United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Oklahoma Agricultural Experiment Station and the Oklahoma Conservation Commission

Supplement to the Soil Survey of Osage County, Oklahoma

How to Use This Soil Survey Supplement

This document, in conjunction with the Web Soil Survey, supplements the Soil Survey of Osage County, Oklahoma, published in 1979. It includes general information about the survey area, updated descriptions of the detailed soil map units, and a description of how the soils formed. The **detailed soil map unit descriptions**, when used in conjunction with the **detailed soil 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**. Note the map unit symbols that are in that area. The **Contents** and **Bookmarks** in this supplement list the map units by symbol and name. Also the **Bookmarks** are linked to where each map unit is described. See the **Contents** and **Bookmarks** for sections of this publication that may address your specific needs.

Advancements in technology and increases in the intensity and variety of land uses have produced a need for updated soils information. In preparation for this publication, the correlation for the Soil Survey of Osage County was amended in February 1997, January 2004, and November 2004. This publication and the Web Soil Survey include the recorrelated map unit legend and updated information regarding major soil properties and the use and management of the soils. In some cases, the name of the map unit and the name of the soil series have changed from the first publication. Some of the map unit symbols and map delineations have changed.

Web Soil Survey

Additional data is available on the Web Soil Survey at http://websoilsurvey.nrcs.usda.gov.

Archived Soil Survey

Comprehensive descriptions of the detailed soil map units and additional information about the soils in the survey area are archived in the original Soil Survey of Osage County, Oklahoma. Archived soil surveys are available from many libraries, from the local office of the Natural Resources Conservation Service, and from the Osage County Conservation District in Pawhuska, Oklahoma.

This document 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 has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for the Soil Survey of Osage County, Oklahoma, was completed in the period 1960-1973. Soil names and descriptions were approved in 1975 and revised in 2004. Fieldwork for the supplement to the soil survey was completed in 2003. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2004. The maps for this survey were recompiled utilizing survey photographic imagery of 1:24,000 and rectified to 1995 digital orthophotography for SSURGO digitizing. This survey was made cooperatively by the Natural Resources Conservation Service, the Oklahoma Agricultural Experiment Station, and the Oklahoma Conservation Commission. It is part of the technical assistance furnished to the Osage County Conservation District.

Soil maps in this soil survey supplement 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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Cover: Rangeland on Niotaze-Bigheart-Rock outcrop complex, 3 to 15 percent slopes, very stony and Niotaze-Bigheart-Rock outcrop complex, 15 to 25 percent slopes, extremely stony. Brush control has been applied for 50 years.

Contents

Issued March 2008

Foreword

This soil survey supplement contains information that can be used in conjunction with the previously published soil survey and with online resources. It provides valuable information for land-planning programs in Oklahoma. It contains predictions of soil behavior for selected land uses. This supplement also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

Soil surveys are 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.

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 not suited for use as septic tank absorption fields. A high water table makes a soil very limited for basements or underground installations.

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

RONALD L. HILLIARD
State Conservationist
Natural Resources Conservation Service

Supplement to the Soil Survey of Osage County, Oklahoma

Fieldwork by Bobby G. Bourlier, Joe D. Nichols, and William J. Ringwald
Natural Resources Conservation Service (Soil Conservation Service),
and by P.J. Workman and Stanley Clemmons, Bureau of Indian Affairs

Update by Gregory F. Scott, Jake Boyett, and Jeremy Dennis
Natural Resources Conservation Service
MLRA 80A/84A Soil Survey Office

United States Department of Agriculture,
Natural Resources Conservation Service,
in cooperation with
Oklahoma Agricultural Experiment Station and
the Oklahoma Conservation Commission

This supplement provides updated information to the original Soil Survey Report of Osage County, Oklahoma issued April 1979. The original tables and maps were deleted. New digital maps on updated photography have replaced the original maps, and include updated information. These are available in this document and on Web Soil Survey at http://websoilsurvey.nrcs.usda.gov. Updated tables were generated from the NRCS National Soil Information System (NASIS). These are available on Web Soil Survey at http://websoilsurvey.nrcs.usda.gov. and also on the NRCS Soil Data Mart at http://soildatamart.nrcs.usda.gov.

Osage County is in north-central Oklahoma (fig. 1). It has an area of about 1,474,509 acres, or about 2,304 square miles. The population of the county is 45,181. Pawhuska, the county seat, is in the central part of the county and has a population of about 3,629. Hulah Lake, Bluestem Lake, Hudson Lake, Birch Lake, Skiatook Lake, Kaw Lake, Keystone Reservoir, and the Arkansas River, and other water areas of more than 4 acres make up about 40,799 acres. Osage County is bordered on the north by Cowley and Chautauqua Counties Kansas, on the east by Washington County, on the west by Kay and Noble Counties, and on the south by Pawnee and Tulsa Counties.

Figure 1.—Location of Osage County in Oklahoma.

How Soil Surveys Are Made

Soil surveys are 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 observe 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 dig 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 or segment of the landscape. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landscape, soil scientists develop a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientists to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge into one another as their characteristics gradually change. To construct an accurate 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 record the characteristics of the soil profiles that they studied. They note 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 a survey area and determining their properties, the soil scientists assign 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 classify and name the soils in a survey area, they compare the individual soils with similar soils in the same taxonomic class in other areas so that they can 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 locate and identify the significant natural bodies of soil in the survey area, they draw the boundaries of these bodies on aerial photographs and identify each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

General Nature of the Survey Area

This section provides information that may be useful to persons not familiar with Osage County. This section briefly describes subjects of general interest, including the history and climate.

History

The Osage Indians were the first settlers in Osage County. In 1907, the tribe allotted 658 acres to each individual listed on the tribal roll. Most of the 2,229 Indians chose to live on the most suitable land for farming. They grew mainly corn and maize and hunted buffalo and prairie chicken for meat. The rolling grasslands and woodlands were leased out to later settlers, who put together many large ranches, several of which have been held together by purchase and lease since that time.

The first immigrants entering the reservation were allowed to live only in three unallotted and unrestricted town sites: Pawhuska, Hominy, and Greyhorse. Most were government employees working as agents, clerks, teachers, mechanics, and traders. After Oklahoma attained statehood in 1907, many settlers were able to purchase land from the Indians and cattle from the herds passing northward through the county to market.

Most of the flood plains along the Arkansas River and other major streams were cleared of trees and brush between 1910 and 1930. The deeper soils on the uplands were also plowed, and vast acreages of corn, oats, and wheat were grown. The Depression and the Dust Bowl of the 1930's forced many farmers to abandon their land. Much of it was sold to the larger cattle ranches or taken over by the banks that held the mortgages. The fields lay idle for many years, and many of the soils of the uplands became severely eroded.

During the early 1940's, bermudagrass was brought into the county through efforts of the Osage County Conservation District and the Soil Conservation Service to help control erosion and to provide additional grazing land. The early plantings thrived and grew beyond expectations, and demand for root stock far exceeded availability. Since then about 112,600 acres, or about 7.6 percent of the county, has been planted to tame pasture plants.

Before 1960, much of the range was grazed by steers brought in from southern states by rail only during the growing season. After a season of grazing on the tall prairie grasses, these steers were shipped on to northern markets. The Blackland shipping pens, in the north-central part of the county along the now abandoned Midland Valley Railroad, were once the main shipping and receiving point for cattle moving in and out of Osage County. Since 1960, many of the ranchers have incorporated cow-calf operations with their steer grazing program, making a balanced year-round business.

Ranches grew steadily in size from the establishment of statehood through the late 1960's; many ranches are 15,000 to 20,000 acres, and a few are 80,000 to 100,000 acres. Inflation set in, cattle markets declined, and many ranches have been subdivided, sold, or leased although a few are still expanding.

Ranching is the main enterprise in Osage County. The average operating unit is about 835 acres. About 75 percent of the land in farms or ranches is open range, 12 percent is wooded range, 7 percent is cropland, and 6 percent is tame pasture.

Small grains, mainly wheat, alfalfa, grain sorghums, and soybeans are the principal crops. Corn and sorghums cut for silage, and orchard crops are grown on a minor acreage.

Local dairies use most of the corn and sorghums and much of the alfalfa hay produced in the county. A large acreage of native grasses and tame pastures are cut for hay; much of this is used by local farmers and ranchers. The other crops are shipped to local and distant markets and sold for cash.

Climate

Prepared by the Natural Resources Conservation Service National Water and Climate Center, Portland, Oregon.

The climate tables were created from the climate station in Pawhuska, Oklahoma. Thunderstorm days, relative humidity, percent sunshine, and wind information are estimated from the First Order station at Pawhuska, Oklahoma.

Table 1 “Temperature and Precipitation” provides data for the survey area as recorded at Pawhuska in the period 1971 to 2000. Table 2 “Freeze Dates in Spring and Fall” provides probable dates of the first freeze in fall and the last freeze in spring. Table 3 “Growing Season” provides data on the length of the growing season.

In winter, the average temperature is 37.7 degrees F and the average daily minimum temperature is 26.0 degrees. The lowest temperature on record, which occurred at Pawhuska on January 22, 1930, is -26 degrees. In summer, the average temperature is 79.3 degrees and the average daily maximum temperature is 90.9 degrees. The highest temperature, which occurred at Pawhuska on July 19, 1936, is 116 degrees.

The 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 average annual total precipitation is about 43.95 inches. Of this, about 31.42 inches, or 71 percent, usually falls in April through October. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 9.55 inches at Pawhuska on September 15, 1915. Thunderstorms occur on about 49 days each year, and most occur in April with 11.

The average seasonal snowfall is 9.9 inches. The greatest snow depth at any one time during the period of record was 13 inches recorded on March 16, 1970. On an average, 8 days per year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 12.5 inches recorded on March 16, 1970.

The average relative humidity in mid-afternoon is about 56 percent. Humidity is higher at night, and the average at dawn is about 81 percent. The sun shines 71 percent of the time in summer and 54 percent in winter. The prevailing wind is from the South. Average wind speed is highest, 12.1 miles per hour, in March.

Table 1.--Temperature and Precipitation

(Recorded in the period 1971-2000 at Pawhuska, Oklahoma)

Month	Temperature (Degrees F)						Precipitation (Inches)				
				2 years in 10 will have		Average number of growing degree days*		2 years in 10 will have		Average number of days w/.1 or more	Average snowfall
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than	Minimum temperature less than		Average	less than	more than		
January	46.3	23.1	34.7	73	-4	9	1.46	0.45	2.39	3	3.4
February	53.2	28.2	40.7	80	-2	38	2.09	0.65	3.32	3	2.7
March	63.1	37.6	50.4	86	13	138	3.59	1.59	5.35	5	0.9
April	72.7	47.1	59.9	91	25	314	4.50	2.12	6.83	6	0.0
May	79.3	56.4	67.8	92	36	552	5.66	3.08	7.91	7	0.0
June	87.0	65.2	76.1	98	48	783	5.20	2.64	7.07	6	0.0
July	92.9	70.0	81.5	105	55	975	3.88	1.22	6.53	4	0.0
August	92.8	68.1	80.4	104	52	942	3.55	1.05	6.10	4	0.0
September	84.4	60.4	72.4	101	36	672	5.06	1.78	8.20	5	0.0
October	74.1	48.4	61.2	91	26	360	3.57	1.47	5.60	4	0.0
November	59.6	36.8	48.2	81	14	99	3.28	0.89	6.03	4	0.5
December	48.9	26.7	37.8	74	0	19	2.10	0.64	3.29	3	2.4
Yearly:											
Average	71.2	47.3	59.3	---	---	---	---	----	----	---	---
Extreme	111	-15	----	107	-9	---	---	----	----	---	---
Total	---	---	---	---	---	4,902	43.95	36.15	51.21	54	9.9

Average number of days per year with at least 1 inch of snow on the ground: 8

*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. (Threshold: 50.0 degrees F.)

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1971-2000 at Pawhuska, Oklahoma)

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 4	April 10	April 15
2 years in 10 later than--	March 29	April 6	April 12
5 years in 10 later than--	March 17	March 28	April 5
First freezing temperature in fall:			
1 year in 10 earlier than--	October 29	October 20	October 9
2 years in 10 earlier than--	November 4	October 25	October 14
5 years in 10 earlier than--	November 16	November 3	October 23

Table 3.--Growing Season

(Recorded for the period 1971-2000 at Pawhuska, Oklahoma)

Probability	Daily Minimum Temperature		
	Number of days higher than 24°F	Number of days higher than 28°F	Number of days higher than 32°F
	Days	Days	Days
9 years in 10	218	202	184
8 years in 10	226	208	190
5 years in 10	242	219	201
2 years in 10	258	231	212
1 year in 10	267	237	217

Detailed Soil Map Units

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 the detailed soil maps represents an area on the landscape and consists of one or more soils or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas 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, are mapped without areas of minor components of other taxonomic classes. Consequently, map units are made up of the soils or miscellaneous areas for which they are named and some areas of included soils that belong to other taxonomic classes.

Most included 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 inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. 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 included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas 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 included areas 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 segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, 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 or of the underlying layers, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying layers. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, *Verdigris silt loam, 0 to 1 percent slopes, occasionally flooded*, is a phase of the Verdigris series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

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. *Bartlesville-Bigheart complex, 1 to 5 percent slopes, very rocky*, is an example.

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

Table 4 "Acreage and Proportionate Extent of the Soils" shows the acreage and proportionate extent of each map unit. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

For general and detailed information about managing the Map Units in this survey, see the soil report descriptions and soil reports on Web Soil Survey at http://websoilsurvey.nrcs.usda.gov and also on the NRCS Soil Data Mart at http://soildatamart.nrcs.usda.gov.

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

Map symbol	Soil name	Acres	Percent
1	Apperson silty clay loam, 1 to 3 percent slopes	8,758	0.6
2	Apperson-Doolin complex, 0 to 3 percent slopes	25,737	1.7
3	Barnsdall very fine sandy loam, 0 to 1 percent slopes, rarely flooded	6,476	0.4
4	Coyle loam, 1 to 3 percent slopes	15,786	1.1
5	Coyle loam, 3 to 5 percent slopes	919	*
6	Catoosa-Shidler-Lula complex, 1 to 3 percent slopes	9,157	0.6
7	Keokuk very fine sandy loam, 0 to 1 percent slopes, occasionally flooded	2,132	0.1
8	Pocasset fine sandy loam, 0 to 1 percent slopes, occasionally flooded	4,290	0.3
9	Pocasset fine sandy loam, 1 to 3 percent slopes, occasionally flooded	1,552	0.1
10	Bethany silt loam, 1 to 3 percent slopes	1,788	0.1
11	Bethany silt loam, 3 to 5 percent slopes	4,421	0.3
12	Bethany-Pawhuska complex, 1 to 5 percent slopes	24,854	1.7
13	Lucien-Coyle complex, 3 to 8 percent slopes	75,420	5.1
15	Agra silt loam, 1 to 3 percent slopes	16,540	1.1
16	Agra silt loam, 3 to 5 percent slopes	3,076	0.2
17	Agra-Pharoah complex, 1 to 5 percent slopes	43,674	3.0
18	Agra-Ashport complex, 0 to 12 percent slopes	26,994	1.8
19	Dougherty loamy fine sand, 1 to 3 percent slopes	8,463	0.6
20	Dougherty loamy fine sand, 3 to 8 percent slopes	10,026	0.7
21	Eufaula loamy fine sand, 3 to 15 percent slopes	14,772	1.0
22	Eufaula-Dougherty complex, 0 to 3 percent slopes	5,170	0.4
23	Foraker-Shidler complex, 12 to 25 percent slopes	33,387	2.3
24	Harrah fine sandy loam, 3 to 5 percent slopes	1,421	*
25	Grainola-Shidler complex, 12 to 25 percent slopes	27,028	1.8
26	Gaddy loamy fine sand, 0 to 1 percent slopes, occasionally flooded	2,472	0.2
27	Gaddy loamy fine sand, 0 to 1 percent slopes, frequently flooded	5,698	0.4
28	Konawa loamy fine sand, 3 to 8 percent slopes, eroded	1,938	0.1
29	Lightning silt loam, 0 to 1 percent slopes, occasionally flooded	3,378	0.2
30	Lula silt loam, 1 to 3 percent slopes	5,515	0.4
31	Braman silt loam, 0 to 1 percent slopes, rarely flooded	24,886	1.7
32	Braman silt loam, 1 to 3 percent slopes, rarely flooded	3,780	0.3
33	Braman-Drummond complex, 0 to 1 percent slopes, rarely flooded	4,615	0.3

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

Map symbol	Soil name	Acres	Percent
34	Minco silt loam, 5 to 8 percent slopes	1,024	*
38	Norge silt loam, 1 to 3 percent slopes	5,923	0.4
39	Norge silt loam, 3 to 5 percent slopes	10,604	0.7
40	Norge silt loam, 5 to 8 percent slopes	1,238	*
41	Norge silt loam, 3 to 5 percent slopes, eroded	5,243	0.4
42	Norge, Agra, and Prue soils, 3 to 8 percent slopes, gullied	1,760	0.1
43	Norge-Pawhuska complex, 1 to 5 percent slopes	16,568	1.1
44	Oil waste land-Huska complex, 1 to 8 percent slopes	1,753	0.1
45	Okemah silt loam, 0 to 1 percent slopes	2,579	0.2
46	Osage silty clay, 0 to 1 percent slopes, occasionally flooded	7,756	0.5
47	Parsons silt loam, 0 to 1 percent slopes	3,929	0.3
48	Parsons silt loam, 1 to 3 percent slopes	10,709	0.7
49	Parsons-Pharoah complex, 0 to 3 percent slopes	21,325	1.4
50	Pits	841	*
51	Prue loam, 3 to 5 percent slopes	11,737	0.8
52	Gaddy fine sandy loam, 0 to 1 percent slopes, occasionally flooded	2,546	0.2
53	Ustibuck silty clay loam, 0 to 1 percent slopes, occasionally flooded	2,279	0.2
54	Shidler silty clay loam, 1 to 5 percent slopes	31,476	2.1
55	Steedman silt loam, 1 to 3 percent slopes	7,398	0.5
56	Steedman silt loam, 3 to 5 percent slopes	3,205	0.2
57	Steedman-Lucien complex, 3 to 15 percent slopes	116,958	7.9
58	Steedman-Lucien complex, 15 to 25 percent slopes	31,916	2.2
60	Coyle-Lucien complex, 3 to 12 percent slopes	9,796	0.7
61	Westsum silty clay loam, 3 to 5 percent slopes	6,053	0.4
62	Westsum-Shidler-Apperson complex, 3 to 12 percent slopes	97,503	6.6
63	Teller loam, 3 to 5 percent slopes	953	*
64	Vanoss silt loam, 0 to 1 percent slopes	893	*
65	Vanoss silt loam, 1 to 3 percent slopes	2,872	0.2
66	Verdigris silt loam, 0 to 1 percent slopes, occasionally flooded	31,211	2.1
67	Verdigris silt loam, 0 to 1 percent slopes, frequently flooded	58,891	4.0
68	Wolco silty clay loam, 1 to 3 percent slopes	5,581	0.4
69	Wolco-Dwight complex, 0 to 3 percent slopes	22,186	1.5
70	Wynona silty clay loam, 0 to 1 percent slopes, occasionally flooded	16,100	1.1
AgFB	Agra-Foraker complex, 1 to 3 percent slopes	88	*
AgFC	Agra-Foraker complex, 3 to 5 percent slopes	130	*
APPA	Ashport, port, Pulaski soils, 0 to 1 percent slopes, occasionally flooded	1	*
BBgC	Bartlesville-Bigheart complex, 1 to 5 percent slopes, very rocky	44,436	3.0
BNRD	Bigheart-Niotaze-Rock outcrop complex, 1 to 8 percent slopes	179,017	12.1
CUEE	Coweta-Urban land-Eram complex, 3 to 12 percent slopes	178	*
DAM	Large dam	330	*
FakD	Foraker clay loam, 5 to 8 percent slopes	124	*
KaUD	Kamie-Urban land complex, 1 to 8 percent slopes	486	*
M-W	Miscellaneous water	104	*
NBRE	Niotaze-Bigheart-Rock outcrop complex, 3 to 15 percent slopes, very stony	150,210	10.2
NBRF	Niotaze-Bigheart-Rock outcrop complex, 15 to 25 percent slopes, extremely stony	72,987	4.9
NBRG	Niotaze-Bigheart-Rock outcrop complex, 25 to 45 percent slopes, rubbly	9,920	0.7
UrDC	Urban land-Dennis complex, 0 to 5 percent slopes	762	*
W	Water	40,799	2.8
WyUA	Wynona-Urban land complex, 0 to 1 percent slopes, occasionally flooded	8	*
	Total	1,474,509	100.0

Less than 0.1 percent

1—Apperson silty clay loam, 1 to 3 percent slopes

Map Unit Setting

MLRA: 76
Elevation: 500 to 1,500 feet
Mean annual precipitation: 26 to 46 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Apperson

Composition: 63 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Shoulder
Parent material: Calcareous clayey residuum weathered from limestone
Slope: 1 to 3 percent
Runoff: Very high
Depth: Bedrock (lithic) at 40 to 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Impermeable
Drainage class: Somewhat poorly drained
Available water capacity: About 8.3 inches
Depth to the top of the seasonal high water table: 1.5 to 2.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 2e
Ecological site number and name: R112XY010OK, Claypan Prairie PE 62-80

Typical Profile

A—0 to 9 inches; silty clay loam
BA—9 to 17 inches; silty clay loam
Bt—17 to 33 inches; silty clay
BC—33 to 50 inches; silty clay
R—50 to 60 inches; bedrock
Representative profile location: About 600 feet west and 1,100 feet north of the southeast corner of Section 16, T. 27 N., R. 9 E.

