses.** Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

**Mean annual increment (MAI).** The average annual increase in volume of a tree during the entire life of the tree.

**Mechanical treatment.** Use of mechanical equipment for seeding, brush management, and other management practices.

**Medium textured soil.** Very fine sandy loam, loam, silt loam, or silt.

**Merchantable trees.** Trees that are of sufficient size to be economically processed into wood products.

**Mineral soil.** Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

**Minimum tillage.** Only the tillage essential to crop production and prevention of soil damage.

**Miscellaneous area.** An area that has little or no natural soil and supports little or no vegetation.

**Moderately coarse textured soil.** Coarse sandy loam, sandy loam, or fine sandy loam.

**Moderately deep soil.** A soil that is 20 to 40 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Moderately fine textured soil.** Clay loam, sandy clay loam, or silty clay loam.

**Mollic epipedon.** A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

**Morphology, soil.** The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons,

and the thickness and arrangement of those horizons in the soil profile.

**Mottling, soil.** Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

**Munsell notation.** A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

**Neutral soil.** A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

**Nodules.** Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

**Nose slope.** A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

**Nutrient, plant.** Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

**Organic matter.** Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low .....	less than 0.5 percent
Low .....	0.5 to 1.0 percent
Moderately low .....	1.0 to 2.0 percent
Moderate .....	2.0 to 4.0 percent
High .....	4.0 to 8.0 percent
Very high .....	more than 8.0 percent

**Overstory.** The trees in a forest that form the upper crown cover.

**Oxbow.** The horseshoe-shaped channel of a former meander, remaining after the stream formed a cutoff across a narrow meander neck.

**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 affects the specified use.

**Permeability.** The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow .....	0.0 to 0.01 inch
Very slow .....	0.01 to 0.06 inch
Slow .....	0.06 to 0.2 inch
Moderately slow .....	0.2 to 0.6 inch
Moderate .....	0.6 inch to 2.0 inches
Moderately rapid .....	2.0 to 6.0 inches
Rapid .....	6.0 to 20 inches
Very rapid .....	more than 20 inches

**Phase, soil.** A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

**pH value.** A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

**Piping** (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

**Plasticity index.** The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

**Plastic limit.** The moisture content at which a soil changes from semisolid to plastic.

**Plowpan.** A compacted layer formed in the soil directly below the plowed layer.

**Ponding.** Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

**Poor filter** (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

**Poorly graded.** Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

**Poor outlets** (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

**Potential native plant community.** See Climax plant community.

**Potential rooting depth (effective rooting depth).**

Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

**Prescribed burning.** Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

**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.

**Proper grazing use.** Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

**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 degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid .....	less than 3.5
Extremely acid .....	3.5 to 4.4
Very strongly acid .....	4.5 to 5.0
Strongly acid .....	5.1 to 5.5

Moderately acid .....	5.6 to 6.0
Slightly acid .....	6.1 to 6.5
Neutral .....	6.6 to 7.3
Slightly alkaline .....	7.4 to 7.8
Moderately alkaline .....	7.9 to 8.4
Strongly alkaline .....	8.5 to 9.0
Very strongly alkaline .....	9.1 and higher

**Redoximorphic concentrations.** Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

**Redoximorphic depletions.** Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

**Redoximorphic features.** Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

**Reduced matrix.** A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

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

**Relief.** The elevations or inequalities of a land surface, considered collectively.

**Residuum (residual soil material).** Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

**Rill.** A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

**Road cut.** A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

**Rock fragments.** Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

**Rock outcrop.** Exposures of bare bedrock other than lava flows and rock-lined pits.

**Rooting depth** (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

**Root zone.** The part of the soil that can be penetrated by plant roots.

**Runoff.** The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

**Sand.** As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

**Sandstone.** Sedimentary rock containing dominantly sand-sized particles.

**Sandy soil.** Sand or loamy sand.

**Saturation.** Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

**Sawlogs.** Logs of suitable size and quality for the production of lumber.

**Seasonally ponded** (in tables). Standing water on soils in closed depressions that is removed only by percolation or evapotranspiration. Generally occurs during the winter and early spring.

**Seasonal wetness** (in tables). The soil may be wet during the period of desired use. This usually occurs during the winter and early spring.

**Second bottom.** The first terrace above the normal flood plain (or first bottom) of a river.

**Sedimentary rock.** Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

**Seepage** (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

**Series, soil.** A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

**Shale.** Sedimentary rock formed by the hardening of a clay deposit.

**Shallow soil.** A soil that is 10 to 20 inches deep over

bedrock or to other material that restricts the penetration of plant roots.

**Sheet erosion.** The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

**Shoulder.** The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

**Shoulder slope.** The uppermost inclined surface at the top of a hillside. It is the transition zone from the backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

**Shrink-swell** (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

**Side slope.** A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

**Silica.** A combination of silicon and oxygen. The mineral form is called quartz.

**Silica-sesquioxide ratio.** The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

**Silt.** As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

**Similar soils.** Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

**Sinkhole.** A depression in the landscape where limestone has been dissolved.

**Site class.** A grouping of site indexes into five to seven production capability levels. Each level can be represented by a site curve.