Additional Components

Westsum: 15 percent
Okemah: 10 percent
Wolco: 10 percent
Shidler: 2 percent

2—Apperson-Doolin complex, 0 to 3 percent slopes

Map Unit Setting

MLRA: 76
Elevation: 750 to 1,500 feet
Mean annual precipitation: 26 to 44 inches

Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Apperson

Composition: 50 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Shoulder
Parent material: Calcareous clayey residuum weathered from limestone
Slope: 0 to 3 percent
Runoff: Very high
Depth: Bedrock (lithic) at 40 to 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Impermeable
Drainage class: Somewhat poorly drained
Available water capacity: About 7.7 inches
Depth to the top of the seasonal high water table: 1.5 to 2.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R112XY010OK, Claypan Prairie PE 62-80

Typical Profile

A—0 to 12 inches; silty clay loam
BA—12 to 16 inches; silty clay loam
Bt—16 to 33 inches; silty clay
BC—33 to 46 inches; silty clay
R—46 to 48 inches; bedrock
Representative profile location: About 165 feet north and 160 feet east of the southwest corner, Section 21, T. 29 N., R. 7 E.

Doolin

Composition: 40 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Silty and clayey alluvium over loamy residuum weathered from sandstone
Slope: 0 to 3 percent
Runoff: Very high
Depth: Bedrock (paralithic) at 50 to 80 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Impermeable
Drainage class: Moderately well drained
Available water capacity: About 5.3 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None
Sodium affected: Sodic within 30 inches

Interpretive Groups

Land capability nonirrigated: 4s
Ecological site number and name: R080AY010OK, Claypan Prairie (North) PE 44-64

Typical Profile

A—0 to 5 inches; silt loam
Btn1—5 to 26 inches; silty clay
Btn2—26 to 50 inches; silty clay
Cr—50 to 60 inches; bedrock
Representative profile location: About 1,550 feet east and 750 feet north of the southwest corner, Section 29, T. 22 N., R. 10 E.

Additional Components

Shidler: 5 percent
Wolco: 5 percent

3—Barnsdall very fine sandy loam, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

MLRA: 84A
Elevation: 500 to 1,200 feet
Mean annual precipitation: 31 to 47 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Barnsdall

Composition: 80 percent
Geomorphic setting: Flood plain on river valley
Parent material: Loamy alluvium over sandy alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Moderate
Drainage class: Well drained
Available water capacity: About 10.5 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: Rare
Ponding: None

Interpretive Groups

Land capability nonirrigated: 1
Ecological site number and name: R076XY050OK, Loamy Bottomland PE 54-62

Typical Profile

Ap—0 to 7 inches; very fine sandy loam
E—7 to 11 inches; very fine sandy loam
Bt1—11 to 29 inches; silty clay loam
Bt2—29 to 45 inches; silty clay loam
BC—45 to 58 inches; clay loam

2C—58 to 72 inches; fine sandy loam
Representative profile location: About 165 feet north and 160 feet east of the southwest corner, Section 21, T. 29 N., R. 7 E.

Additional Components

Mason: 15 percent
Verdigris: 5 percent

4—Coyle loam, 1 to 3 percent slopes

Map Unit Setting

MLRA: 80A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Coyle

Composition: 75 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Summit and backslope
Parent material: Loamy residuum weathered from sandstone
Slope: 1 to 3 percent
Runoff: High
Depth: Bedrock (paralithic) at 20 to 40 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 5.7 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R080AY056OK, Loamy Prairie PE 44-64

Typical Profile

A—0 to 10 inches; loam
BA—10 to 16 inches; loam
Bt—16 to 24 inches; sandy clay loam
BC—24 to 36 inches; sandy clay loam
Cr—36 to 40 inches; bedrock
Representative profile location: About 200 feet east and 50 feet north of the southwest corner, Section 29, T. 22 N., R. 10 E.

Additional Components

Lucien: 10 percent
Zaneis: 10 percent
Agra: 5 percent

5—Coyle loam, 3 to 5 percent slopes

Map Unit Setting

MLRA: 80A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Coyle

Composition: 70 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Summit and backslope
Parent material: Loamy residuum weathered from sandstone
Slope: 3 to 5 percent
Runoff: High
Depth: Bedrock (paralithic) at 20 to 40 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 5.6 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R080AY056OK, Loamy Prairie PE 44-64

Typical Profile

A—0 to 11 inches; loam
BA—11 to 15 inches; loam
Bt—15 to 34 inches; sandy clay loam
Cr—34 to 40 inches; bedrock
Representative profile location: About 400 feet east and 900 feet north of the southwest corner, Section 19, T. 23 N., R. 10 E.

Additional Components

Lucien: 15 percent
Mulhall: 15 percent

6—Catoosa-Shidler-Lula complex, 1 to 3 percent slopes

Map Unit Setting

MLRA: 76
Elevation: 500 to 1,500 feet
Mean annual precipitation: 30 to 45 inches
Mean annual air temperature: 57 to 63 degrees Fahrenheit
Frost-free period: 190 to 220 days

Component Description

Catoosa

Composition: 48 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Summit
Parent material: Silty residuum weathered from limestone
Slope: 1 to 3 percent
Runoff: High
Depth: Bedrock (lithic) at 20 to 40 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 5.8 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R112XY059OK, Loamy Prairie (northeast) PE 62-80

Typical Profile

A—0 to 9 inches; silt loam
BA—9 to 13 inches; silt loam
Bt—13 to 30 inches; silty clay loam
R—30 to 32 inches; bedrock
Representative profile location: About 2,700 feet north and 720 feet west of the southeast corner, Section 12, T. 25 N., R. 8 E.

Shidler

Composition: 40 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Summit and shoulder
Parent material: Loamy residuum weathered from cherty limestone
Slope: 1 to 3 percent
Runoff: Very high
Depth: Bedrock (lithic) at 4 to 20 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 1.6 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 7s
Ecological site number and name: R076XY098OK, Very Shallow PE 54-62

Typical Profile

A—0 to 8 inches; cobbly silty clay loam
R—8 to 10 inches; bedrock
Representative profile location: About 450 feet west and 2,500 feet south of the northeast corner, Section 12, T. 25 N., R. 8 E.

Lulu

Composition: 10 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Shoulder
Parent material: Silty residuum weathered from limestone
Slope: 1 to 3 percent
Runoff: Low
Depth: Bedrock (lithic) at 40 to 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 18.0 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 2e
Ecological site number and name: R112XY059OK, Loamy Prairie (northeast) PE 62-80

Typical Profile

A—0 to 10 inches; silt loam
BA—10 to 18 inches; silty clay loam
Bt—18 to 49 inches; silty clay loam
R—49 to 50 inches; bedrock
Representative profile location: About 750 feet west and 2,500 feet south of the northeast corner, Section 12, T. 25 N., R. 8 E.

Additional Components

Rock outcrop: 2 percent

7—Keokuk very fine sandy loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

MLRA: 80A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Keokuk

Composition: 85 percent
Geomorphic setting: Flood plain on river valley
Parent material: Loamy and sandy alluvium

Slope: 0 to 1 percent
Runoff: Negligible
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Moderate
Drainage class: Well drained
Available water capacity: About 10.3 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: Occasional
Ponding: None

Interpretive Groups

Land capability nonirrigated: 2w
Ecological site number and name: R080AY050OK, Loamy Bottomland PE 44-64

Typical Profile

A—0 to 9 inches; very fine sandy loam
C1—9 to 40 inches; very fine sandy loam
C2—40 to 65 inches; stratified silt loam to loamy very fine sand
Representative profile location: About 750 feet east and 20 feet north of the southwest corner, Section 35, T. 24 N., R. 4 E.

Additional Components

Gaddy: 10 percent
Braman: 5 percent

8—Pocasset fine sandy loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

MLRA: 84A
Elevation: 500 to 1,500 feet
Mean annual precipitation: 28 to 47 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Pocasset

Composition: 80 percent
Geomorphic setting: Flood plain on river valley
Parent material: Calcareous loamy alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately rapid
Slowest permeability class within 80 inches: Moderately rapid
Drainage class: Well drained
Available water capacity: About 7.0 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: Occasional
Ponding: None

Interpretive Groups

Land capability nonirrigated: 2w
Ecological site number and name: R080AY050OK, Loamy Bottomland PE 44-64

Typical Profile

Ap—0 to 12 inches; fine sandy loam
AC—12 to 25 inches; fine sandy loam
C—25 to 60 inches; fine sandy loam
Representative profile location: About 1,600 feet west and 25 feet north of the southeast corner, Section 2, T. 23 N., R. 8 E.

Additional Components

Easpur: 15 percent
Verdigris: 5 percent

9—Pocasset fine sandy loam, 1 to 3 percent slopes, occasionally flooded

Map Unit Setting

MLRA: 84A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 28 to 40 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Pocasset

Composition: 90 percent
Geomorphic setting: Flood plain on river valley
Parent material: Calcareous loamy alluvium
Slope: 1 to 3 percent
Runoff: Very low
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately rapid
Slowest permeability class within 80 inches: Moderately rapid
Drainage class: Well drained
Available water capacity: About 7.2 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: Occasional
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R080AY050OK, Loamy Bottomland PE 44-64

Typical Profile

Ap—0 to 16 inches; fine sandy loam
AC—16 to 36 inches; fine sandy loam
C—36 to 72 inches; stratified loamy fine sand to fine sandy loam
Representative profile location: About 2,100 feet east and 1,400 feet north of the southwest corner, Section 21, T. 26 N., R. 11 E.

Additional Components

Easpur: 10 percent

10—Bethany silt loam, 1 to 3 percent slopes

Map Unit Setting

MLRA: 80A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Bethany

Composition: 80 percent
Geomorphic setting: Plain on paleoterrace on upland
Position on landform: Tread
Parent material: Silty alluvium over clayey residuum weathered from shale
Slope: 1 to 3 percent
Runoff: Medium
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately slow
Slowest permeability class within 80 inches: Slow
Drainage class: Well drained
Available water capacity: About 10.7 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 2e
Ecological site number and name: R080AY056OK, Loamy Prairie PE 44-64

Typical Profile

Ap—0 to 11 inches; silt loam
Bt—11 to 30 inches; silty clay loam
Btk—30 to 64 inches; silty clay
BCk—64 to 74 inches; silty clay
Representative profile location: About 850 feet east and 4,250 feet north of the southwest corner, Section 7, T. 25 N., R. 5 E.

Additional Components

Grant: 10 percent
Norge: 10 percent

11—Bethany silt loam, 3 to 5 percent slopes

Map Unit Setting

MLRA: 80A
Elevation: 700 to 1,300 feet
Mean annual precipitation: 26 to 40 inches

Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Bethany

Composition: 85 percent
Geomorphic setting: Plain on paleoterrace on upland
Position on landform: Riser
Parent material: Silty alluvium over clayey residuum weathered from shale
Slope: 3 to 5 percent
Runoff: Medium
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Slow
Drainage class: Well drained
Available water capacity: About 10.6 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R080AY056OK, Loamy Prairie PE 44-64

Typical Profile

A—0 to 9 inches; silt loam
Bt—9 to 26 inches; silty clay loam
Btk—26 to 41 inches; silty clay
BCk—41 to 80 inches; silty clay
Representative profile location: About 3,600 feet west and 1,800 feet north of the southeast corner, Section 14, T. 27 N., R. 5 E.

Additional Components

Norge: 10 percent
Grainola: 3 percent
Lucien: 2 percent

12—Bethany-Pawhuska complex, 1 to 5 percent slopes

Map Unit Setting

MLRA: 80A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Bethany

Composition: 60 percent
Geomorphic setting: Plain on paleoterrace on upland
Position on landform: Riser
Parent material: Silty alluvium over clayey residuum weathered from shale

Slope: 3 to 5 percent
Runoff: Medium
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately slow
Slowest permeability class within 80 inches: Slow
Drainage class: Well drained
Available water capacity: About 10.7 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R080AY056OK, Loamy Prairie PE 44-64

Typical Profile

Ap—0 to 14 inches; silt loam
Bt—14 to 27 inches; silty clay loam
Btk—27 to 63 inches; silty clay
BCk—63 to 80 inches; silty clay loam
Representative profile location: About 1,160 feet south and 10 feet east of the northwest corner, Section 17, T. 25 N., R. 5 E.

Pawhuska

Composition: 35 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Saline clayey residuum weathered from sandstone and shale
Slope: 1 to 5 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Moderately well drained
Available water capacity: About 7.7 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches

Interpretive Groups

Land capability nonirrigated: 4s
Ecological site number and name: R080AY091OK, Slickspot PE 44-64

Typical Profile

A—0 to 3 inches; silt loam
Bt—3 to 50 inches; silty clay
BC—50 to 80 inches; silty clay loam
Representative profile location: About 500 feet south and 380 feet west of the northeast corner, Section 11, T. 25 N., R. 4 E.

Additional Components

Norge: 5 percent

13—Lucien-Coyle complex, 3 to 8 percent slopes

Map Unit Setting (fig. 2)

MLRA: 80A
Elevation: 500 to 1,500 feet
Mean annual precipitation: 26 to 46 inches
Mean annual air temperature: 57 to 68 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Lucien

Composition: 60 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Loamy residuum weathered from sandstone and shale
Slope: 3 to 8 percent
Runoff: Very high
Depth: Bedrock (paralithic) at 10 to 20 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately rapid
Slowest permeability class within 80 inches: Very slow
Drainage class: Well drained
Available water capacity: About 2.9 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 4e
Ecological site number and name: R080AY083OK, Shallow Prairie PE 44-64

Typical Profile

A—0 to 9 inches; loam
Bw—9 to 16 inches; loam
Cr—16 to 20 inches; bedrock
Representative profile location: About 2,540 feet south and 2,300 feet east of the northwest corner, Section 4, T. 24 N., R. 12 E.

Coyle

Composition: 20 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Loamy residuum weathered from sandstone
Slope: 3 to 8 percent
Runoff: High
Depth: Bedrock (paralithic) at 20 to 40 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Impermeable

Drainage class: Well drained
Available water capacity: About 4.3 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 4e
Ecological site number and name: R080AY056OK, Loamy Prairie PE 44-64

Typical Profile

A—0 to 8 inches; loam
BA—8 to 15 inches; loam
Bt—15 to 26 inches; sandy clay loam
Cr—26 to 40 inches; bedrock
Representative profile location: About 2,450 feet west and 2,400 feet south of the northeast corner, Section 4, T. 24 N., R. 12 E.

Additional Components

Dennis: 5 percent
Prue: 5 percent
Rock Outcrop: 5 percent
Steedman: 5 percent

Figure 2.—Bison grazing rangeland on Lucien-Coyle complex, 3 to 8 percent slopes.

15—Agra silt loam, 1 to 3 percent slopes

Map Unit Setting

MLRA: 80A
Elevation: 500 to 1,500 feet
Mean annual precipitation: 26 to 46 inches
Mean annual air temperature: 57 to 68 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Agra

Composition: 80 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Shoulder
Parent material: Clayey residuum weathered from clayey shale
Slope: 1 to 3 percent
Runoff: High
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Moderately well drained
Available water capacity: About 10.1 inches
Depth to the top of the seasonal high water table: 3.0 to 4.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 2e
Ecological site number and name: R080AY010OK, Claypan Prairie (North) PE 44-64

Typical Profile

A—0 to 13 inches; silt loam
BA—13 to 20 inches; silty clay loam
Bt1—20 to 32 inches; silty clay loam
Bt2—32 to 42 inches; silty clay
Btk—42 to 62 inches; silty clay
Representative profile location: About 700 feet east and 650 feet north of the southwest corner, Section 17, T. 24 N., R. 7 E.

Additional Components

Steedman: 15 percent
Okemah: 5 percent

16—Agra silt loam, 3 to 5 percent slopes

Map Unit Setting

MLRA: 80A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 68 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Agra

Composition: 80 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Clayey residuum weathered from clayey shale
Slope: 3 to 5 percent
Runoff: High
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Moderately well drained
Available water capacity: About 10.1 inches
Depth to the top of the seasonal high water table: 3.0 to 4.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R080AY010OK, Claypan Prairie (North) PE 44-64

Typical Profile

A—0 to 11 inches; silt loam
BA—11 to 20 inches; silty clay loam
Bt1—20 to 31 inches; silty clay loam
Bt2—31 to 42 inches; silty clay
Btk—42 to 62 inches; silty clay
Representative profile location: About 950 feet west and 1,100 feet north of the southeast corner, Section 6, T. 27 N., R. 8 E.

Additional Components

Coyle: 10 percent
Steedman: 10 percent

17—Agra-Pharoah complex, 1 to 5 percent slopes

Map Unit Setting

MLRA: 80A
Elevation: 500 to 1,500 feet
Mean annual precipitation: 26 to 46 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Agra

Composition: 55 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Clayey residuum weathered from clayey shale
Slope: 1 to 5 percent
Runoff: Very high

Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Moderately well drained
Available water capacity: About 9.9 inches
Depth to the top of the seasonal high water table: 3.0 to 4.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R080AY010OK, Claypan Prairie (North) PE 44-64

Typical Profile

A—0 to 9 inches; silt loam
BA—9 to 18 inches; silty clay loam
Bt1—18 to 38 inches; silty clay
Bt2—38 to 72 inches; silty clay
Bt3—72 to 80 inches; silty clay
Representative profile location: About 2,000 feet south and 1,000 feet east of the northwest corner, Section 33, T. 25 N., R. 9 E.

Pharoah

Composition: 30 percent
Geomorphic setting: Hillslope on paleoterrace on upland
Position on hillslope: Summit
Parent material: Clayey alluvium and/or residuum weathered from shale
Slope: 1 to 3 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Very slow
Drainage class: Somewhat poorly drained
Available water capacity: About 10.8 inches
Depth to the top of the seasonal high water table: 0.5 to 1.5 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 4w
Ecological site number and name: R112XY010OK, Claypan Prairie PE 62-80

Typical Profile

A—0 to 9 inches; silt loam
Btg—9 to 72 inches; silty clay
BC—72 to 76 inches; silty clay
Representative profile location: About 1,600 feet north and 1,700 feet west of the southeast corner, Section 33, T. 25 N., R. 9 E.

Additional Components

Coyle: 10 percent
Okemah: 5 percent

18—Agra-Ashport complex, 0 to 12 percent slopes

Map Unit Setting

MLRA: 80A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 68 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Agra

Composition: 60 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Clayey residuum weathered from clayey shale
Slope: 1 to 5 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Moderately well drained
Available water capacity: About 9.8 inches
Depth to the top of the seasonal high water table: 3.0 to 4.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R080AY010OK, Claypan Prairie (North) PE 44-64

Typical Profile

A—0 to 10 inches; silt loam
BA—10 to 16 inches; silty clay loam
Bt1—16 to 36 inches; silty clay
Bt2—36 to 64 inches; silty clay
Bt3—64 to 80 inches; silty clay
Representative profile location: About 900 feet east and 1,700 feet north of the southwest corner, Section 17, T. 25 N., R. 7 E.

Ashport

Composition: 30 percent
Geomorphic setting: Flood plain on river valley
Parent material: Fine-silty alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Moderate
Drainage class: Well drained
Available water capacity: About 11.8 inches
Depth to the top of the seasonal high water table: Greater than 6 feet

Flooding: Frequent
Ponding: None

Interpretive Groups

Land capability nonirrigated: 5w
Ecological site number and name: R080AY050OK, Loamy Bottomland PE 44-64

Typical Profile

A—0 to 19 inches; silt loam
AC—19 to 60 inches; silty clay loam
Representative profile location: About 950 feet east and 1,550 feet north of the southwest corner, Section 17, T. 25 N., R. 7 E.

Additional Components

Coyle: 5 percent
Steedman: 5 percent

19—Dougherty loamy fine sand, 1 to 3 percent slopes

Map Unit Setting

MLRA: 84A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 28 to 40 inches
Mean annual air temperature: 57 to 65 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Dougherty

Composition: 85 percent
Geomorphic setting: Dune on dune field on sandhills on valley
Position on hillslope: Backslope
Parent material: Sandy and loamy alluvium and/or sandy eolian deposits
Slope: 1 to 3 percent
Runoff: Very low
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Moderate
Drainage class: Well drained
Available water capacity: About 6.4 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R084AY018OK, Deep Sand Savannah PE 44-64

Typical Profile

A—0 to 7 inches; loamy fine sand
E—7 to 24 inches; loamy fine sand
Bt—24 to 36 inches; sandy clay loam

BC—36 to 55 inches; sandy clay loam
C—55 to 62 inches; loamy fine sand
Representative profile location: About 1,840 feet north and 240 feet west of the southeast corner, Section 11, T. 23N., R. 3 E.

Additional Components

Konawa: 10 percent
Eufaula: 5 percent

20—Dougherty loamy fine sand, 3 to 8 percent slopes

Map Unit Setting

MLRA: 84A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 28 to 40 inches
Mean annual air temperature: 57 to 65 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Dougherty

Composition: 85 percent
Geomorphic setting: Dune on dune field on sandhills on valley
Position on hillslope: Backslope
Parent material: Sandy and loamy alluvium and/or sandy eolian deposits
Slope: 3 to 8 percent
Runoff: Low
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Moderate
Drainage class: Well drained
Available water capacity: About 6.7 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 4e
Ecological site number and name: R084AY018OK, Deep Sand Savannah PE 44-64

Typical Profile

A—0 to 6 inches; loamy fine sand
E—6 to 22 inches; loamy fine sand
Bt—22 to 50 inches; sandy clay loam
C—50 to 72 inches; loamy fine sand
Representative profile location: About 4,600 feet west and 3,600 feet south of the northeast corner, Section 16, T. 20 N., R. 10 E.

Additional Components

Konawa: 10 percent
Eufaula: 5 percent

21—Eufaula loamy fine sand, 3 to 15 percent slopes

Map Unit Setting

MLRA: 84A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 28 to 40 inches
Mean annual air temperature: 57 to 65 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Eufaula

Composition: 85 percent
Geomorphic setting: Dune on dune field on terrace on valley
Position on hillslope: Backslope
Parent material: Eolian sands
Slope: 3 to 15 percent
Runoff: Very low
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Rapid
Slowest permeability class within 80 inches: Rapid
Drainage class: Somewhat excessively drained
Available water capacity: About 5.2 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 6e
Ecological site number and name: R084AY018OK, Deep Sand Savannah PE 44-64

Typical Profile

A—0 to 5 inches; loamy fine sand
E—5 to 48 inches; fine sand
E/Bt—48 to 72 inches; loamy fine sand
Representative profile location: About 920 feet west and 40 feet north of the southeast corner, Section 31, T. 23 N., R. 7 E.

Additional Components

Dougherty: 15 percent

22—Eufaula-Dougherty complex, 0 to 3 percent slopes

Map Unit Setting

MLRA: 84A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 28 to 40 inches
Mean annual air temperature: 57 to 65 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Eufaula

Composition: 80 percent

Geomorphic setting: Dune on dune field on terrace on valley
Position on hillslope: Backslope
Parent material: Eolian sands
Slope: 0 to 3 percent
Runoff: Negligible
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Rapid
Slowest permeability class within 80 inches: Rapid
Drainage class: Somewhat excessively drained
Available water capacity: About 4.8 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R084AY018OK, Deep Sand Savannah PE 44-64

Typical Profile

A—0 to 6 inches; loamy fine sand
E—6 to 58 inches; loamy fine sand
E/Bt—58 to 72 inches; loamy fine sand
Representative profile location: About 600 feet west and 2,600 feet north of the southeast corner, Section 3, T. 23 N., R. 3 E.

Dougherty

Composition: 15 percent
Geomorphic setting: Dune on dune field on sandhills on valley
Position on hillslope: Backslope
Parent material: Sandy and loamy alluvium and/or sandy eolian deposits
Slope: 0 to 3 percent
Runoff: Very low
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Moderate
Drainage class: Well drained
Available water capacity: About 6.1 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R084AY018OK, Deep Sand Savannah PE 44-64

Typical Profile

A—0 to 7 inches; loamy fine sand
E—7 to 35 inches; loamy fine sand
Bt—35 to 52 inches; sandy clay loam
BC—52 to 59 inches; fine sandy loam
C—59 to 72 inches; loamy fine sand
Representative profile location: About 1,400 feet west and 2,600 feet north of the southeast corner, Section 3, T. 22 N., R. 3 E.

Additional Components

Konawa: 5 percent

23—Foraker-Shidler complex, 12 to 25 percent slopes

Map Unit Setting (fig. 3)

MLRA: 76
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 45 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 220 days

Component Description

Foraker

Composition: 45 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Calcareous clayey residuum weathered from shale
Slope: 12 to 25 percent
Runoff: Very high
Depth: Bedrock (paralithic) at 20 to 40 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Impermeable
Drainage class: Moderately well drained

Figure 3.—Pond on Westsum-Shidler-Apperson complex, 3 to 12 percent slopes with Foraker-Shidler complex, 12 to 25 percent slopes in background.

Available water capacity: About 5.4 inches
Depth to the top of the seasonal high water table: 0.0 to 2.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 7e
Ecological site number and name: R076XY010OK, Claypan Prairie (Eastern) PE 54-62

Typical Profile

A—0 to 8 inches; gravelly silty clay loam
BA—8 to 11 inches; silty clay loam
Bt—11 to 26 inches; silty clay
Bk—26 to 38 inches; silty clay
Cr—38 to 48 inches; bedrock
Representative profile location: About 2,200 feet west and 1,000 feet south of the northeast corner, Section 16, T. 29 N., R. 7 E.

Shidler

Composition: 35 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Shoulder and summit
Parent material: Loamy residuum weathered from cherty limestone
Slope: 12 to 25 percent
Runoff: Very high
Depth: Bedrock (lithic) at 4 to 20 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 1.6 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 7e
Ecological site number and name: R076XY098OK, Very Shallow PE 54-62

Typical Profile

A—0 to 8 inches; silty clay loam
R—8 to 10 inches; bedrock
Representative profile location: About 1,100 feet south and 2,400 feet west of the northeast corner, Section 16, T. 29 N., R. 7 E.

Additional Components

Apperson: 5 percent
Coweta: 5 percent
Grainola: 5 percent
Rock outcrop: 5 percent

24—Harrah fine sandy loam, 3 to 5 percent slopes

Map Unit Setting

MLRA: 84A
Elevation: 700 to 1,300 feet
Mean annual precipitation: 30 to 40 inches
Mean annual air temperature: 57 to 63 degrees Fahrenheit
Frost-free period: 200 to 230 days

Component Description

Harrah

Composition: 90 percent
Geomorphic setting: Hillslope on hills on upland
Position on hillslope: Backslope
Parent material: Loamy and sandy colluvium derived from sandstone
Slope: 3 to 5 percent
Runoff: Low
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Moderate
Drainage class: Well drained
Available water capacity: About 8.0 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R084AY075OK, Sandy Savannah PE 44-64

Typical Profile

A—0 to 8 inches; fine sandy loam
E—8 to 14 inches; fine sandy loam
Bt—14 to 51 inches; sandy clay loam
BC—51 to 74 inches; sandy clay loam
Representative profile location: About 1,880 feet north and 1,400 feet east of the southwest corner, Section 30, T. 26 N., R. 11 E.

Additional Components

Bartlesville: 10 percent

25—Grainola-Shidler complex, 12 to 25 percent slopes

Map Unit Setting

MLRA: 76
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 44 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 220 days

Component Description

Grainola

Composition: 55 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Footslope
Position on landform: Side slope
Parent material: Calcareous clayey residuum weathered from shale
Slope: 12 to 25 percent
Runoff: Very high
Depth: Bedrock (paralithic) at 20 to 40 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 5.8 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 7e
Ecological site number and name: R080AY010OK, Claypan Prairie (North) PE 44-64

Typical Profile

A—0 to 8 inches; silty clay loam
Bt—8 to 28 inches; silty clay
BC—28 to 36 inches; silty clay
Cr—36 to 42 inches; bedrock
Representative profile location: About 1,060 feet east and 280 feet south of the northwest corner, Section 14, T. 27 N., R. 5 E.

Shidler

Composition: 30 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Shoulder and summit
Parent material: Loamy residuum weathered from cherty limestone
Slope: 12 to 25 percent
Runoff: Very high
Depth: Bedrock (lithic) at 4 to 20 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 1.6 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 7e
Ecological site number and name: R076XY098OK, Very Shallow PE 54-62

Typical Profile

A—0 to 8 inches; silty clay loam
R—8 to 10 inches; bedrock
Representative profile location: About 1,060 feet east and 350 feet south of the northwest corner, Section 14, T. 27 N., R. 5 E.

Additional Components

Apperson: 5 percent
Foraker: 5 percent
Rock outcrop: 5 percent

26—Gaddy loamy fine sand, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

MLRA: 80A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Gaddy

Composition: 80 percent
Geomorphic setting: Flood plain on river valley
Parent material: Calcareous sandy alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Rapid
Slowest permeability class within 80 inches: Rapid
Drainage class: Somewhat excessively drained
Available water capacity: About 4.9 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: Occasional
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R080AY068OK, Sandy Bottomland PE 44-64

Typical Profile

A—0 to 17 inches; loamy fine sand
C—17 to 65 inches; stratified fine sand to clay loam
Representative profile location: About 4,900 feet west and 3,500 feet south of the northeast corner, Section 9, T. 23 N., R. 3 E.

Additional Components

Yahola: 15 percent
Keokuk: 5 percent

27—Gaddy loamy fine sand, 0 to 1 percent slopes, frequently flooded

Map Unit Setting

MLRA: 80A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Gaddy

Composition: 65 percent
Geomorphic setting: Flood plain on river valley
Parent material: Calcareous sandy alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Rapid
Slowest permeability class within 80 inches: Rapid
Drainage class: Somewhat excessively drained
Available water capacity: About 4.9 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: Frequent
Ponding: None

Interpretive Groups

Land capability nonirrigated: 5w
Ecological site number and name: R080AY068OK, Sandy Bottomland PE 44-64

Typical Profile

A—0 to 16 inches; loamy fine sand
C—16 to 60 inches; stratified fine sand to clay loam
Representative profile location: About 1,200 feet west and 150 feet south of the northeast corner, Section 32, T. 24 N., R. 3 E.

Additional Components

Tearney: 15 percent
Keokuk: 10 percent
Yahola: 10 percent

28—Konawa loamy fine sand, 3 to 8 percent slopes, eroded

Map Unit Setting

MLRA: 84A
Elevation: 500 to 1,500 feet
Mean annual precipitation: 30 to 40 inches
Mean annual air temperature: 58 to 64 degrees Fahrenheit
Frost-free period: 200 to 230 days

Component Description

Konawa

Composition: 85 percent
Geomorphic setting: Paleoterrace on upland
Geomorphic position: Riser
Parent material: Loamy and sandy alluvium
Slope: 3 to 8 percent
Runoff: Medium
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Moderate
Drainage class: Well drained
Available water capacity: About 7.8 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 4e
Ecological site number and name: R084AY818OK, Eroded Deep Sand Savannah PE 48-68

Typical Profile

A—0 to 6 inches; loamy fine sand
E—6 to 15 inches; loamy fine sand
Bt—15 to 30 inches; sandy clay loam
BC—30 to 62 inches; loamy fine sand
Representative profile location: About 2,200 feet north and 1,380 feet west of the southeast corner, Section 22, T. 20 N., R. 10 E.

Additional Components

Dougherty: 15 percent

29—Lightning silt loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

MLRA: 112
Elevation: 500 to 1,500 feet
Mean annual precipitation: 24 to 45 inches
Mean annual air temperature: 55 to 65 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Lightning

Composition: 80 percent
Geomorphic setting: Flood plain on river valley
Parent material: Loamy and/or clayey alluvium
Slope: 0 to 1 percent
Runoff: Very high
Depth: Greater than 60 inches

Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Poorly drained
Available water capacity: About 10.3 inches
Depth to the top of the seasonal high water table: 0.0 to 1.0 feet
Flooding: Occasional
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3w
Ecological site number and name: R112XY045OK, Heavy Bottomland PE 62-80

Typical Profile

Ap—0 to 7 inches; silt loam
E—7 to 10 inches; silty clay loam
Btg—10 to 57 inches; silty clay loam
BC—57 to 72 inches; silty clay
Representative profile location: About 1,240 feet west and 300 feet south of the northeast corner, Section 29, T. 22 N., R. 11 E.

Additional Components

Drummond: 10 percent
Mason: 5 percent
Osage: 5 percent

30—Lula silt loam, 1 to 3 percent slopes

Map Unit Setting

MLRA: 112
Elevation: 500 to 1,200 feet
Mean annual precipitation: 32 to 45 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 220 days

Component Description

Lula
Composition: 80 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Shoulder
Parent material: Silty residuum weathered from limestone
Slope: 1 to 3 percent
Runoff: Low
Depth: Bedrock (lithic) at 40 to 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 9.0 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 2e
Ecological site number and name: R112XY059OK Loamy Prairie (northeast) PE 62-80

Typical Profile

A—0 to 10 inches; silt loam
BA—10 to 18 inches; silty clay loam
Bt—18 to 49 inches; silty clay loam
R—49 to 50 inches; bedrock
Representative profile location: About 90 feet west and 240 feet north of the southeast corner, Section 36, T. 26 N., R. 8 E.

Additional Components

Catoosa: 10 percent
Apperson: 5 percent
Wolco: 5 percent

31—Braman silt loam, 0 to 1 percent slopes, rarely flooded

Map Unit Setting (fig. 4)

MLRA: 80A
Elevation: 740 to 1,500 feet
Mean annual precipitation: 30 to 42 inches
Mean annual air temperature: 55 to 61 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Braman

Composition: 80 percent
Geomorphic setting: Flood plain on river valley
Parent material: Calcareous loamy alluvium
Slope: 0 to 1 percent
Runoff: Low
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately slow
Slowest permeability class within 80 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 11.8 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: Rare
Ponding: None

Interpretive Groups

Land capability nonirrigated: 1
Ecological site number and name: R080AY050OK, Loamy Bottomland PE 44-64

Typical Profile

A—0 to 13 inches; silt loam
Bt—13 to 40 inches; silty clay loam
BC—40 to 96 inches; silty clay loam
Representative profile location: About 1,440 feet east and 1,050 feet south of the northwest corner, Section 13, T. 26 N., R. 9 E.

Figure 4.—Landscape of wheat and home-site development on Braman silt loam, 0 to 1 percent slopes, rarely flooded.

Additional Components

Osage: 20 percent

32—Braman silt loam, 1 to 3 percent slopes, rarely flooded

Map Unit Setting

MLRA: 80A
Elevation: 800 to 1,500 feet
Mean annual precipitation: 30 to 36 inches
Mean annual air temperature: 57 to 61 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Braman

Composition: 100 percent
Geomorphic setting: Flood plain on river valley
Parent material: Calcareous loamy alluvium
Slope: 1 to 3 percent
Runoff: Medium
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately slow
Slowest permeability class within 80 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 11.8 inches
Depth to the top of the seasonal high water table: Greater than 6 feet

Flooding: Rare
Ponding: None

Interpretive Groups

Land capability nonirrigated: 2e
Ecological site number and name: R080AY050OK, Loamy Bottomland PE 44-64

Typical Profile

Ap—0 to 8 inches; silt loam
Bt—8 to 40 inches; silty clay loam
BC—40 to 96 inches; silty clay loam
Representative profile location: About 2,200 feet west and 2,500 feet north of the southeast corner, Section 13, T. 25 N., R. 5 E.

33—Braman-Drummond complex, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

MLRA: 80A
Elevation: 500 to 1,500 feet
Mean annual precipitation: 24 to 47 inches
Mean annual air temperature: 55 to 65 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Braman

Composition: 45 percent
Geomorphic setting: Flood plain on river valley
Parent material: Calcareous loamy alluvium
Slope: 0 to 1 percent
Runoff: Low
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately slow
Slowest permeability class within 80 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 11.8 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: Rare
Ponding: None

Interpretive Groups

Land capability nonirrigated: 1
Ecological site number and name: R080AY050OK, Loamy Bottomland PE 44-64

Typical Profile

Ap—0 to 12 inches; silt loam
Bt—12 to 40 inches; silty clay loam
BC—40 to 96 inches; silty clay loam
Representative profile location: About 1,600 feet west and 500 feet south of the northeast corner, Section 20, T. 25 N., R. 10 E.

Drummond

Composition: 40 percent
Geomorphic setting: Flood plain on river valley
Parent material: Calcareous clayey and loamy alluvium
Slope: 0 to 1 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Somewhat poorly drained
Available water capacity: About 7.8 inches
Depth to the top of the seasonal high water table: 2.0 to 6.0 feet
Flooding: Rare
Ponding: None
Sodium affected: Sodic within 30 inches

Interpretive Groups

Land capability nonirrigated: 4s
Ecological site number and name: R080AY097OK, Subirrigated (Saline) PE 44-64

Typical Profile

Ap—0 to 5 inches; silt loam
Bt—5 to 43 inches; silty clay
BC1—43 to 80 inches; silty clay
Representative profile location: About 1,100 feet west and 500 feet south of the northeast corner, Section 20, T. 25 N., R. 10 E.

Additional Components

Osage: 5 percent
Verdigris: 5 percent
Wynona: 5 percent

34—Minco silt loam, 5 to 8 percent slopes

Map Unit Setting

MLRA: 80A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 200 to 230 days

Component Description

Minco

Composition: 90 percent
Geomorphic setting: Stream terrace on river valley
Geomorphic position: Riser
Parent material: Loamy alluvium and/or eolian deposits
Slope: 5 to 8 percent
Runoff: Medium
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate

Slowest permeability class within 80 inches: Moderate
Drainage class: Well drained
Available water capacity: About 11.0 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 4e
Ecological site number and name: R080AY056OK, Loamy Prairie PE 44-64

Typical Profile

Ap—0 to 19 inches; silt loam
Bw—19 to 38 inches; silt loam
C—38 to 62 inches; silt loam
Representative profile location: About 2,000 feet north and 50 feet west of the southeast corner, Section 34, T. 24 N., R. 4 E.

Additional Components

Norge: 5 percent
Teller: 5 percent

38—Norge silt loam, 1 to 3 percent slopes

Map Unit Setting

MLRA: 80A
Elevation: 700 to 1,300 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Norge

Composition: 70 percent
Geomorphic setting: Paleoterrace on upland
Position on landform: Tread
Parent material: Loamy alluvium
Slope: 1 to 3 percent
Runoff: Medium
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately slow
Slowest permeability class within 80 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 11.4 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 2e
Ecological site number and name: R080AY056OK, Loamy Prairie PE 44-64

Typical Profile

Ap—0 to 10 inches; silt loam
BA—10 to 17 inches; silty clay loam
Bt—17 to 49 inches; silty clay loam
BC—49 to 74 inches; silty clay loam
Representative profile location: About 1,100 feet south and 1,100 feet west of the northeast corner, Section 7, T. 25 N., R. 5 E.

Additional Components

Bethany: 15 percent
Teller: 10 percent
Vanoss: 5 percent

39—Norge silt loam, 3 to 5 percent slopes

Map Unit Setting

MLRA: 80A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 200 to 230 days

Component Description

Norge

Composition: 80 percent
Geomorphic setting: Paleoterrace on upland
Position on landform: Tread
Parent material: Loamy alluvium
Slope: 3 to 5 percent
Runoff: Medium
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately slow
Slowest permeability class within 80 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 11.4 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R080AY056OK, Loamy Prairie PE 44-64

Typical Profile

Ap—0 to 8 inches; silt loam
BA—8 to 13 inches; silty clay loam
Bt—13 to 48 inches; silty clay loam
BC—48 to 72 inches; silty clay loam
Representative profile location: About 250 feet north and 250 feet west of the southeast corner, Section 11, T. 24 N., R. 5 E.

Additional Components

Teller: 10 percent
Minco: 5 percent
Vanoss: 5 percent

40—Norge silt loam, 5 to 8 percent slopes

Map Unit Setting

MLRA: 80A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Norge

Composition: 80 percent
Geomorphic setting: Paleoterrace on upland
Position on landform: Tread
Parent material: Loamy alluvium
Slope: 5 to 8 percent
Runoff: High
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately slow
Slowest permeability class within 80 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 11.4 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 4e
Ecological site number and name: R080AY056OK, Loamy Prairie PE 44-64

Typical Profile

Ap—0 to 8 inches; silt loam
BA—8 to 13 inches; silty clay loam
Bt—13 to 62 inches; silty clay loam
BC—62 to 80 inches; silty clay loam
Representative profile location: About 800 feet south and 2,500 feet west of the northeast corner, Section 7, T. 26 N., R. 3 E.