**Site curve (50-year).** A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and

codominant trees that are 50 years old or are 50 years old at breast height.

**Site curve (100-year).** A set of related curves on a graph that shows the average height of dominant or dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant or dominant and codominant trees that are 100 years old or are 100 years old at breast height.

**Site index.** A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

**Skid trails.** Pathways along which logs are dragged to a common site for loading onto a logging truck.

**Slippage** (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

**Slope.** The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

**Slope** (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

**Slope/erodibility** (in tables). A combination of slope and susceptibility to water erosion may be restrictive in the use of this soil.

**Slow intake** (in tables). The slow movement of water into the soil.

**Slow refill** (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

**Small stones** (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

**Soft bedrock.** Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

**Soil.** A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

**Soil reaction** (in tables). A measure of acidity or alkalinity of a soil, expressed in pH values, which indicates that the soil reaction is either too high or too low for the intended use.

**Soil separates.** Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand .....	2.0 to 1.0
Coarse sand .....	1.0 to 0.5
Medium sand .....	0.5 to 0.25
Fine sand .....	0.25 to 0.10
Very fine sand .....	0.10 to 0.05
Silt .....	0.05 to 0.002
Clay .....	less than 0.002

**Solum.** The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

**Species.** A single, distinct kind of plant or animal having certain distinguishing characteristics.

**Stickiness (surface)** (in tables). The soil is slippery and sticky when wet and slow to dry.

**Stones.** Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

**Stony.** Refers to a soil containing stones in numbers that interfere with or prevent tillage.

**Strath terrace.** A surface cut formed by the erosion of hard or semiconsolidated bedrock and thinly mantled with stream deposits.

**Stream channel.** The hollow bed where a natural stream of surface water flows or may flow; the deepest or central part of the bed, formed by the main current and covered more or less continuously by water.

**Stream terrace.** One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that were produced during a former stage of erosion or deposition.

**Strippcropping.** Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

**Structure, soil.** The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar*

(prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

**Subsoil.** Technically, the B horizon; roughly, the part of the solum below plow depth.

**Substratum.** The part of the soil below the solum.

**Subsurface layer.** Technically, the E horizon.

Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

**Subsurface layer.** Any subsurface soil horizon (A, E, AB, or EB) below the surface layer.

**Summit.** A general term for the top, or highest level, of an upland feature, such as a hill or mountain. It commonly refers to a higher area that has a gentle slope and is flanked by steeper slopes.

**Surface layer.** The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

**Surface soil.** The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

**Taxadjuncts.** Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

**Terrace.** An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

**Terrace** (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

**Texture, soil.** The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand*, *loamy sand*, *sandy*

*loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

**Texture, soil.** The relative proportions of sand, silt, and clay particles in a mass of soil. The textural classes are *C—clay, CL—clay loam, L—loam, LS—loamy sand, S—sand, SC—sandy clay, SCL—sandy clay loam, SI—silt, SIC—silty clay, SICL—silty clay loam, SIL—silt loam, SL—sandy loam.* Terms used in lieu of texture are *WB—weathered bedrock and UWB—unweathered bedrock.* The texture modifiers that may apply to textural classes are *CB—cobbly, CBV—very cobbly, CBX—extremely cobbly, GR—gravelly, GRV—very gravelly, GRX—extremely gravelly, SR—stratified.*

**Thin layer** (in tables). Otherwise suitable soil material that is too thin for the specified use.

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

**Toeslope.** The outermost inclined surface at the base of a hill; part of a footslope.

**Too acid** (in tables). The soil is so acid that growth of plants is restricted.

**Too clayey** (in tables). The soil is slippery and sticky when wet and slow to dry.

**Too sandy** (in tables). The soil is soft and loose, droughty, and low in fertility or is too fine to use as gravel.

**Topsoil.** The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

**Trafficability.** The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

**Unstable fill** (in tables). Risk of caving or sloughing on banks of fill material.

**Upland.** Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

**Valley.** An elongated depressional area primarily developed by stream action.

**Very deep soil.** A soil that is more than 60 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Very shallow soil.** A soil that is less than 10 inches deep over bedrock or to other material that restricts the penetration of plant roots.

**Water bars.** Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

**Water-spreading.** Diverting runoff from natural channels by means of a system of dams, dikes, or ditches and spreading it over relatively flat surfaces.

**Weathering.** All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

**Well graded.** Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

**Wetness** (in tables). The soil is wet during the period of desired use.

**Wilting point (or permanent wilting point).** The moisture content of soil, on an oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

**Windthrow.** The uprooting and tipping over of trees by the wind.