Additional Components

Grant: 10 percent
Teller: 10 percent

41—Norge silt loam, 3 to 5 percent slopes, eroded

Map Unit Setting

MLRA: 80A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Norge

Composition: 85 percent
Geomorphic setting: Paleoterrace on upland
Position on landform: Tread
Parent material: Loamy alluvium
Slope: 3 to 5 percent
Runoff: Medium
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately slow
Slowest permeability class within 80 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 11.6 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R080AY856OK, Eroded Loamy Prairie PE 44-64

Typical Profile

Ap—0 to 8 inches; silt loam
BA—8 to 41 inches; silty clay loam
Bt—41 to 72 inches; silty clay loam
BC—72 to 80 inches; silty clay loam
Representative profile location: About 180 feet north and 800 feet west of the southeast corner, Section 14, T. 25 N., R. 3 E.

Additional Components

Teller: 10 percent
Coyle: 5 percent

42—Norge, Agra, and Prue soils, 3 to 8 percent slopes, gullied

Map Unit Setting

MLRA: 80A
Elevation: 500 to 1,500 feet
Mean annual precipitation: 26 to 42 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Norge

Composition: 35 percent
Geomorphic setting: Paleoterrace on upland
Position on landform: Tread
Parent material: Loamy alluvium
Slope: 3 to 8 percent
Runoff: High
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately slow
Slowest permeability class within 80 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 11.4 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 6e
Ecological site number and name: R080AY856OK, Eroded Loamy Prairie PE 44-64

Typical Profile

Ap—0 to 11 inches; silt loam
BA—11 to 22 inches; silty clay loam
Bt—22 to 72 inches; silty clay loam
BC—72 to 80 inches; silty clay loam
Representative profile location: About 330 feet west and 600 feet north of the southeast corner, Section 28, T. 22 N., R. 8 E.

Agra

Composition: 28 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Clayey residuum weathered from clayey shale
Slope: 3 to 5 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Moderately well drained
Available water capacity: About 10.0 inches
Depth to the top of the seasonal high water table: 3.0 to 4.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 6e
Ecological site number and name: R080AY810OK, Eroded Claypan Prairie (North) PE 44-64

Typical Profile

A—0 to 13 inches; silt loam
BA—13 to 19 inches; silty clay loam
Bt1—19 to 29 inches; silty clay loam
Bt2—29 to 42 inches; silty clay
Bt3—42 to 72 inches; silty clay
Representative profile location: About 500 feet west and 700 feet north of the southeast corner, Section 28, T. 22 N., R. 8 E.

Prue

Composition: 27 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Footslope
Parent material: Loamy colluvium derived from sandstone and shale
Slope: 3 to 8 percent
Runoff: Medium
Depth: Bedrock (paralithic) at 72 to 99 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Impermeable
Drainage class: Somewhat poorly drained
Available water capacity: About 10.3 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 6e
Ecological site number and name: R112XY856OK, Eroded Loamy Prairie PE 62-80

Typical Profile

A—0 to 13 inches; loam
BA—13 to 20 inches; loam
Bt—20 to 42 inches; sandy clay loam
2BC—42 to 72 inches; silty clay loam
2Cr—72 to 76 inches; bedrock
Representative profile location: About 500 feet west and 600 feet north of the southeast corner, Section 28, T. 22 N., R. 8 E.

Additional Components

Gullied Land: 10 percent

43—Norge-Pawhuska complex, 1 to 5 percent slopes

Map Unit Setting

MLRA: 80A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Norge

Composition: 50 percent
Geomorphic setting: Paleoterrace on upland
Position on landform: Tread
Parent material: Loamy alluvium
Slope: 1 to 5 percent
Runoff: Medium
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately slow
Slowest permeability class within 80 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 11.4 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R080AY056OK, Loamy Prairie PE 44-64

Typical Profile

Ap—0 to 10 inches; silt loam
BA—10 to 15 inches; silty clay loam
Bt—15 to 28 inches; silty clay loam
BC—28 to 72 inches; silty clay loam
Representative profile location: About 1,320 feet south and 2,600 feet west of the northeast corner, Section 12, T. 24 N., R. 4 E.

Pawhuska

Composition: 35 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Saline clayey residuum weathered from sandstone and shale
Slope: 1 to 5 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Moderately well drained
Available water capacity: About 7.8 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches

Interpretive Groups

Land capability nonirrigated: 4s
Ecological site number and name: R080AY091OK, Slickspot PE 44-64

Typical Profile

A—0 to 8 inches; silt loam
Bt—8 to 56 inches; silty clay
BC—56 to 72 inches; silty clay loam
Representative profile location: About 350 feet east and 1,700 feet north of the southwest corner, Section 25, T. 26 N., R. 4 E.

Additional Components

Bethany: 5 percent
Coyle: 5 percent
Teller: 5 percent

44—Oil Waste Land-Huska complex, 1 to 8 percent slopes

Map Unit Setting

MLRA: 80A
Elevation: 500 to 2,200 feet
Mean annual precipitation: 22 to 48 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 240 days

Component Description

Oil Waste Land

Composition: 80 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Summit and backslope
Parent material: Loamy and clayey residuum weathered from sandstone and shale
Slope: 1 to 8 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Impermeable
Slowest permeability class within 80 inches: Impermeable
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches

Interpretive Groups

Land capability nonirrigated: 8

Typical Profile

C—0 to 60 inches; variable
Representative profile location: About 3,300 feet north and 3,700 feet west of the southeast corner, Section 26, T. 27 N., R. 5 E.

Huska

Composition: 20 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Shoulder
Position on landform: Side slope
Parent material: Saline clayey residuum weathered from sandstone and shale

Slope: 1 to 3 percent
Runoff: Very high
Depth: Bedrock (paralithic) at 40 to 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Impermeable
Drainage class: Moderately well drained
Available water capacity: About 4.6 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None
Salt affected: Saline within 30 inches
Sodium affected: Sodic within 30 inches

Interpretive Groups

Land capability nonirrigated: 6s
Ecological site number and name: R080AY091OK, Slickspot PE 44-64

Typical Profile

A—0 to 9 inches; loam
Btn—9 to 15 inches; silty clay
Btnz—15 to 50 inches; silty clay
Cr—50 to 55 inches; bedrock
Representative profile location: About 3,300 feet north and 3,300 feet west of the southeast corner, Section 26, T. 27 N., R. 5 E.

45—Okemah silt loam, 0 to 1 percent slopes

Map Unit Setting

MLRA: 112
Elevation: 500 to 1,200 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 65 degrees Fahrenheit
Frost-free period: 190 to 220 days

Component Description

Okemah

Composition: 88 percent
Geomorphic setting: Terrace on upland
Geomorphic position: Tread
Parent material: Clayey and loamy colluvium or alluvium over clayey residuum weathered from shale
Slope: 0 to 1 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Slow
Drainage class: Somewhat poorly drained
Available water capacity: About 10.7 inches
Depth to the top of the seasonal high water table: 1.0 to 2.5 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 1
Ecological site number and name: R112XY059OK, Loamy Prairie (northeast) PE 62-80

Typical Profile

A—0 to 15 inches; silt loam
BA—15 to 21 inches; silty clay loam
Bt—21 to 50 inches; silty clay
BC—50 to 71 inches; silty clay
Representative profile location: About 3,300 feet north and 3,700 feet west of the southeast corner, Section 26, T. 27 N., R. 5 E.

Additional Components

Dennis: 5 percent
Parsons: 5 percent
Pharoah: 2 percent

46—Osage silty clay, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

MLRA: 84A
Elevation: 500 to 1,000 feet
Mean annual precipitation: 36 to 45 inches
Mean annual air temperature: 55 to 64 degrees Fahrenheit
Frost-free period: 190 to 220 days

Component Description

Osage

Composition: 90 percent
Geomorphic setting: Flood plain on river valley
Parent material: Clayey alluvium
Slope: 0 to 1 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Poorly drained
Available water capacity: About 8.9 inches
Depth to the top of the seasonal high water table: 0.0 to 1.0 feet
Flooding: Occasional
Ponding: None

Interpretive Groups

Land capability nonirrigated: 5w
Ecological site number and name: R112XY045OK, Heavy Bottomland PE 62-80

Typical Profile

Ap—0 to 16 inches; silty clay
Bg—16 to 72 inches; silty clay
Representative profile location: About 700 feet south and 50 feet east of the northwest corner, Section 33, T. 26 N., R. 9 E.

Additional Components

Lightning: 5 percent
Wynona: 5 percent

47—Parsons silt loam, 0 to 1 percent slopes

Map Unit Setting

MLRA: 112
Elevation: 500 to 1,000 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 65 degrees Fahrenheit
Frost-free period: 190 to 220 days

Component Description

Parsons

Composition: 85 percent
Geomorphic setting: Paleoterrace on upland
Position on landform: Tread
Parent material: Clayey alluvium and/or residuum weathered from shale
Slope: 0 to 1 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Very slow
Drainage class: Somewhat poorly drained
Available water capacity: About 10.4 inches
Depth to the top of the seasonal high water table: 0.5 to 1.5 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 2w
Ecological site number and name: R112XY010OK, Claypan Prairie PE 62-80

Typical Profile

A—0 to 9 inches; silt loam
E—9 to 12 inches; silt loam
Btg—12 to 76 inches; silty clay
BC—76 to 80 inches; silty clay
Representative profile location: About 3,350 feet east and 2,500 feet south of the northwest corner, Section 15, T. 21 N., R. 12 E.

Additional Components

Okemah: 10 percent
Pharoah: 5 percent

48—Parsons silt loam, 1 to 3 percent slopes

Map Unit Setting

MLRA: 112
Elevation: 500 to 1,200 feet

Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 65 degrees Fahrenheit
Frost-free period: 190 to 220 days

Component Description

Parsons

Composition: 80 percent
Geomorphic setting: Paleoterrace on upland
Position on landform: Tread
Parent material: Clayey alluvium and/or residuum weathered from shale
Slope: 1 to 3 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Somewhat poorly drained
Available water capacity: About 10.4 inches
Depth to the top of the seasonal high water table: 0.5 to 1.5 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3s
Ecological site number and name: R112XY010OK, Claypan Prairie PE 62-80

Typical Profile

A—0 to 9 inches; silt loam
E—9 to 12 inches; silt loam
Btg—12 to 32 inches; silty clay
BC—32 to 70 inches; silty clay
Representative profile location: About 2,370 feet south and 450 feet west of the northeast corner, Section 4, T. 21 N., R. 10 E.

Additional Components

Okemah: 10 percent
Dennis: 5 percent
Pharoah: 5 percent

49—Parsons-Pharoah complex, 0 to 3 percent slopes

Map Unit Setting

MLRA: 112
Elevation: 500 to 1,000 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 65 degrees Fahrenheit
Frost-free period: 190 to 220 days

Component Description

Parsons

Composition: 50 percent
Geomorphic setting: Paleoterrace on upland
Position on landform: Tread

Parent material: Clayey alluvium and/or residuum weathered from shale
Slope: 0 to 3 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Somewhat poorly drained
Available water capacity: About 10.4 inches
Depth to the top of the seasonal high water table: 0.5 to 1.5 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3s
Ecological site number and name: R112XY010OK, Claypan Prairie PE 62-80

Typical Profile

A—0 to 10 inches; silt loam
E—10 to 13 inches; silt loam
Btg—13 to 32 inches; silty clay
BC—32 to 62 inches; silty clay
Representative profile location: About 2,450 feet east and 2,450 feet south of the northwest corner, Section 10, T. 28 N., R. 8 E.

Pharoah

Composition: 40 percent
Geomorphic setting: Hillslope on paleoterrace on upland
Position on hillslope: Summit
Parent material: Clayey alluvium and/or residuum weathered from shale
Slope: 0 to 3 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Somewhat poorly drained
Available water capacity: About 10.4 inches
Depth to the top of the seasonal high water table: 0.5 to 1.5 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 4w
Ecological site number and name: R112XY010OK, Claypan Prairie PE 62-80

Typical Profile

A—0 to 6 inches; silt loam
Bt—6 to 46 inches; silty clay
BC—46 to 60 inches; clay
Representative profile location: About 2,600 feet east and 1,400 feet north of the southwest corner, Section 19, T. 28 N., R. 8 E.

Additional Components

Okemah: 10 percent

50—Pits

Map Unit Setting

MLRA: 84A
Elevation: 500 to 2,200 feet
Mean annual precipitation: 22 to 48 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 240 days

Component Description

Pits

Composition: 100 percent
Geomorphic setting: Borrow pit
Parent material: Mine spoil or earthy fill
Slope: 0 to 4 percent
Runoff: High
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Slow
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 8

Typical Profile

C—0 to 60 inches; variable
Representative profile location: About 200 feet south and 200 feet east of the northwest corner, Section 12, T. 25 N., R. 8 E.

51—Prue loam, 3 to 5 percent slopes

Map Unit Setting

MLRA: 84A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 30 to 46 inches
Mean annual air temperature: 57 to 68 degrees Fahrenheit
Frost-free period: 190 to 220 days

Component Description

Prue

Composition: 82 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Footslope
Parent material: Loamy colluvium derived from sandstone and shale
Slope: 3 to 5 percent

Runoff: Low
Depth: Bedrock (paralithic) at 72 to 99 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Impermeable
Drainage class: Somewhat poorly drained
Available water capacity: About 10.4 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R112XY059OK, Loamy Prairie (northeast) PE 62-80

Typical Profile

A—0 to 12 inches; loam
BA—12 to 18 inches; loam
Bt—18 to 39 inches; sandy clay loam
2BC—39 to 72 inches; silty clay
2Cr—72 to 96 inches; bedrock
Representative profile location: About 150 feet west and 2,550 feet north of the southeast corner, Section 18, T. 23 N., R. 10 E.

Additional Components

Bates: 5 percent
Dennis: 5 percent
Steedman: 5 percent
Coweta: 3 percent

52—Gaddy fine sandy loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

MLRA: 80A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 200 to 230 days

Component Description

Gaddy

Composition: 90 percent
Geomorphic setting: Flood plain on river valley
Parent material: Calcareous sandy alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately rapid
Slowest permeability class within 80 inches: Moderately rapid
Drainage class: Somewhat excessively drained
Available water capacity: About 5.4 inches

Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: Occasional
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3s
Ecological site number and name: R080AY068OK, Sandy Bottomland PE 44-64

Typical Profile

A—0 to 14 inches; fine sandy loam
C—14 to 80 inches; stratified fine sand to clay loam
Representative profile location: About 1,725 feet west and 300 feet south of the northeast corner, Section 4, T. 24 N., R. 3 E.

Additional Components

Easpur: 5 percent
Keokuk: 5 percent

53—Ustibuck silty clay loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

MLRA: 112
Elevation: 600 to 1,500 feet
Mean annual precipitation: 30 to 40 inches
Mean annual air temperature: 57 to 63 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Ustibuck

Composition: 95 percent
Geomorphic setting: Flood plain on river valley
Parent material: Clayey alluvium
Slope: 0 to 1 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Poorly drained
Available water capacity: About 9.8 inches
Depth to the top of the seasonal high water table: At soil surface
Flooding: Occasional
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3w
Ecological site number and name: R112XY045OK, Heavy Bottomland PE 62-80

Typical Profile

Ap—0 to 11 inches; silty clay loam
2Bw—11 to 27 inches; silty clay
2Cb—27 to 60 inches; silty clay

Representative profile location: About 480 feet north and 170 feet east of the southwest corner, Section 34, T. 25 N., R. 3 E.

Additional Components

Braman: 5 percent

54—Shidler silty clay loam, 1 to 5 percent slopes

Map Unit Setting

MLRA: 76
Elevation: 500 to 1,300 feet
Mean annual precipitation: 30 to 45 inches
Mean annual air temperature: 57 to 63 degrees Fahrenheit
Frost-free period: 200 to 220 days

Component Description

Shidler

Composition: 75 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Summit and shoulder
Parent material: Loamy residuum weathered from cherty limestone
Slope: 1 to 5 percent
Runoff: Very high
Depth: Bedrock (lithic) at 4 to 20 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 1.1 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 7s
Ecological site number and name: R076XY098OK, Very Shallow PE 54-62

Typical Profile

A—0 to 7 inches; stony silty clay loam
R—7 to 20 inches; bedrock
Representative profile location: About 600 feet south and 50 feet east of the northwest corner, Section 18, T. 25 N., R. 9 E.

Additional Components

Catoosa: 10 percent
Lula: 10 percent
Rock outcrop: 5 percent

55—Steedman silt loam, 1 to 3 percent slopes

Map Unit Setting

MLRA: 84A
Elevation: 500 to 1,500 feet

Mean annual precipitation: 31 to 46 inches
Mean annual air temperature: 57 to 68 degrees Fahrenheit
Frost-free period: 190 to 220 days

Component Description

Steedman

Composition: 85 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Summit and shoulder
Parent material: Clayey residuum weathered from sandstone and shale
Slope: 1 to 3 percent
Runoff: Very high
Depth: Bedrock (paralithic) at 20 to 40 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Impermeable
Drainage class: Moderately well drained
Available water capacity: About 4.7 inches
Depth to the top of the seasonal high water table: 1.0 to 2.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3s
Ecological site number and name: R080AY056OK, Loamy Prairie PE 44-64

Typical Profile

A—0 to 7 inches; silt loam
Bt—7 to 33 inches; silty clay
Cr—33 to 42 inches; bedrock
Representative profile location: About 2,000 feet west and 750 feet south of the northeast corner, Section 16, T. 24 N., R. 10 E.

Additional Components

Coweta: 5 percent
Dennis: 5 percent
Foraker: 5 percent

56—Steedman silt loam, 3 to 5 percent slopes

Map Unit Setting

MLRA: 84A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 30 to 40 inches
Mean annual air temperature: 57 to 68 degrees Fahrenheit
Frost-free period: 190 to 220 days

Component Description

Steedman

Composition: 80 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Summit and shoulder
Parent material: Clayey residuum weathered from sandstone and shale

Slope: 3 to 5 percent
Runoff: Very high
Depth: Bedrock (paralithic) at 20 to 40 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Impermeable
Drainage class: Moderately well drained
Available water capacity: About 4.9 inches
Depth to the top of the seasonal high water table: 1.0 to 2.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R080AY056OK, Loamy Prairie PE 44-64

Typical Profile

A—0 to 5 inches; silt loam
Bt—5 to 34 inches; silty clay
Cr—34 to 48 inches; bedrock
Representative profile location: About 1,500 feet south and 4,500 feet west of the northeast corner, Section 16, T. 24 N., R. 10 E.

Additional Components

Foraker: 15 percent
Shidler: 3 percent
Rock outcrop: 2 percent

57—Steedman-Lucien complex, 3 to 15 percent slopes

Map Unit Setting (fig. 5)

MLRA: 84A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 68 degrees Fahrenheit
Frost-free period: 200 to 230 days

Component Description

Steedman

Composition: 70 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Shoulder and summit
Parent material: Clayey residuum weathered from sandstone and shale
Slope: 3 to 15 percent
Runoff: Very high
Depth: Bedrock (paralithic) at 20 to 40 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Impermeable
Drainage class: Moderately well drained
Available water capacity: About 3.7 inches
Depth to the top of the seasonal high water table: 1.0 to 2.0 feet
Flooding: None
Ponding: None

Figure 5.—Cattle grazing rangeland on Steedman-Lucien complex, 3 to 15 percent slopes.

Interpretive Groups

Land capability nonirrigated: 6e
Ecological site number and name: R080AY056OK, Loamy Prairie PE 44-64

Typical Profile

A—0 to 8 inches; stony silt loam
Bt—8 to 28 inches; silty clay
Cr—28 to 60 inches; bedrock
Representative profile location: About 2,640 feet south and 500 feet east of the northwest corner, Section 30, T. 24 N., R. 12 E.

Lucien

Composition: 20 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Loamy residuum weathered from sandstone and shale
Slope: 3 to 15 percent
Runoff: Very high
Depth: Bedrock (paralithic) at 10 to 20 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately rapid
Slowest permeability class within 80 inches: Very slow
Drainage class: Well drained
Available water capacity: About 2.1 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 6e
Ecological site number and name: R080AY083OK, Shallow Prairie PE 44-64

Typical Profile

A—0 to 6 inches; loam
Bw—6 to 12 inches; loam
Cr—12 to 14 inches; bedrock
Representative profile location: About 500 feet east and 2,400 feet north of the southwest corner, Section 30, T. 24 N., R. 12 E.

Additional Components

Foraker: 5 percent
Rock outcrop: 5 percent

58—Steedman-Lucien complex, 15 to 25 percent slopes

Map Unit Setting

MLRA: 84A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 68 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Steedman

Composition: 55 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Shoulder and summit
Parent material: Clayey residuum weathered from sandstone and shale
Slope: 15 to 25 percent
Runoff: Very high
Depth: Bedrock (paralithic) at 20 to 40 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Impermeable
Drainage class: Moderately well drained
Available water capacity: About 4.8 inches
Depth to the top of the seasonal high water table: 1.0 to 2.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 7e
Ecological site number and name: R080AY056OK, Loamy Prairie PE 44-64

Typical Profile

A—0 to 6 inches; stony silt loam
Bt—6 to 36 inches; silty clay
Cr—36 to 48 inches; bedrock
Representative profile location: About 1,700 feet west and 400 feet south of the northeast corner, Section 6, T. 23 N., R. 9 E.

Lucien

Composition: 20 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Loamy residuum weathered from sandstone and shale
Slope: 15 to 25 percent
Runoff: Very high
Depth: Bedrock (paralithic) at 10 to 20 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately rapid
Slowest permeability class within 80 inches: Very slow
Drainage class: Well drained
Available water capacity: About 2.0 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 7e
Ecological site number and name: R080AY083OK Shallow Prairie PE 44-64

Typical Profile

A—0 to 7 inches; loam
Bw—7 to 11 inches; loam
Cr—11 to 15 inches; bedrock
Representative profile location: About 1,700 feet west and 900 feet south of the northeast corner, Section 6, T. 23 N., R. 9 E.

Additional Components

Coyle: 10 percent
Foraker: 10 percent
Rock outcrop: 5 percent

60—Coyle-Lucien complex, 3 to 12 percent slopes

Map Unit Setting

MLRA: 80A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Coyle

Composition: 50 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope and summit
Parent material: Loamy residuum weathered from sandstone
Slope: 3 to 12 percent
Runoff: High
Depth: Bedrock (paralithic) at 20 to 40 inches

Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 3.9 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 6e
Ecological site number and name: R080AY056OK Loamy Prairie PE 44-64

Typical Profile

A—0 to 10 inches; fine sandy loam
BA—10 to 14 inches; fine sandy loam
Bt—14 to 23 inches; sandy clay loam
BC—23 to 27 inches; sandy clay loam
Cr—27 to 30 inches; bedrock
Representative profile location: About 2,320 feet west and 1,050 feet south of the northeast corner, Section 12, T. 27 N., R. 5 E.

Lucien

Composition: 35 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Loamy residuum weathered from sandstone and shale
Slope: 3 to 12 percent
Runoff: Very high
Depth: Bedrock (paralithic) at 10 to 20 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately rapid
Slowest permeability class within 80 inches: Very slow
Drainage class: Well drained
Available water capacity: About 2.9 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 6e
Ecological site number and name: R080AY083OK, Shallow Prairie PE 44-64

Typical Profile

A—0 to 7 inches; fine sandy loam
Bw—7 to 18 inches; fine sandy loam
Cr—18 to 20 inches; bedrock
Representative profile location: About 2,320 feet west and 1,450 feet south of the northeast corner, Section 12, T. 27 N., R. 5 E.

Additional Components

Bethany: 10 percent
Grainola: 5 percent

61—Westsum silty clay loam, 3 to 5 percent slopes

Map Unit Setting

MLRA: 76
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 44 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Westsum

Composition: 75 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Calcareous clayey residuum weathered from shale
Slope: 3 to 5 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Well drained
Available water capacity: About 10.2 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R080AY010OK, Claypan Prairie (North) PE 44-64

Typical Profile

A—0 to 9 inches; silty clay loam
BA—9 to 17 inches; silty clay loam
Bt1—17 to 26 inches; silty clay
Bt2—26 to 57 inches; silty clay
BC—57 to 72 inches; silty clay
Representative profile location: About 2,080 feet south and 200 feet west of the northeast corner, Section 27, T. 28 N., R. 8 E.

Additional Components

Foraker: 12 percent
Apperson: 10 percent
Shidler: 3 percent

62—Westsum-Shidler-Apperson complex, 3 to 12 percent slopes

Map Unit Setting

MLRA: 76
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 44 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Westsum

Composition: 40 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Calcareous clayey residuum weathered from shale
Slope: 3 to 5 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Well drained
Available water capacity: About 10.4 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R080AY010OK, Claypan Prairie (North) PE 44-64

Typical Profile

A—0 to 11 inches; silty clay loam
BA—11 to 18 inches; silty clay loam
Bt1—18 to 27 inches; silty clay
Bt2—27 to 39 inches; silty clay
BC—39 to 69 inches; silty clay
Representative profile location: About 1,180 feet north and 200 feet east of the southwest corner of Section 21, T. 26 N., R. 6 E.

Shidler

Composition: 25 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Summit and shoulder
Parent material: Loamy residuum weathered from cherty limestone
Slope: 3 to 12 percent
Runoff: Very high
Depth: Bedrock (lithic) at 4 to 20 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Impermeable
Drainage class: Well drained
Available water capacity: About 1.2 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 7s
Ecological site number and name: R076XY098OK, Very Shallow PE 54-62

Typical Profile

A—0 to 8 inches; stony silty clay loam
R—8 to 11 inches; bedrock
Representative profile location: About 1,350 feet north and 750 feet east of the southwest corner of Section 21, T. 26 N., R. 6 E.

Apperson

Composition: 20 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Calcareous clayey residuum weathered from limestone
Slope: 3 to 5 percent
Runoff: Very high
Depth: Bedrock (lithic) at 40 to 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Impermeable
Drainage class: Somewhat poorly drained
Available water capacity: About 7.7 inches
Depth to the top of the seasonal high water table: 1.5 to 2.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R112XY010OK, Claypan Prairie PE 62-80

Typical Profile

A—0 to 12 inches; silty clay loam
BA—12 to 16 inches; silty clay loam
Bt—16 to 33 inches; silty clay
BC—33 to 46 inches; silty clay
R—46 to 48 inches; bedrock
Representative profile location: About 1,350 feet north and 900 feet east of the southwest corner of Section 21, T. 26 N., R. 6 E.

Additional Components

Foraker: 10 percent
Rock outcrop: 5 percent

63—Teller loam, 3 to 5 percent slopes

Map Unit Setting

MLRA: 80A
Elevation: 500 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 200 to 230 days

Component Description

Teller

Composition: 80 percent
Geomorphic setting: Stream terrace on valley

Position on landform: Tread
Parent material: Loamy alluvium
Slope: 3 to 5 percent
Runoff: Low
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Moderate
Drainage class: Well drained
Available water capacity: About 10.5 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R080AY056OK, Loamy Prairie PE 44-64

Typical Profile

Ap—0 to 14 inches; loam
Bt—14 to 52 inches; clay loam
BC—52 to 60 inches; loam
Representative profile location: About 2,450 feet east and 1,800 feet north of the southwest corner, Section 4, T. 24N, R. 4E.

Additional Components

Norge: 10 percent
Konawa: 5 percent
Minco: 5 percent

64—Vanoss silt loam, 0 to 1 percent slopes

Map Unit Setting

MLRA: 80A
Elevation: 700 to 1,300 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 200 to 230 days

Component Description

Vanoss

Composition: 85 percent
Geomorphic setting: Paleoterrace on valley
Position on landform: Tread
Parent material: Loamy alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Moderate
Drainage class: Well drained
Available water capacity: About 11.7 inches

Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 1
Ecological site number and name: R080AY056OK, Loamy Prairie PE 44-64

Typical Profile

Ap—0 to 9 inches; silt loam
A—9 to 12 inches; silt loam
BA—12 to 19 inches; silty clay loam
Bt—19 to 56 inches; silty clay loam
BC—56 to 72 inches; loam
Representative profile location: About 1,300 feet south and 100 feet west of the northeast corner, Section 1, T. 25 N., R. 3 E.

Additional Components

Bethany: 5 percent
Norge: 5 percent
Teller: 5 percent

65—Vanoss silt loam, 1 to 3 percent slopes

Map Unit Setting (fig. 6)

MLRA: 80A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 200 to 230 days

Component Description

Vanoss

Composition: 80 percent
Geomorphic setting: Paleoterrace on valley
Position on landform: Tread
Parent material: Loamy alluvium
Slope: 1 to 3 percent
Runoff: Low
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Moderate
Drainage class: Well drained
Available water capacity: About 11.5 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 2e
Ecological site number and name: R080AY056OK, Loamy Prairie PE 44-64

Figure 6.—Stocker cattle grazing wheat on Vanoss silt loam, 1 to 3 percent slopes.

Typical Profile

Ap—0 to 11 inches; silt loam
BA—11 to 16 inches; silty clay loam
Bt1—16 to 45 inches; silty clay loam
Bt2—45 to 58 inches; silty clay loam
BC—58 to 72 inches; loam
Representative profile location: About 2,200 feet south and 50 feet west of the northeast corner, Section 1, T. 25 N., R. 3 E.

Additional Components

Norge: 10 percent
Minco: 5 percent
Teller: 5 percent

66—Verdigris silt loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

MLRA: 112
Elevation: 300 to 1,000 feet
Mean annual precipitation: 36 to 56 inches
Mean annual air temperature: 57 to 68 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Verdigris

Composition: 90 percent
Geomorphic setting: Flood plain on river valley
Parent material: Silty alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Moderate
Drainage class: Well drained
Available water capacity: About 11.8 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: Occasional
Ponding: None

Interpretive Groups

Land capability nonirrigated: 2w
Ecological site number and name: R112XY050OK, Loamy Bottomland PE 62-80

Typical Profile

A—0 to 21 inches; silt loam
AC—21 to 72 inches; silty clay loam
Representative profile location: About 2,600 feet north and 300 feet west of the southeast corner, Section 1, T. 25 N., R. 3 E.

Additional Components

Cleora: 5 percent
Wynona: 5 percent

67—Verdigris silt loam, 0 to 1 percent slopes, frequently flooded

Map Unit Setting

MLRA: 112
Elevation: 300 to 1,200 feet
Mean annual precipitation: 31 to 56 inches
Mean annual air temperature: 57 to 68 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Verdigris

Composition: 70 percent
Geomorphic setting: Flood plain on river valley
Parent material: Silty alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate

Slowest permeability class within 80 inches: Moderate
Drainage class: Well drained
Available water capacity: About 11.8 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: Frequent
Ponding: None

Interpretive Groups

Land capability nonirrigated: 5w
Ecological site number and name: R112XY050OK, Loamy Bottomland PE 62-80

Typical Profile

A—0 to 18 inches; silt loam
AC—18 to 60 inches; silty clay loam
Representative profile location: About 100 feet west and 1,100 feet south of the northeast corner, Section 23, T. 28 N., R. 5 E.

Additional Components

Cleora: 15 percent
Barnsdall: 5 percent
Mason: 5 percent
Wynona: 5 percent

68—Wolco silty clay loam, 1 to 3 percent slopes

Map Unit Setting

MLRA: 76
Elevation: 500 to 2,600 feet
Mean annual precipitation: 27 to 44 inches
Mean annual air temperature: 54 to 64 degrees Fahrenheit
Frost-free period: 170 to 220 days

Component Description

Wolco

Composition: 75 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Shoulder
Parent material: Clayey residuum weathered from limestone and shale
Slope: 1 to 3 percent
Runoff: Very high
Depth: Bedrock (lithic) at 40 to 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Moderately well drained
Available water capacity: About 10.3 inches
Depth to the top of the seasonal high water table: 1.5 to 3.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 2e
Ecological site number and name: R112XY059OK, Loamy Prairie (northeast) PE 62-80

Typical Profile

A—0 to 14 inches; silty clay loam
BA—14 to 21 inches; silty clay loam
Bt—21 to 55 inches; silty clay
R—55 to 60 inches; bedrock
Representative profile location: About 1,800 feet north and 30 feet west of the southeast corner, Section 13, T. 28 N., R. 6 E.

Additional Components

Apperson: 10 percent
Lula: 10 percent
Dwight: 5 percent

69—Wolco-Dwight complex, 0 to 3 percent slopes

Map Unit Setting

MLRA: 76
Elevation: 500 to 2,600 feet
Mean annual precipitation: 27 to 44 inches
Mean annual air temperature: 54 to 64 degrees Fahrenheit
Frost-free period: 170 to 220 days

Component Description

Wolco

Composition: 50 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Shoulder
Parent material: Clayey residuum weathered from limestone and shale
Slope: 0 to 3 percent
Runoff: Very high
Depth: Bedrock (lithic) at 40 to 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Moderately well drained
Available water capacity: About 10.8 inches
Depth to the top of the seasonal high water table: 1.5 to 3.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 2e
Ecological site number and name: R112XY059OK, Loamy Prairie (northeast) PE 62-80

Typical Profile

A—0 to 12 inches; silty clay loam
BA—12 to 17 inches; silty clay loam
Bt—17 to 58 inches; silty clay
R—58 to 60 inches; bedrock
Representative profile location: About 2,230 feet south and 1,000 feet west of the northeast corner of Section 14, T. 27 N., R. 5 E.

Dwight

Composition: 40 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Clayey alluvium or loess derived from shale over cherty limestone
Slope: 0 to 3 percent
Runoff: Very high
Depth: Bedrock (lithic) at 40 to 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Moderately well drained
Available water capacity: About 7.3 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None
Sodium affected: Sodic within 30 inches

Interpretive Groups

Land capability nonirrigated: 4s
Ecological site number and name: R112XY091OK, Slickspot PE 62-80

Typical Profile

A—0 to 5 inches; silt loam
Bt—5 to 30 inches; silty clay
BC—30 to 54 inches; silty clay
R—54 to 60 inches; bedrock
Representative profile location: About 2,230 feet south and 950 feet west of the northeast corner of Section 14, T. 27 N., R. 5 E.

Additional Components

Lula: 10 percent
Apperson: 5 percent

70—Wynona silty clay loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

MLRA: 112
Elevation: 500 to 1,000 feet
Mean annual precipitation: 36 to 47 inches
Mean annual air temperature: 55 to 64 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Wynona

Composition: 85 percent
Geomorphic setting: Flood plain on river valley
Parent material: Loamy and silty alluvium
Slope: 0 to 1 percent
Runoff: Very high
Depth: Greater than 60 inches

Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately slow
Slowest permeability class within 80 inches: Slow
Drainage class: Somewhat poorly drained
Available water capacity: About 11.5 inches
Depth to the top of the seasonal high water table: 0.0 to 2.0 feet
Flooding: Occasional
Ponding: None

Interpretive Groups

Land capability nonirrigated: 4w
Ecological site number and name: R112XY050OK, Loamy Bottomland PE 62-80

Typical Profile

A—0 to 8 inches; silty clay loam
Btg1—8 to 47 inches; silty clay loam
Btg2—47 to 63 inches; silty clay
Representative profile location: About 1,900 feet south and 70 feet west of the northeast corner, Section 9, T. 21 N., R. 12 E.

Additional Components

Mason: 5 percent
Osage: 5 percent
Verdigris: 5 percent

AgFB—Agra-Foraker complex, 1 to 3 percent slopes

Map Unit Setting

MLRA: 76
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 68 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Agra

Composition: 45 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Shoulder
Parent material: Clayey residuum weathered from clayey shale
Slope: 1 to 3 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Moderately well drained
Available water capacity: About 9.9 inches
Depth to the top of the seasonal high water table: 3.0 to 4.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 2e
Ecological site number and name: R080AY010OK, Claypan Prairie (North) PE 44-64

Typical Profile

A—0 to 10 inches; silt loam
Bt1—10 to 18 inches; silty clay loam
Bt2—18 to 29 inches; silty clay
Bt3—29 to 44 inches; silty clay
Btk—44 to 60 inches; silty clay
Representative profile location: About 1,500 feet north and 2,100 feet west of the southeast corner, Section 27, T. 28 N., R. 5 E.

Foraker

Composition: 35 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope and shoulder
Parent material: Calcareous clayey residuum weathered from shale
Slope: 1 to 3 percent
Runoff: Very high
Depth: Bedrock (paralithic) at 20 to 40 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Impermeable
Drainage class: Moderately well drained
Available water capacity: About 4.3 inches
Depth to the top of the seasonal high water table: 0.0 to 2.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3s
Ecological site number and name: R076XY010OK, Claypan Prairie (Eastern) PE 54-62

Typical Profile

A—0 to 6 inches; clay loam
BA—6 to 16 inches; silty clay loam
Bt—16 to 26 inches; silty clay
Bk—26 to 30 inches; silty clay
Cr—30 to 40 inches; bedrock
Representative profile location: About 1,500 feet north and 1,800 feet west of the southeast corner, Section 27, T. 28 N., R. 5 E.

Additional Components

Coyle: 6 percent
Shidler: 6 percent
Steedman: 5 percent
Huska: 3 percent

AgFC—Agra-Foraker complex, 3 to 5 percent slopes

Map Unit Setting

MLRA: 76
Elevation: 700 to 1,500 feet

Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 68 degrees Fahrenheit
Frost-free period: 190 to 230 days

Component Description

Agra

Composition: 45 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Clayey residuum weathered from clayey shale
Slope: 3 to 5 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Very slow
Slowest permeability class within 80 inches: Very slow
Drainage class: Moderately well drained
Available water capacity: About 9.9 inches
Depth to the top of the seasonal high water table: 3.0 to 4.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R080AY010OK, Claypan Prairie (North) PE 44-64

Typical Profile

A—0 to 9 inches; silt loam
Bt1—9 to 15 inches; silty clay loam
Bt2—15 to 29 inches; silty clay
Bt3—29 to 42 inches; silty clay
Btk—42 to 60 inches; silty clay
Representative profile location: About 2,300 feet north and 1,900 feet west of the southeast corner, Section 27, T. 27 N., R. 5 E.

Foraker

Composition: 35 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope and shoulder
Parent material: Calcareous clayey residuum weathered from shale
Slope: 3 to 5 percent
Runoff: Very high
Depth: Bedrock (paralithic) at 20 to 40 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Impermeable
Drainage class: Moderately well drained
Available water capacity: About 4.3 inches
Depth to the top of the seasonal high water table: 0.0 to 2.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R076XY010OK, Claypan Prairie (Eastern) PE 54-62

Typical Profile

A—0 to 6 inches; clay loam
BA—6 to 16 inches; silty clay loam
Bt—16 to 26 inches; silty clay
Bk—26 to 30 inches; silty clay
Cr—30 to 40 inches; bedrock
Representative profile location: About 2,000 feet north and 1,900 feet west of the southeast corner, Section 27, T. 27 N., R. 5 E.

Additional Components

Coyle: 6 percent
Shidler: 6 percent
Steedman: 5 percent
Huska: 3 percent

APPA—Ashport, Port, and Pulaski soils, 0 to 1 percent slopes, frequently flooded

Map Unit Setting

MLRA: 80A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 26 to 40 inches
Mean annual air temperature: 57 to 65 degrees Fahrenheit
Frost-free period: 185 to 240 days

Component Description

Ashport

Composition: 30 percent
Geomorphic setting: Flood plain on river valley
Parent material: Fine-silty alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Moderate
Drainage class: Well drained
Available water capacity: About 11.8 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: Frequent
Ponding: None

Interpretive Groups

Land capability nonirrigated: 5w
Ecological site number and name: R080AY050OK, Loamy Bottomland PE 44-64

Typical Profile

A—0 to 32 inches; silt loam
C—32 to 72 inches; silty clay loam
Representative profile location: About 2,525 feet south and 300 feet east of the northwest corner, Section 33, T. 21 N., R. 1 W., Noble County, Oklahoma.

Port

Composition: 30 percent
Geomorphic setting: Flood plain on valley
Parent material: Calcareous loamy alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Moderate
Drainage class: Well drained
Available water capacity: About 11.8 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: Frequent
Ponding: None

Interpretive Groups

Land capability nonirrigated: 5w
Ecological site number and name: R080AY050OK, Loamy Bottomland PE 44-64

Typical Profile

A—0 to 27 inches; silt loam
Bw—27 to 45 inches; silty clay loam
C—45 to 72 inches; silty clay loam
Representative profile location: About 2,550 feet south and 200 feet east of the northwest corner, Section 33, T. 21 N., R. 1 W., Noble County, Oklahoma.

Pulaski

Composition: 25 percent
Geomorphic setting: Flood plain on river valley
Parent material: Coarse-loamy alluvium
Slope: 0 to 1 percent
Runoff: Negligible
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately rapid
Slowest permeability class within 80 inches: Moderately rapid
Drainage class: Well drained
Available water capacity: About 9.1 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: Frequent
Ponding: None

Interpretive Groups

Land capability nonirrigated: 5w
Ecological site number and name: R084AY050OK, Loamy Bottomland PE 48-64

Typical Profile

A—0 to 7 inches; fine sandy loam
AC—7 to 40 inches; fine sandy loam
C—40 to 64 inches; stratified loamy fine sand to loam
Representative profile location: About 2,550 feet south and 400 feet east of the northwest corner, Section 33, T. 21 N., R. 1 W., Noble County, Oklahoma.

Additional Components

Easpur: 5 percent
Tribbey: 5 percent
Yahola: 5 percent

BBgC—Bartlesville-Bigheart complex, 1 to 5 percent slopes, very rocky

Map Unit Setting

MLRA: 84A
Elevation: 700 to 1,300 feet
Mean annual precipitation: 30 to 40 inches
Mean annual air temperature: 57 to 63 degrees Fahrenheit
Frost-free period: 200 to 220 days

Component Description

Bartlesville

Composition: 57 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Summit and backslope
Position on landform: Interfluve, head slope, side slope
Parent material: Loamy residuum weathered from sandstone
Slope: 1 to 5 percent
Runoff: Low
Depth: Bedrock (paralithic) at 20 to 39 inches
Bedrock (lithic) at 22 to 47 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 5.6 inches
Depth to the top of the seasonal high water table: 2.0 to 2.7 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e
Ecological site number and name: R084AY075OK, Sandy Savannah PE 44-64

Typical Profile

A—0 to 4 inches; fine sandy loam
E—4 to 9 inches; fine sandy loam
Bt1—9 to 15 inches; sandy clay loam
Bt2—15 to 20 inches; sandy clay loam
Bt3—20 to 28 inches; sandy clay loam
Bt4—28 to 36 inches; sandy clay loam
Cr—36 to 41 inches; bedrock
R—41 to 45 inches; bedrock
Representative profile location: 2,300 feet south and 650 feet east of the northwest corner of Section 23, T. 27 N., R. 10 E.

Bigheart

Composition: 23 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Shoulder
Position on landform: Side slope, nose slope
Parent material: Residuum weathered from sandstone
Slope: 1 to 5 percent
Runoff: Medium
Depth: Bedrock (lithic) at 10 to 20 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately slow
Slowest permeability class within 80 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 1.7 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 4s
Ecological site number and name: R084AY075OK, Sandy Savannah PE 44-64

Typical Profile

A—0 to 5 inches; fine sandy loam
Bw1—5 to 11 inches; fine sandy loam
Bw2—11 to 15 inches; fine sandy loam
R—15 to 39 inches; bedrock
Representative profile location: About 2,350 feet south and 1,100 feet east of the northwest corner of Section 23, T. 27 N., R. 10 E.

Additional Components

Niotaze: 9 percent
Rock outcrop: 5 percent
Bates: 4 percent
Prue: 2 percent

BNRD—Bigheart-Niotaze-Rock outcrop complex, 1 to 8 percent slopes

Map Unit Setting (fig. 7)

MLRA: 84A
Elevation: 700 to 1,500 feet
Mean annual precipitation: 32 to 48 inches
Mean annual air temperature: 55 to 68 degrees Fahrenheit
Frost-free period: 170 to 235 days

Component Description

Bigheart

Composition: 42 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Shoulder

Figure 7.—Mixture of forest and prairie vegetation on an area of Bigheart-Niotaze-Rock outcrop Complex, 1 to 8 percent slopes. Note exposed bedrock in the foreground.

Position on landform: Side slope, nose slope
Parent material: Residuum weathered from sandstone
Slope: 1 to 8 percent
Runoff: High
Depth: Bedrock (lithic) at 10 to 20 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately slow
Slowest permeability class within 80 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 1.7 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 4e
Ecological site number and name: R084AY075OK, Sandy Savannah PE 44-64

Typical Profile

A—0 to 5 inches; fine sandy loam
Bw1—5 to 11 inches; fine sandy loam
Bw2—11 to 15 inches; fine sandy loam
R—15 to 39 inches; bedrock
Representative profile location: About 3,000 feet north and 400 feet east of the southwest corner of Section 24, T. 20 N., R. 11 E.

Niotaze

Composition: 22 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Loamy colluvium derived from sandstone over clayey residuum weathered from shale
Slope: 1 to 8 percent
Runoff: Very high
Depth: Bedrock (densic) at 20 to 40 inches
Bedrock (paralithic) at 31 to 79 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Slow
Drainage class: Somewhat poorly drained
Available water capacity: About 4.0 inches
Depth to the top of the seasonal high water table: 1.0 to 2.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 4e
Ecological site number and name: R084AY075OK, Sandy Savannah PE 44-64

Typical Profile

A—0 to 3 inches; fine sandy loam
E—3 to 10 inches; fine sandy loam
2Bt—10 to 18 inches; silty clay
2BCt—18 to 28 inches; silty clay
2Cd—28 to 39 inches; silty clay
2Cr—39 to 43 inches; bedrock
Representative profile location: About 2,500 feet north and 400 feet east of the southwest corner of Section 24, T. 20 N., R. 11 E.

Rock outcrop

Composition: 13 percent
Geomorphic setting: Drainageway on upland
Position on hillslope: Backslope
Parent material: Sandstone
Slope: 1 to 5 percent
Runoff: Very high
Depth: Bedrock (lithic) at 0 inches
Slowest permeability class within 80 inches: Impermeable
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 8s
Ecological site number and name: None assigned

Typical Profile

R—0 to 80 inches; bedrock
Representative profile location: About 500 feet east and 300 feet north of the southwest corner of Section 27, T. 27 N., R. 11 E.

Additional Components

Bates: 3 percent
Coweta: 3 percent
Steedman: 2 percent

CUEE—Coweta-Urban Land-Eram complex, 3 to 12 percent slopes

Map Unit Setting

MLRA: 112
Elevation: 500 to 2,000 feet
Mean annual precipitation: 22 to 46 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 185 to 230 days

Component Description

Coweta

Composition: 30 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Summit and backslope
Parent material: Loamy residuum weathered from sandstone and shale
Slope: 3 to 12 percent
Runoff: High
Depth: Bedrock (paralithic) at 10 to 20 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 2.5 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 6e
Ecological site number and name: None assigned

Typical Profile

A—0 to 6 inches; loam
Bw—6 to 17 inches; gravelly loam
Cr—17 to 31 inches; bedrock
Representative profile location: About 3,500 feet north and 3,300 feet west of the southeast corner of Section 22, T. 20 N., R. 12 E.

Urban Land

Composition: 30 percent
Geomorphic setting: Urban land
Slope: 3 to 12 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Slow
Depth to the top of the seasonal high water table: Greater than 6 feet

Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 8
Ecological site number and name: None assigned

Typical Profile

C—0 to 60 inches; variable
Representative profile location: About 3,550 feet north and 3,300 feet west of the southeast corner of Section 22, T. 20 N., R. 12 E.

Eram

Composition: 20 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Footslope and backslope
Parent material: Clayey residuum weathered from sandstone and shale
Slope: 3 to 12 percent
Runoff: Very high
Depth: Bedrock (paralithic) at 20 to 40 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Impermeable
Drainage class: Moderately well drained
Available water capacity: About 5.8 inches
Depth to the top of the seasonal high water table: 1.0 to 2.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 6e
Ecological site number and name: None assigned

Typical Profile

A—0 to 14 inches; silty clay loam
Bt—14 to 25 inches; silty clay loam
BC—25 to 34 inches; silty clay loam
Cr—34 to 40 inches; bedrock
Representative profile location: About 3,450 feet north and 3,300 feet west of the southeast corner of Section 22, T. 20 N., R. 12 E.

Additional Components

Bates: 10 percent
Dennis: 5 percent
Okemah: 5 percent

DAM—Large Dam

Map Unit Setting

MLRA: 84A
Elevation: 700 to 2,000 feet
Mean annual precipitation: 22 to 40 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 185 to 230 days

Component Description

Dam

Composition: 100 percent
Geomorphic setting: Artificial levee
Parent material: Mine spoil or earthy fill
Slope: 0 to 45 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class within 80 inches: Slow
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 8
Ecological site number and name: None assigned

Typical Profile

C—0 to 80 inches; variable
Representative profile location: About 2,800 feet west and 1,000 feet north of the southeast corner of Section 25, T. 26 N., R. 8 E.

FakD—Foraker clay loam, 5 to 8 percent slopes

Map Unit Setting

MLRA: 76
Elevation: 700 to 1,500 feet
Mean annual precipitation: 31 to 44 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 220 days

Component Description

Foraker

Composition: 90 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Calcareous clayey residuum weathered from shale
Slope: 5 to 8 percent
Runoff: Very high
Depth: Bedrock (paralithic) at 20 to 40 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Impermeable
Drainage class: Moderately well drained
Available water capacity: About 4.4 inches
Depth to the top of the seasonal high water table: 0.0 to 2.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 4e
Ecological site number and name: R076XY010OK, Claypan Prairie (Eastern) PE 54-62

Typical Profile

A—0 to 9 inches; clay loam
BA—9 to 18 inches; silty clay loam
Bt—18 to 26 inches; silty clay
Bk—26 to 30 inches; silty clay
Cr—30 to 40 inches; bedrock
Representative profile location: About 4,300 feet north and 2,300 feet west of the southeast corner, Section 15, T. 27 N., R. 5 E.

Additional Components

Apperson: 5 percent
Shidler: 5 percent

KaUD—Kamie-Urban Land complex, 1 to 8 percent slopes

Map Unit Setting

MLRA: 118B
Elevation: 500 to 2,000 feet
Mean annual precipitation: 22 to 51 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 185 to 230 days

Component Description

Kamie

Composition: 62 percent
Geomorphic setting: Terrace on upland
Geomorphic position: Riser
Parent material: Loamy and sandy alluvium
Slope: 1 to 8 percent
Runoff: Medium
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderate
Slowest permeability class within 80 inches: Moderate
Drainage class: Well drained
Available water capacity: About 8.1 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 4e
Ecological site number and name: None assigned

Typical Profile

A—0 to 8 inches; loamy fine sand
E—8 to 18 inches; loamy fine sand
Bt—18 to 54 inches; sandy clay loam
BC—54 to 64 inches; sandy clay loam
Representative profile location: About 1,860 feet north and 750 feet east of the southwest corner of Section 34, T. 20 N., R. 12 E.

Urban Land

Composition: 38 percent
Geomorphic setting: Urban land
Slope: 1 to 8 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Slow
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 8
Ecological site number and name: None assigned

Typical Profile

C—0 to 60 inches; variable
Representative profile location: About 1,860 feet north and 900 feet east of the southwest corner of Section 34, T. 20 N., R. 12 E.

M-W—Miscellaneous Water

Map Unit Setting (fig. 8)

MLRA: 76
Elevation: 250 to 4,000 feet
Mean annual precipitation: 22 to 48 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 240 days

Component Description

Water

Composition: 100 percent
Geomorphic setting: Sewage lagoon

NBRE—Niotaze-Bigheart-Rock outcrop complex, 3 to 15 percent slopes, very stony

Map Unit Setting

MLRA: 84A
Elevation: 700 to 1,300 feet
Mean annual precipitation: 30 to 40 inches
Mean annual air temperature: 57 to 63 degrees Fahrenheit
Frost-free period: 200 to 220 days

Component Description

Niotaze

Composition: 50 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Loamy colluvium derived from sandstone over clayey residuum weathered from shale

Figure 8.—Rangeland on Niotaze-Bigheart-Rock outcrop complex, 3 to 15 percent slopes, very stony and Bartlesville-Bigheart complex, 1 to 5 percent slopes, very rocky.

Slope: 3 to 15 percent
Runoff: Very high
Depth: Bedrock (densic) at 20 to 40 inches
Bedrock (paralithic) at 31 to 79 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Slow
Drainage class: Somewhat poorly drained
Available water capacity: About 4.0 inches
Depth to the top of the seasonal high water table: 1.0 to 2.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 6e
Ecological site number and name: R084AY075OK, Sandy Savannah PE 44-64

Typical Profile

A—0 to 3 inches; very stony fine sandy loam
E—3 to 10 inches; very stony fine sandy loam
2Bt—10 to 18 inches; silty clay
2BCt—18 to 28 inches; silty clay
2Cd—28 to 39 inches; silty clay
2Cr—39 to 43 inches; bedrock
Representative profile location: About 900 feet south and 1,100 feet west of the northeast corner, Section 26, T. 20 N., R. 11 E.

Bigheart

Composition: 23 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Shoulder
Position on landform: Nose slope, side slope
Parent material: Residuum weathered from sandstone
Slope: 1 to 8 percent
Runoff: High
Depth: Bedrock (lithic) at 10 to 20 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately slow
Slowest permeability class within 80 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 1.7 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 4e
Ecological site number and name: R084AY075OK, Sandy Savannah PE 44-64

Typical Profile

A—0 to 5 inches; fine sandy loam
Bw1—5 to 11 inches; fine sandy loam
Bw2—11 to 15 inches; fine sandy loam
R—15 to 39 inches; bedrock
Representative profile location: About 1,100 feet south and 1,400 feet west of the northeast corner, Section 26, T. 20 N., R. 11 E.

Rock outcrop

Composition: 20 percent
Geomorphic setting: Drainageway on upland
Position on hillslope: Backslope
Parent material: Sandstone
Slope: 1 to 5 percent
Runoff: Very high
Depth: Bedrock (lithic) at 0 inches
Slowest permeability class within 80 inches: Impermeable
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 8s
Ecological site number and name: None assigned

Typical Profile

R—0 to 80 inches; bedrock
Representative profile location: About 500 feet south and 800 feet west of the northeast corner, Section 26, T. 20 N., R. 11 E.

Additional Components

Talihina: 5 percent
Bartlesville: 2 percent

NBRF—Niotaze-Bigheart-Rock outcrop complex, 15 to 25 percent slopes, extremely stony

Map Unit Setting (fig. 9)

MLRA: 84A
Elevation: 700 to 1,300 feet
Mean annual precipitation: 30 to 40 inches
Mean annual air temperature: 57 to 63 degrees Fahrenheit
Frost-free period: 200 to 220 days

Component Description

Niotaze

Composition: 47 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Loamy colluvium derived from sandstone over clayey residuum weathered from shale
Slope: 15 to 25 percent
Runoff: Very high

Figure 9.—Profile of Niotaze soil series in the Niotaze-Bigheart-Rock outcrop complex, 15 to 25 percent slopes, extremely stony.

Depth: Bedrock (densic) at 20 to 40 inches
Bedrock (paralithic) at 31 to 79 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Slow
Drainage class: Somewhat poorly drained
Available water capacity: About 4.0 inches
Depth to the top of the seasonal high water table: 1.0 to 2.0 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 7e
Ecological site number and name: R084AY075OK, Sandy Savannah PE 44-64

Typical Profile

A—0 to 3 inches; very stony fine sandy loam
E—3 to 10 inches; very stony fine sandy loam
2Bt—10 to 18 inches; silty clay
2BCt—18 to 28 inches; silty clay
2Cd—28 to 39 inches; silty clay
2Cr—39 to 43 inches; bedrock
Representative profile location: About 2,000 feet east and 500 feet south of the northwest corner, Section 2, T. 20 N., R. 11 E.

Bigheart

Composition: 24 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Shoulder
Position on landform: Nose slope and side slope
Parent material: Residuum weathered from sandstone
Slope: 3 to 8 percent
Runoff: High
Depth: Bedrock (lithic) at 10 to 20 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately slow
Slowest permeability class within 80 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 1.7 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 4e
Ecological site number and name: R084AY075OK, Sandy Savannah PE 44-64

Typical Profile

A—0 to 5 inches; fine sandy loam
Bw1—5 to 11 inches; fine sandy loam
Bw2—11 to 15 inches; fine sandy loam
R—15 to 39 inches; bedrock
Representative profile location: About 1,700 feet east and 1,000 feet south of the northwest corner, Section 2, T. 20 N., R. 11 E.

Rock outcrop

Composition: 18 percent
Geomorphic setting: Drainageway on upland
Position on hillslope: Backslope
Parent material: Sandstone
Slope: 1 to 5 percent
Runoff: Very high
Depth: Bedrock (lithic) at 0 inches
Slowest permeability class within 80 inches: Impermeable
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 8s
Ecological site number and name: None assigned

Typical Profile

R—0 to 80 inches; bedrock
Representative profile location: About 1,600 feet east and 1,100 feet south of the northwest corner, Section 2, T. 20 N., R. 11 E.

Additional Components

Bartlesville: 11 percent

NBRG—Niotaze-Bigheart-Rock outcrop complex, 25 to 45 percent slopes, rubbly

Map Unit Setting (fig. 10)

MLRA: 84A
Elevation: 700 to 1,300 feet
Mean annual precipitation: 30 to 40 inches
Mean annual air temperature: 57 to 63 degrees Fahrenheit
Frost-free period: 200 to 220 days

Component Description

Niotaze

Composition: 53 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Backslope
Parent material: Loamy colluvium derived from sandstone over clayey residuum weathered from shale
Slope: 25 to 45 percent
Runoff: Very high
Depth: Bedrock (densic) at 20 to 40 inches
Bedrock (paralithic) at 31 to 79 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Slow
Drainage class: Somewhat poorly drained
Available water capacity: About 4.0 inches
Depth to the top of the seasonal high water table: 1.0 to 2.0 feet
Flooding: None
Ponding: None

Figure 10.—Boulders on the surface of Niotaze-Bigheart-Rock outcrop complex, 25 to 45 percent slopes, rubbly.

Interpretive Groups

Land capability nonirrigated: 7e
Ecological site number and name: R084AY075OK, Sandy Savannah PE 44-64

Typical Profile

A—0 to 3 inches; very bouldery fine sandy loam
E—3 to 10 inches; very bouldery fine sandy loam
2Bt—10 to 18 inches; silty clay
2BCt—18 to 28 inches; silty clay
2Cd—28 to 39 inches; silty clay
2Cr—39 to 43 inches; bedrock
Representative profile location: About 1,500 feet north and 800 feet west of the southeast corner, Section 15, T. 25 N., R. 12 E.

Bigheart

Composition: 27 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Shoulder
Position on landform: Side slope and nose slope
Parent material: Residuum weathered from sandstone
Slope: 1 to 8 percent
Runoff: High
Depth: Bedrock (lithic) at 10 to 20 inches

Slowest permeability class of the soil to 60 inches or above a restrictive layer: Moderately slow
Slowest permeability class within 80 inches: Moderately slow
Drainage class: Well drained
Available water capacity: About 1.7 inches
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 4e
Ecological site number and name: R084AY075OK, Sandy Savannah PE 44-64

Typical Profile

A—0 to 5 inches; fine sandy loam
Bw1—5 to 11 inches; fine sandy loam
Bw2—11 to 15 inches; fine sandy loam
R—15 to 39 inches; bedrock
Representative profile location: About 1,300 feet north and 900 feet west of the southeast corner, Section 15, T. 25 N., R. 12 E.

Rock outcrop

Composition: 20 percent
Geomorphic setting: Drainageway on upland
Position on hillslope: Backslope
Parent material: Sandstone
Slope: 1 to 5 percent
Runoff: Very high
Depth: Bedrock (lithic) at 0 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Blank
Slowest permeability class within 80 inches: Impermeable
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 8s
Ecological site number and name: None assigned

Typical Profile

R—0 to 80 inches; bedrock
Representative profile location: About 1,200 feet north and 900 feet west of the southeast corner, Section 15, T. 25 N., R. 12 E.

UrDC—Urban Land-Dennis complex, 0 to 5 percent slopes

Map Unit Setting

MLRA: 112
Elevation: 500 to 2,000 feet
Mean annual precipitation: 22 to 46 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 185 to 230 days

Component Description

Urban Land
Composition: 55 percent
Geomorphic setting: Urban land
Slope: 0 to 5 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Slow
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 8
Ecological site number and name: None assigned

Typical Profile

C—0 to 60 inches; variable
Representative profile location: About 1,600 feet north and 600 feet west of the southeast corner, Section 27, T. 20 N., R. 12 E.

Dennis

Composition: 35 percent
Geomorphic setting: Hillslope on hill on upland
Position on hillslope: Shoulder and backslope
Parent material: Clayey residuum weathered from shale
Slope: 0 to 5 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Slow
Drainage class: Somewhat poorly drained
Available water capacity: About 10.4 inches
Depth to the top of the seasonal high water table: 1.0 to 2.5 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 3e

Typical Profile

A—0 to 8 inches; silt loam
BA—8 to 14 inches; silty clay loam
Bt1—14 to 24 inches; silty clay
Bt2—24 to 38 inches; silty clay
BC—38 to 78 inches; clay
Representative profile location: About 1,700 feet north and 600 feet west of the southeast corner, Section 27, T. 20 N., R. 12 E.

Additional Components

Okemah: 5 percent
Pharoah: 5 percent

W—Water

Map Unit Setting

MLRA: 80A
Elevation: 250 to 4,000 feet
Mean annual precipitation: 22 to 48 inches
Mean annual air temperature: 57 to 64 degrees Fahrenheit
Frost-free period: 190 to 240 days

Component Description

Water

Composition: 100 percent
Geomorphic setting: Valley

WyUA—Wynona-Urban Land complex, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

MLRA: 112
Elevation: 300 to 2,000 feet
Mean annual precipitation: 22 to 56 inches
Mean annual air temperature: 55 to 68 degrees Fahrenheit
Frost-free period: 185 to 230 days

Component Description

Wynona

Composition: 45 percent
Geomorphic setting: Flood plain on river valley
Parent material: Loamy and silty alluvium
Slope: 0 to 1 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Slow
Drainage class: Somewhat poorly drained
Available water capacity: About 11.0 inches
Depth to the top of the seasonal high water table: 0.0 to 2.0 feet
Flooding: Occasional
Ponding: None

Interpretive Groups

Land capability nonirrigated: 4w
Ecological site number and name: None asssigned

Typical Profile

A1—0 to 10 inches; silty clay loam
A2—10 to 23 inches; silty clay loam
Bg1—23 to 33 inches; silty clay loam
Bg2—33 to 80 inches; silty clay loam
Representative profile location: About 100 feet north and 3,600 feet east of the southwest corner of Section 32, T. 20 N., R. 12 E.

Urban Land

Composition: 40 percent
Geomorphic setting: Urban land
Slope: 0 to 1 percent
Runoff: Very high
Depth: Greater than 60 inches
Slowest permeability class of the soil to 60 inches or above a restrictive layer: Slow
Slowest permeability class within 80 inches: Slow
Depth to the top of the seasonal high water table: Greater than 6 feet
Flooding: None
Ponding: None

Interpretive Groups

Land capability nonirrigated: 8
Ecological site number and name: None assigned

Typical Profile

C—0 to 60 inches; variable
Representative profile location: About 100 feet north and 3,100 feet east of the southwest corner of Section 32, T. 20 N., R. 12 E.

Additional Components

Cleora: 5 percent
Osage: 5 percent
Radley: 5 percent

Use and Management of the Soils

A 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 in predicting soil behavior.

Information developed during a soil survey can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities. 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.

Interpretive ratings help engineers, planners, and others understand how soil properties influence important nonagricultural uses, such as building site development and construction materials. The ratings indicate the most restrictive soil features affecting the suitability of the soils for these uses.

Soils are rated in their natural state. No unusual modification of the soil site or material is made other than that which is considered normal practice for the rated use. Even though soils may have limitations, it is important to remember that engineers and others can modify soil features or can design or adjust the plans for a structure to compensate for most of the limitations. Most of these practices, however, are costly. The final decision in selecting a site for a particular use generally involves weighing the costs of site preparation and maintenance.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use a 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 a 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.

For general and detailed information about managing the map units in this survey, see the information in this section and the soil reports and report descriptions on the Web Soil Survey at http://websoilsurvey.nrcs.usda.gov and the Soil Data Mart at http://soildatamart.nrcs.usda.gov.

Rangeland

Mark Moseley, range conservationist, Natural Resources Conservation Service, Stillwater, helped prepare parts of this section.

Range, grazed forestland, and native pasture provide forage for livestock in the survey area.

Range is defined as land on which the native vegetation (the climax, or natural potential, plant community) is predominantly grasses, grass-like plants, forbs, and

shrubs suitable for grazing and browsing. Range includes natural grasslands, savannahs, many wetlands, some deserts, tundra, and certain shrub and forb communities. Rangeland receives no regular or frequent cultural treatment. The composition and production of the plant community are determined by soil, climate, topography, overstory canopy, and grazing management.

Grazed forestland is defined as land on which the understory includes, as an integral part of the forest plant community, plants that can be grazed without significant impairment of other forest values.

Native pasture is defined as land on which the potential (climax) vegetation is forest but which is used and managed primarily for the production of native forage plants. Native pasture includes cutover forest land and forest land that has been cleared and is managed for native or naturalized forage plants.

Forty-seven percent of Osage County is rangeland and native pastureland. Most range areas within the county are found on gently sloping to steep side slopes and a few narrow very gently sloping to sloping summits that are not economical to cultivate. A few native grass meadows that are managed for hay production are found in the central and north central part of the county. Three distinct rangeland types are present. In the southeastern part of the county most of the soils are loamy and are moderately deep or shallow over sandstone. These soils support an oak savannah that has low productivity because of the shallow rooting depth and low water holding capacity. In the northeastern and western part of the county the soils are loamy and are dominantly moderately deep, with some shallow and deep soils over shale, and shale interbedded with sandstone. These soils support mid- and tall-grasses, and productivity is moderate. In the north-central, central, and south-central part of the county the soils are loamy and are moderately deep, with some shallow and deep soils over sandstone and sandstone interbedded with shale. The soils support mid- and tall-grasses that are moderately productive.

Approximately 75 percent of the annual production on rangeland grows in April, May, and June coinciding with spring rains and moderate temperatures. A secondary growth period generally occurs in September and October coinciding with fall rains and cooling temperatures.

Most of the local ranches and livestock farms are cow-calf operations. There are some pure stocker enterprises and some ranchers that diversify their cow-calf operation with stockers to provide greater flexibility.

Several livestock operations supplement the grazing of native rangeland with introduced grasses such as bermudagrass and plains bluestem. Forage crops are also used. Protein, hay, and small grain crops are used to supplement livestock through winter.

Droughts occur of varying lengths, with short term summer droughts being common. Longer periods of drought, some lasting several months, also happen frequently.

The pre-settlement vegetation evolved with periodic natural fires, droughts, migratory grazing by bison and impact from many other wildlife species. The bison would heavily impact an area and then move to other grazing range sites. However, remnants of the original plant species are still found on most rangeland and progressive grazing management will allow these high quality plants to re-establish without re-seeding.

Early settlement brought continuous grazing and eliminated much of the high-quality vegetation on some range sites. Areas that were once open savannah range sites with a mixture of grasses, forbs, and scattered trees, are now covered with oak, a few mid- and tall-grasses, and low successional grasses and forbs. Some prairie sites are now growing low successional grasses and forbs instead of tall grasses.

The amount of forage presently produced may be less than half of that originally produced. Eastern redcedar has increased significantly on some sites because of the lack of prairie fires.

The table "Rangeland Productivity and Characteristic Plant Communities" is available on the Soil Data Mart at http://soildatamart.nrcs.usda.gov. This table shows, for each soil, the ecological site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. Only those soils that are used as rangeland or are suited to use as rangeland are listed.

An ecological site for rangeland is a distinctive kind of land and vegetation with specific physical characteristics that makes it different from other kinds of land in its ability to produce a distinctive kind and amount of vegetation.

Many different ecological sites are in the survey area. Over historical time, the combination of plants best suited to a particular soil and climate became dominant. If the soil is not excessively disturbed, this group of plants is the natural plant community for the site. Natural 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, ecological sites 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 range plants. Soil reaction, salt content, and a seasonal high water table are also important. The "Electronic Field Office Technical Guide," which is available at http://www.nrcs.usda.gov/technical/efotg/ and through the local offices of the Natural Resources Conservation Service, can provide specific information about ecological sites.

Total production is the amount of vegetation that can be expected to grow annually on well managed rangeland. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruit of woody plants, It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In a normal year, growing conditions are near the historical monthly average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Figure 11 shows a typical growth curve for native vegetation and other forage that represents the percentage of total growth that occurs each month.

Dry weight is the total annual yield per acre of air-dry vegetation. Yields are adjusted to a percent of air-dry moisture content. The relationship of green weight to air-dry weight varies according to such factors as stage of maturity, exposure, amount of shade, recent rains, and unseasonable dry periods.

Characteristic vegetation consists of the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil. The plants are listed by common name. Under composition, the anticipated percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Similarity Index

Similarity index is the comparison from 1 to 100 percent of the present plant community to a vegetative state on an ecological site. The Natural Resources Conservation Service uses similarity index two ways.

The first is to use similarity index to compare the present vegetation on an ecological site to the presumed historic vegetation for that site. This comparison provides a basis to the client for knowing the extent and direction of changes that have taken place between current vegetation and historic vegetation. A similarity index of 70 would suggest that the present plant community contains 70 percent of the presumed historic plant community for that site.

The second is to use similarity index as a measure of how near the current plant community is to the landowners goal for the land. The management goal for rangeland is not necessarily a similarity index of 100 as compared to the historic plant community. Therefore, the similarity index can represent the percentage of the plant community that resembles a desired plant community.

Abnormal disturbances that change the natural plant community include repeated overuse by livestock, excessive burning, erosion, and cultivation. Grazing animals select the most palatable plants. These plants will eventually die if they are continually grazed at a severity that does not allow for recovery. A very severe disturbance can completely destroy the natural community. Under these conditions, the less desirable plants, such as annuals and weed-like plants, can increase. If the plant community and the soils have not deteriorated significantly, it eventually can return to predominantly natural plants if proper range management is applied.

Knowledge of the ecological site is necessary as a basis for planning and applying the management needed to maintain or improve the desired plant community for selected uses (fig. 11). Such information is needed to support management objectives, planned grazing systems, stocking rates, suitable wildlife management practices, potential for recreational uses, and condition of watersheds.

Rangeland Management

Rangeland management requires knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the similarity index.

Effective range management conserves rainfall, enhances water quality, reduces the hazard of downstream flooding, improves yields, provides forage for livestock and

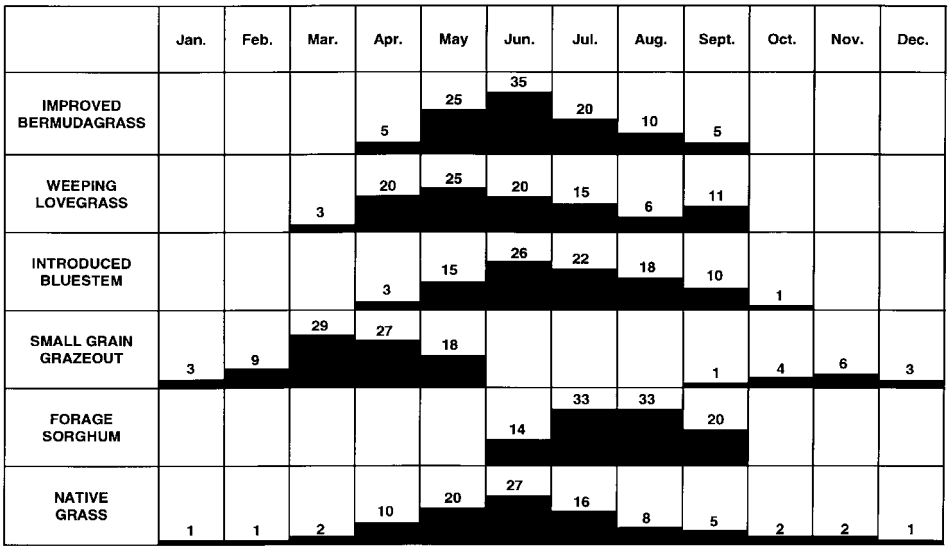

Figure 11.—Forage calendar showing the estimated monthly percentage of growth on an annual basis of forage production.

wildlife, enhances recreational opportunities, and protects the soil. The main management concern is recognizing important changes in the plant cover or the range trend which occur gradually and may be overlooked.

Each range manager should evaluate the type of plant community that best supports the range and then apply management and ecological principles to achieve the goals. The desired plant community should be within the capabilities of the land.

The primary range management practices used in Osage County include prescribed grazing, stock-water developments, and fences. If undesirable plants become dominant, range seeding, brush management, or prescribed burning are commonly used.

Range management includes four major considerations:

1. Grazing distribution is achieved by managing livestock to graze all parts of the grazing unit equally.

2. Selective grazing occurs because animals graze preferred plants to balance their diets. If selective grazing occurs repeatedly, the preferred plants are damaged.

3. A proper stocking rate is achieved by balancing animal numbers with forage production.

4. Rest periods occur during which time-grazed plants are given enough rest to recover and to maintain growth.

It is important to remember that forage production is controlled by rainfall while composition is determined by grazing management.

Setting the stocking rate is not an exact science because there are influences from grazing management systems, season of use, mix of livestock, and seasonal forage production. Some rules of thumb, however, can be helpful. To maintain a nutritional cover of plants, about 50 percent, of the annual growth of the key or most important grazing plants, should remain at the end of the grazing season. Plants can be removed not only through grazing by livestock but also through grazing by rodents, insects, and wildlife and through the deterioration caused by climatic variations. Because of these factors, a safe initial stocking rate for livestock should be calculated on the basis of 25 percent of the total annual growth, by weight, of the vegetation.

For example, production on the loamy prairie range site with a similarity index above 70 to the historic plant community for an average season could be 3,500 pounds per acre of air-dry grasses, forbs, and limited woody species. Twenty-five percent of this is 875 pounds per acre.

A 1,000-pound cow and her calf is equivalent to one animal unit (AU) and will consume about 2.6 percent of her body weight (26 pounds) of forage per day. So, in one month, an animal unit will consume 790 pounds of native vegetation, depending on the quality and stage of growth of the plants (26 pounds per day times 365 days per year divided by 12 months per year).

Dividing 875 pounds (forage allocation) by 26 pounds (forage required per day for one animal unit) suggests that 1 acre of loamy prairie range site with a similarity index of 70 will feed one cow for 33.6 days. To convert forage available from 1 acre to animal unit months (AUM), the available forage (875 pounds) is divided by the amount required to feed an animal unit for 1 month (790 pounds). One acre will provide 1.1 AUM of grazing. Therefore, 10.9 acres will feed one cow for 12 months in this example. Another approach is to calculate the annual forage needs of an animal unit (790 pounds per month times 12 months equals 9,490 pounds). Dividing the 875 pounds of usable forage per acre into the 9,490 pounds needed by the cow reveals that approximately 10.9 acres is needed for one cow annually. Stocking rate calculation should be adjusted for animal size, grazing system, and grazing season.

More information about planning a grazing program is available from the local office of the Natural Resources Conservation Service.

Ecological Site Descriptions

Thirty ecological sites are recognized in Osage County. The ecological site identifier has eleven characters. The 'R' indicates an ecological site. The next four characters identify the major land resource area, the sixth character identifies the major land resource unit subdivision, the next three characters identify the individual ecological site number, and the final two characters identify the state. This is followed by the proper name for the ecological site. The following descriptions list the plants that are characteristic of the sites. Detailed ecological site descriptions are available at the local office of the Natural Resources Conservation Service.

R076XY010OK, Claypan Prairie (Eastern) PE 54-62. This site is in areas of level to moderately sloping soils on uplands. The soils have a subsoil of dense clay. The historic climax vegetation includes little bluestem, big bluestem, switchgrass, indiangrass, meadow dropseed, tall dropseed, and Scribner panicum. Legumes include slimflower scurfpea and wild indigo. Forbs include gayfeathers, heath aster, and ashy sunflower.

R076XY050OK, Loamy Bottomland PE 54-62. This site is in areas of very deep, loamy soils on bottomlands. The historic climax vegetation includes big bluestem, indiangrass, switchgrass, eastern gamagrass, Florida paspalum, broadleaf uniola, prairie cordgrass, beaked panicum, Canada wildrye, and Virginia wildrye. Forbs include goldenrod, wholeleaf rosin, leadplant, blacksamson, and Maximilian sunflower. Woody species include American elm, green ash, pecan, poison ivy, and oak species.

R076XY098OK, Very Shallow PE 54-62. This site is in areas of nearly level to gently sloping, very shallow soils. The historic climax vegetation is predominantly blue grama, hairy grama, and sideoats grama. Big bluestem, little bluestem, indiangrass, and switchgrass are in crevices of the deeper soils. Forbs include cobaea beardtongue, willowleaf sunflower, and dotted gayfeather.

R080AY010OK, Claypan Prairie (North) PE 44-64. This site is on uplands in areas of level to gently sloping, deep, loamy soils that have a dense, clayey subsoil. The historic climax vegetation includes little bluestem, big bluestem, switchgrass, dropseed species, indiangrass, Canada wildrye, sideoats grama, and eastern gamagrass. Forbs include Maximilian sunflower, compassplant, western ragweed, Louisiana sagewort, false-boneset, rainlily, Carolina larkspur, purple coneflower, and daisy fleabane. Legumes include various prairie clover species, Illinois bundleflower, littleleaf sensitive-briar, and slimleaf scurfpea. Shrubs and vines include leadplant, ceanothus, smooth sumac, and buckbrush.

R080AY050OK, Loamy Bottomland PE 44-64. This site is on flood plains or terraces. The soils are nearly level to very gently sloping, loamy, and very deep. They are subject to stream overflow and runoff from hillsides. The historic climax vegetation includes big bluestem, switchgrass, indiangrass, eastern gamagrass, Florida paspalum, and little bluestem. Cool-season grasses include Canada wildrye, Virginia wildrye, Texas bluegrass, and western wheatgrass. Forbs include Maximilian sunflower, stiff sunflower, and Jerusalem artichoke. Woody species include elm, willow, pecan, oak, cottonwood, green ash, and coralberry.

R080AY056OK, Loamy Prairie PE 44-64. This site is in areas of deep, loamy soils on uplands. The historic climax vegetation includes little bluestem, big bluestem, indiangrass, switchgrass, Canada wildrye, sideoats grama, and blue grama. Legumes include leadplant, wild indigo, scurfpea, and prairie acacia. Woody species are rare.

R080AY068OK, Sandy Bottomland PE 44-64. This site is in areas of sandy, droughty soils that are subject to wind erosion and are on first and second bottoms. The historic climax vegetation includes sand bluestem, indiangrass, little bluestem, and switchgrass. Woody species include willow and cottonwood.

R080AY073OK, Sandy Prairie PE 44-64. This site is in areas of deep, moderately sandy soils on uplands that have hummocky or gently rolling to steeply rolling topography. The historic climax vegetation includes sand bluestem, little bluestem, indiangrass, switchgrass, sideoats grama, and blue grama. Woody species include skunkbush.

R080AY083OK, Shallow Prairie PE 44-64. This site is in areas of gently sloping to moderately steep, shallow soils in prairies. Rock outcrop is common on the surface and typically covers 15 to 20 percent of the area. The historic climax vegetation includes little bluestem, big bluestem, indiangrass, switchgrass, dropseed species, and Scribner panicum. Legumes include catclaw sensitive-brier, Illinois bundleflower, Virginia tephrosia, leadplant, and white, purple, and roundhead prairie clovers.

R080AY090OK, Meadow PE 44-64. This site is on level bottomlands, typically along small streams that drain sandy areas. The historic climax vegetation includes bushy bluestem, sedges, rushes, switchgrass, indiangrass, big bluestem, beaked panicum, little bluestem, broomsedge bluestem, and indigobush. Woody species include willow and cottonwood.

R080AY091OK, Slickspot PE 44-64. This site is on uplands in areas of level to gently sloping, deep, loamy soils that have a clayey, blocky, alkali subsoil. The historic climax vegetation includes alkali sacaton, switchgrass, western wheatgrass, tall dropseed, white tridens, blue grama, dropseed, gummy lovegrass, fall witchgrass, yellow neptunia, mourning lovegrass, and purple threeawn. Forbs include dotted gayfeather, curly cup gumweed, goldenweed, and hairy goldenaster.

R080AY097OK, Subirrigated (Saline) PE 44-64. This site is on low terraces or flood plains. The soils are deep, level, loamy, and strongly affected by salinity. The historic climax vegetation includes switchgrass, western wheatgrass, vine mesquite, prairie cordgrass, alkali sacaton, tall dropseed, and inland saltgrass. Forbs include sunflower. Woody species include willow, cottonwood, and baccharis.

R080AY810OK, Eroded Claypan Prairie (North) PE 44-64. This site is in areas where part or all of the A horizon has been removed by erosion. The soil integrity has been changed. Because of the past erosion and the probability of ongoing erosion, the plant community can be determined only by onsite inspection. The productivity of this site has not been determined. See R080AY010OK, Claypan Prairie (North) PE 44-64, for the historic climax vegetation on the parent site.

R080AY856OK, Eroded Loamy Prairie PE 44-64. This site is in areas where part or all of the A horizon has been removed by erosion. The soil integrity has been changed. Because of the past erosion and the probability of ongoing erosion, the plant community can be determined only by onsite inspection. The productivity of this site has not been determined. See R080AY056OK, Loamy Prairie PE 44-64, for the historic climax vegetation on the parent site.

R080AY873OK, Eroded Sandy Prairie PE 44-64. This site is in areas where part or all of the A horizon has been removed by erosion. The soil integrity has been changed. Because of the past erosion and the probability of ongoing erosion, the plant community can be determined only by onsite inspection. The productivity of this site has not been determined. See R080AY073OK, Sandy Prairie PE 44-64, for the historic climax vegetation on the parent site.

R084AY018OK, Deep Sand Savannah PE 48-64. This site is in areas of nearly level to moderately steep, coarse textured soils on uplands. The historic climax vegetation includes big bluestem, sand bluestem, indiangrass, little bluestem, switchgrass, broadleaf uniola, beaked panicum, purpletop, tall dropseed, Scribner panicum, and sand lovegrass. Woody species include post oak, blackjack oak, hickory, winged elm, and persimmon.

R084AY050OK, Loamy Bottomland PE 48-64. This site is in areas of deep, loamy soils on bottomlands that are subject to occasional or frequent overflow from streams and runoff from hillsides. The historic climax vegetation includes big

bluestem, switchgrass, indiangrass, eastern gamagrass, Florida paspalum, Canada wildrye, Virginia wildrye, Texas bluegrass, and western wheatgrass. Forbs include Maximilian sunflower, stiff sunflower, and Jerusalem artichoke. Woody species include elm, willow, pecan, oak, cottonwood, green ash, and coralberry.

R084AY075OK, Sandy Savannah PE 44-64. This site is in areas of gently sloping to steep fine sandy loams that support mid grasses and tall grasses mixed with an overstory of oak. The historic climax vegetation includes sand bluestem, little bluestem, indiangrass, switchgrass, and sideoats grama. Forbs include Maximilian sunflower, ashy sunflower, stiff sunflower, compassplant, daisy fleabane, goldenrods, and numerous others in trace amounts. Woody species include post oak, blackjack oak and hickory.

R084AY079OK, Savannah Breaks PE 48-64. This site is in areas of savannah rangeland that have steep, rocky slopes. The historic climax vegetation includes big bluestem, little bluestem, indiangrass, switchgrass, hairy grama, Scribner panicum, rock muhly, hairawn muhly, and nimblewill muhly. Woody species include post oak and blackjack oak.

R084AY089OK, Shallow Savannah PE 48-64. This site is in rolling savannahs that have an overstory of post oak and blackjack oak. The historic climax vegetation includes little bluestem, big bluestem, switchgrass, indiangrass, Canada wildrye, hairy grama, tall dropseed, and meadow dropseed. Legumes include lespedeza, roundhead lespedeza, slender lespedeza, prairie clover, and Virginia tephrosia. Woody species include post oak and blackjack oak.

R084AY095OK, Subirrigated PE 48-64. This site is on uplands and flood plains. The soils are deep, nearly level and very gently sloping, and sandy. They have a high water table. The historic climax vegetation includes switchgrass, big bluestem, indiangrass, and eastern gamagrass. Woody species include willow and cottonwood.

R084AY818OK, Eroded Deep Sand Savannah PE 48-64. This site is in areas where part or all of the A horizon has been removed by erosion. The soil integrity has been changed. Because of the past erosion and the probability of ongoing erosion, the plant community can be determined only by onsite inspection. The productivity of this site has not been determined. See R084AY018OK, Deep Sand Savannah PE 48-64, for the historic climax vegetation on the parent site.

R112XY010OK, Claypan Prairie PE 62-80. This site is in areas of nearly level to moderately sloping soils on uplands. The historic climax vegetation includes little bluestem, big bluestem, switchgrass, indiangrass, meadow dropseed, tall dropseed, and Scribner panicum. Legumes include prairie scurfpea, Illinois bundleflower, and leadplant. Forbs include blacksamson, gayfeathers, heath aster, ashy sunflower, and wild indigo. Woody species include poison ivy.

R112XY045OK, Heavy Bottomland PE 62-80. This site is on bottomlands that are often subject to overflow. The soils are deep clay. The historic climax vegetation includes big bluestem, indiangrass, eastern gamagrass, prairie cordgrass, switchgrass, Canada wildrye, Virginia wildrye, meadow dropseed, and broomsedge bluestem. Forbs include ironweed and white snakeroot. Woody species include elm, ash, oak, walnut, and pecan.

R112XY050OK, Loamy Bottomland PE 62-80. This site is on bottomlands. The soils are deep and loamy. The historic climax vegetation includes big bluestem, indiangrass, switchgrass, eastern gamagrass, prairie cordgrass, beaked panicum, Canada wildrye, Virginia wildrye, and switchcane. Legumes include leadplant and Illinois bundleflower. Forbs include goldenrod, wholeleaf rosinweed, blacksamson, and Maximilian sunflower. Woody species include American elm, green ash, pecan, and oak.

R112XY056OK, Loamy Prairie PE 62-80. This site is in areas of nearly level to gently sloping soils. The historic climax vegetation includes big bluestem, little

bluestem, indiangrass, switchgrass, tall dropseed, sideoats grama, jointtail, and purpletop.

R112XY059OK, Loamy Prairie (Northeast) PE 62-80. This site is on uplands. The soils are nearly level to moderately steep and are on convex slopes of low ridges and on the side slopes of moderately steep ridges in broad valleys. The historic climax vegetation includes big bluestem, little bluestem, indiangrass, switchgrass, jointtail, purpletop, and dropseed species.

R112XY083OK, Shallow Prairie (Central) PE 62-80. This site is in areas of rocky sandstone and limestone slopes and ridges in the Bluestem Hills and Cherokee Prairies major land resource areas. The historic climax vegetation includes little bluestem, big bluestem, indiangrass, switchgrass, Canada wildrye, sideoats grama, tall dropseed, meadow dropseed, blue grama, and buffalograss. Woody species include coralberry, hackberry, winged elm, and persimmon.

R112XY091OK, Slickspot PE 62-80. This site is in crusted, alkali spots on uplands. The historic climax vegetation includes alkali sacaton, switchgrass, white tridens, tall dropseed, blue grama, dropseed, purple threeawn, mourning lovegrass, gummy lovegrass, and fall witchgrass. Legumes include yellow neptunia. Forbs include narrowleaf rhombopod, pricklypear, curlycup gumweed, wax goldenweed, and hairy goldenaster.

R112XY856OK, Eroded Loamy Prairie PE 62-80. This site is in areas where part or all of the A horizon has been removed by erosion. The soil integrity has been changed. Because of the past erosion and the probability of ongoing erosion, the plant community can be determined only by onsite inspection. The productivity of this site has not been determined. See R112XY056OK, Loamy Prairie PE 62-80, R112XY059OK or Loamy Prairie (northeast) PE 62-80 for the historic climax vegetation on the parent site.

Formation and Classification of the Soils

This section summarizes the major factors of soil formation and describes the system of soil classification. The classification of each soil in the survey area is shown in Table 5 "Classification of the Soils." The Official Soil Series Descriptions, including the range of important characteristics of the soils, for the series in this survey area are online at http://soils.usda.gov/technical/classification/osd/. Characteristics of the soil and the material in which it formed are identified in each soil series. A pedon, a small three-dimensional area of soil, which is typical of the series is described. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (Soil Survey Staff, 1999).

Formation of the Soils

Soil is produced by the action of soil-forming processes on materials deposited or accumulated by geologic agencies. The characteristics of the soil at any given point are determined by the physical and mineralogical composition of the parent materials; the climate under which the soil material has accumulated and existed since accumulation; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time the forces of soil development have acted on the soil material.

Climate and vegetation are the active factors of soil formation. They act on parent material that has accumulated through the weathering of rocks and slowly change it into a natural body that has genetically related horizons. The effects of climate and vegetation are conditioned by relief. Parent material also affects the kind of profile that can be formed and, in extreme cases, determines it almost entirely. Finally, time is needed for the changing of the parent material into a soil profile. The time may be long or short, but some time is always required for differentiation of horizons. Generally, a long time is required for the development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects that few generalizations can be made regarding the effects of any one unless conditions are specified for the other four.

Climate

Osage County has a moist subhumid climate. The climate is fairly uniform throughout the county, and differences among soils cannot be attributed to differences in climate based on the present climatic regime. Moisture and warm temperatures have been sufficient to promote the formation of distinct layers in many of the soils. Soil leaching is moderate. The physical abrasion and redistribution of materials by wind action contributes to soil formation. Cold temperatures occur often enough and long enough to alter materials because of the forces of freezing and thawing.

Living Organisms

Plants, burrowing animals, insects, and soil micro-organisms have a direct influence on the formation of soils. The native grasses and trees in the county have

had different effects on the losses and gains of organic matter and plant nutrients and on the soil structure and porosity. Soils that formed under prairie vegetation, such as those of the Bethany and Norge series have a dark grayish brown surface layer and a moderately high content of organic matter. Soils that formed under trees, such as those of the Bigheart and Bartlesville soil series, have a brown surface layer and a low content of organic matter.

Topography

Relief influences the formation of the soils mainly through its effect on movement of water, erosion, soil temperature, and the kind of plant cover. In Osage County, relief is determined largely by the resistance of underlying formations to weathering and geological erosion. The topography of the southern third of Osage County is rolling to hilly uplands with long narrow, very gently sloping to moderately sloping summits. The drainage deeply dissects the uplands forming broad gently sloping to steep side slopes with narrow flood plains. Native vegetation is prairie and post oak and blackjack oak savannah with an understory of tall and mid grasses. The northern two thirds of Osage County is nearly level to rolling uplands with broad nearly level and very gently sloping summits. Native vegetation is prairies of mid and tall grasses.

Parent Material

Soils form in unconsolidated material that influences the rate of formation; the chemical, physical, and mineral composition of the soil; and the color of the soil. Soils on the uplands in Osage County formed in material weathered from alluvium, sandstone, and shale. Examples of soils that formed in shale are Foraker and Grainola series. Soils that formed in sandstone are Bigheart, Lucien, Bartlesville, and Coyle series.

Alluvial sediment is extensive along streams and rivers of the county. The kind of sediment deposited and the kinds of soil that formed in it depend largely on the source of the sediment and the velocity of the streams. Soils formed in ancient fluvial sediments include Norge, Bethany, Teller, and Okemah series. Soils formed in recent fluvial sediments are Ashport, Port, Pulaski, and Gaddy series.

Time

As a factor in soil formation, time is difficult to measure strictly in years. The length of time needed for development of genetic horizons depends on the intensity and the interactions of soil-forming factors in promoting the losses, gains, transfers, or transformations of the constituents necessary in forming soil horizons. Soils that have no definite genetic horizons are young or immature. Mature or older soils have approached equilibrium with their environment and tend to have well-defined horizons.

The soils in Osage County range from young to old. Bethany and Dennis soils are examples of old soils. Coyle and Teller soils are younger, but they have well-expressed horizons. The Bigheart and Shidler soils are considered young soils. They have had sufficient time to develop well-expressed horizons; but, because they are sloping, geological erosion has taken away soil material almost as fast as it is formed. Ashport and Pulaski soils are young soils that formed in recent sediments on flood plains and show little horizon development.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1999 and 2003). 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. 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 Mollisol.

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 Ustoll (Ust, meaning dry, plus oll, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Argiustolls (Argi, meaning argillic horizonation, plus ustoll, the suborder of the Mollisols that has an ustic moisture regime).

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

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 class, mineral content, temperature regime, thickness of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, active, thermic Udic Argiustolls.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series. An example is Teller.

Table 5.--Classification of the Soils

Soil name	Family or higher taxonomic class
Agra	Fine, mixed, superactive, thermic Udertic Paleustolls
Apperson	Fine, smectitic, thermic Aquic Hapluderts
Ashport	Fine-silty, mixed, superactive, thermic Fluventic Haplustolls
Barnsdall	Fine-silty, mixed, active, thermic Ultic Hapludalfs
Bartlesville	Fine-loamy, siliceous, active, thermic Oxyaquic Hapludalfs
Bates	Fine-loamy, siliceous, active, thermic Typic Argiudolls
Bethany	Fine, mixed, superactive, thermic Pachic Paleustolls
Bigheart	Loamy, siliceous, active, thermic Lithic Eutrudepts
Braman	Fine-silty, mixed, superactive, thermic Pachic Argiustolls
Catoosa	Fine-silty, mixed, superactive, thermic Typic Argiudolls
Cleora	Coarse-loamy, mixed, active, thermic Fluventic Hapludolls
Coweta	Loamy, siliceous, superactive, thermic, shallow Typic Hapludolls
Coyle	Fine-loamy, siliceous, active, thermic Udic Argiustolls
Dennis	Fine, mixed, active, thermic Aquic Argiudolls
Doolin	Fine, smectitic, thermic Typic Natrustolls
Dougherty	Loamy, mixed, active, thermic Arenic Haplustalfs

Table 5.--Classification of the Soils--Continued

Soil name	Family or higher taxonomic class
Drummond	Fine, mixed, superactive, thermic Mollic Natrustalfs
Dwight	Fine, smectitic, mesic Typic Natrustolls
Easpur	Fine-loamy, mixed, superactive, thermic Fluventic Haplustolls
Eram	Fine, mixed, active, thermic Aquic Argiudolls
Eufaula	Siliceous, thermic Psammentic Paleustalfs
Foraker	Fine, smectitic, thermic Udertic Argiustolls
Gaddy	Sandy, mixed, thermic Udic Ustifluvents
Grainola	Fine, mixed, active, thermic Udertic Haplustalfs
Grant	Fine-silty, mixed, superactive, thermic Udic Argiustolls
Harrah	Fine-loamy, siliceous, active, thermic Ultic Paleustalfs
Huska	Fine, mixed, superactive, thermic Mollic Natrustalfs
Kamie	Fine-loamy, mixed, active, thermic Typic Paleudalfs
Keokuk	Coarse-silty, mixed, superactive, thermic Fluventic Haplustolls
Konawa	Fine-loamy, mixed, active, thermic Ultic Haplustalfs
Lightning	Fine, mixed, active, thermic Chromic Vertic Epiaqualfs
Lucien	Loamy, mixed, superactive, thermic, shallow Udic Haplustolls
Lula	Fine-silty, mixed, active, thermic Typic Argiudolls
Mason	Fine-silty, mixed, active, thermic Pachic Argiudolls
Minco	Coarse-silty, mixed, superactive, thermic Udic Haplustolls
Mulhall	Fine-loamy, siliceous, active, thermic Udic Paleustolls
Niotaze	Fine, smectitic, thermic Albaquic Hapludalfs
Norge	Fine-silty, mixed, active, thermic Udic Paleustolls
Okemah	Fine, mixed, active, thermic Aquic Paleudolls
Osage	Fine, smectitic, thermic Typic Epiaquerts
Parsons	Fine, mixed, active, thermic Mollic Albaqualfs
Pawhuska	Fine, mixed, superactive, thermic Mollic Natrustalfs
Pharoah	Fine, mixed, superactive, thermic Vertic Argiaquolls
Pocasset	Coarse-loamy, mixed, superactive, thermic Fluventic Haplustolls
Port	Fine-silty, mixed, superactive, thermic Cumulic Haplustolls
Prue	Fine-loamy, siliceous, active, thermic Mollic Paleudalfs
Pulaski	Coarse-loamy, mixed, superactive, nonacid, thermic Udic Ustifluvents
Radley	Fine-silty, mixed, active, thermic Fluventic Hapludolls
Shidler	Loamy, mixed, active, thermic Lithic Haplustolls
Steedman	Fine, smectitic, thermic Udertic Haplustalfs
Talihina	Clayey, mixed, active, thermic, shallow Aquic Hapludolls
Tearney	Clayey over sandy or sandy-skeletal, mixed, superactive, thermic Fluventic Hapludolls
Teller	Fine-loamy, mixed, active, thermic Udic Argiustolls
Tribbey	Coarse-loamy, mixed, superactive, nonacid, thermic Oxyaquic Udifluvents
Ustibuck	Fine, smectitic, thermic Ustic Epiaquerts
Vanoss	Fine-silty, mixed, superactive, thermic Udic Argiustolls
Verdigris	Fine-silty, mixed, superactive, thermic Cumulic Hapludolls
Westsum	Fine, mixed, active, thermic Udertic Argiustolls
Wolco	Fine, mixed, active, thermic Pachic Argiustolls
Wynona	Fine-silty, mixed, active, thermic Cumulic Epiaquolls
Yahola	Coarse-loamy, mixed, superactive, calcareous, thermic Udic Ustifluvents
Zaneis	Fine-loamy, siliceous, active, thermic Udic Argiustolls

References

United States Department of Agriculture. 1979. Soil Survey of Osage County, Oklahoma.

United States Department of Agriculture, Natural Resources Conservation Service. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Soil Survey Staff. U. S. Department of Agriculture Handbook 436.

United States Department of Agriculture, Natural Resources Conservation Service. 1998. Keys to soil taxonomy. 8th edition. Soil Survey Staff.

United States Department of Agriculture, Soil Conservation Service. 1993. Soil survey manual. U.S. Department of Agriculture Handbook 18.

Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as gravel, 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.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

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

Back slope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Back slopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

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.

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts, the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

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.

Butte. An isolated small mountain or hill with steep or precipitous sides and a top variously flat, rounded, or pointed that may be a residual mass isolated by erosion or an exposed volcanic neck.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.

Canyon. A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high local relief.

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 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.

Cemented. Material in an air-dry test specimen that does not slake after being immersed in water for 1 hour. Cemented soil material has a brittle, hard consistence caused by some cementing agent other than clay. Calcium carbonate, silica, or oxides or salts of iron and aluminum are common cementing materials.

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 channer.

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.

Clayey soil. Silty clay, sandy clay, or clay.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax 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.

Closed depression. A low area completely surrounded by higher ground and having no natural outlet.

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.

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.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

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."

Consolidated sandstone. Sandstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry, are not easily crushed, and cannot be textured by the usual field method.

Consolidated shale. Shale that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

Consolidated siltstone. Siltstone that disperses within a few hours when fragments are placed in water. The fragments are extremely hard or very hard when dry and are not easily crushed.

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.

Coppice dune. A small dune of fine grained soil material stabilized around shrubs or small trees.

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.

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.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, 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 rock (in tables). Bedrock is too near the surface for the specified use.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage Class (natural). Refers to the frequency and duration of 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.

Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

Dune. A mound, ridge, or hill of loose, windblown granular material (generally sand), either bare or covered with vegetation.

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.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

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.

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.

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.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called normal field capacity, normal moisture capacity, or capillary capacity.

Fine textured soil. Sandy clay, silty clay, or clay.

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.

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.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

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. Very gravelly soil material has 35 to 60 percent of these rock fragments, and extremely gravelly soil material has more than 60 percent.

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.

Gypsum. A mineral consisting of hydrous calcium sulfate.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Heavy metal. Inorganic substances that are solid at ordinary temperatures and are not soluble in water. They form oxides and hydroxides that are basic. Examples are copper, iron, cadmium, zinc, manganese, lead, and arsenic.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

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.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

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.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

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.

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.

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.

Mesa. A broad, nearly flat topped and commonly isolated upland mass characterized by summit widths that are more than the heights of bounding erosional scarps.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Microhigh. An area that is 2 to 12 inches higher than the adjacent microlow.

Microlow. An area that is 2 to 12 inches lower than the adjacent microhigh.

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).

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

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.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value between 6.6 and 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.

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

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.

Pebble. See Gravel.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher lying areas of the erosion surface.

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:

Impermeable	less than 0.0015 inch
Very slow	0.0015 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.

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas. Temporary flooding occurs primarily in response to precipitation and runoff.

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.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

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

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

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.

Relict stream terrace. One of a series of platforms in or adjacent to a stream valley that formed prior to the current stream system.

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.

Ridge. A long, narrow elevation of the land surface. It generally is sharp crested and forms an extended upland between valleys.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Riser. The relatively short, steeply sloping area below a terrace tread that grades to a lower terrace tread or base level.

Riverwash. Unstable areas of sandy, silty, clayey, or gravelly sediments. These areas are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

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.

Rubble land. Areas that have more than 90 percent of the surface covered by stones or boulders. Voids contain no soil material and virtually no vegetation other than lichens. The areas commonly are at the base of mountain slopes, but some are on mountain slopes as deposits of cobbles, stones, and boulders left by Pleistocene glaciation or by periglacial phenomena.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs the growth of plants. A saline soil does not contain excess exchangeable sodium.

Salinity. The electrical conductivity of a saline soil. It is expressed, in millimhos per centimeter, as follows:

Nonsaline	< 2
Very slight	2 to 4
Slight	4 to 8
Moderate	8 to 16
Strong	> 16

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.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

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.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.

Sediment. Solid, clastic material, both mineral and organic, that is in suspension, is being transported or has been moved from its site of origin by water, wind, ice, or mass wasting, and has come to rest on the earth's surface either above or below sea level.

Sedimentary plain. An extensive nearly level to gently rolling or moderately sloping area that is underlain by sedimentary bedrock and that has a slope of 0 to 8 percent.

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.

Sedimentary uplands. Land areas of bedrock formed from water- or wind-deposited sediments. They are higher on the landscape than the flood plain.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Semiconsolidated sedimentary beds. Soft geologic sediments that disperse when fragments are placed in water. The fragments are hard or very hard when dry. Determining the texture by the usual field method is difficult.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. 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 slope. The uppermost inclined surface at the top of a hillside. It is the transition zone from the back slope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is silty or clayey, is slippery when wet, and is low in productivity.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

Nearly level	0 to 1 percent
Very gently sloping	1 to 3 percent
Gently sloping	3 to 5 percent
Moderately sloping	5 to 8 percent
Strongly sloping	8 to 12 percent
Moderately steep	12 to 20 percent
Steep	20 to 40 percent
Very steep	45+ percent

Classes for complex slopes are as follows:

Nearly level	0 to 3 percent
Gently undulating	1 to 5 percent
Undulating	1 to 8 percent
Rolling	5 to 10 percent
Strongly rolling	5 to 16 percent
Hilly	10 to 30 percent
Steep	20 to 45 percent
Very steep	45+ percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

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.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^{+} to Ca^{++} + Mg^{++}. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13 to 30:1
Strong	more than 30:1

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 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.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter 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.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

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.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are: platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grain (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

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. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

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.

Tailwater. The water directly downstream of a structure.

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 is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

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

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Trafficability. The degree to which a soil is capable of supporting vehicular traffic across a wide range in soil moisture conditions.

Tread. The relatively flat terrace surface that was cut or built by stream or wave action.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Valley fill. Alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

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.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

NRCS Accessibility Statement

The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.